



OFFICE OF THE DIRECTOR, NATIONAL INSTITUTES OF HEALTH

Grant Number: 5P51OD011107-58
FAIN: P51OD011107

Principal Investigator(s):
Prasant Mohapatra

Project Title: California National Primate Research Center

Ahmad Hakim-Elahi
UNIVERSITY OF CALIFORNIA AT DAVIS
1850 RESEARCH PARK DRIVE
SUITE 300
DAVIS, CA 956186153

Award e-mailed to: awards@ucdavis.edu

Period Of Performance:

Budget Period: 05/01/2019 – 04/30/2020

Project Period: 05/01/1997 – 04/30/2023

Dear Business Official:

The National Institutes of Health hereby awards a grant in the amount of \$11,401,866 (see "Award Calculation" in Section I and "Terms and Conditions" in Section III) to Regents of the University of California in support of the above referenced project. This award is pursuant to the authority of 42 USC 241 42 CFR 52 and is subject to the requirements of this statute and regulation and of other referenced, incorporated or attached terms and conditions.

Acceptance of this award including the "Terms and Conditions" is acknowledged by the grantee when funds are drawn down or otherwise obtained from the grant payment system.

Each publication, press release, or other document about research supported by an NIH award must include an acknowledgment of NIH award support and a disclaimer such as "Research reported in this publication was supported by the Office Of The Director, National Institutes Of Health of the National Institutes of Health under Award Number P51OD011107. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health." Prior to issuing a press release concerning the outcome of this research, please notify the NIH awarding IC in advance to allow for coordination.

Award recipients must promote objectivity in research by establishing standards that provide a reasonable expectation that the design, conduct and reporting of research funded under NIH awards will be free from bias resulting from an Investigator's Financial Conflict of Interest (FCOI), in accordance with the 2011 revised regulation at 42 CFR Part 50 Subpart F. The Institution shall submit all FCOI reports to the NIH through the eRA Commons FCOI Module. The regulation does not apply to Phase I Small Business Innovative Research (SBIR) and Small Business Technology Transfer (STTR) awards. Consult the NIH website <http://grants.nih.gov/grants/policy/coi/> for a link to the regulation and additional important information.

If you have any questions about this award, please contact the individual(s) referenced in Section IV.

Sincerely yours,

Gavin Wilkom
Grants Management Officer
OFFICE OF THE DIRECTOR, NATIONAL INSTITUTES OF HEALTH

Additional information follows

SECTION I – AWARD DATA – 5P51OD011107-58**Award Calculation (U.S. Dollars)**

Salaries and Wages	\$2,559,452
Fringe Benefits	\$995,626
Personnel Costs (Subtotal)	\$3,555,078
Equipment	\$582,399
Travel	\$78,376
Other	\$4,876,884
Subawards/Consortium/Contractual Costs	\$315,195

Federal Direct Costs	\$9,407,932
Federal F&A Costs	\$1,993,934
Approved Budget	\$11,401,866
Total Amount of Federal Funds Obligated (Federal Share)	\$11,401,866
TOTAL FEDERAL AWARD AMOUNT	\$11,401,866

AMOUNT OF THIS ACTION (FEDERAL SHARE) **\$11,401,866**

SUMMARY TOTALS FOR ALL YEARS		
YR	THIS AWARD	CUMULATIVE TOTALS
58	\$11,401,866	\$11,401,866
59	\$11,401,861	\$11,401,861
60	\$11,401,854	\$11,401,854
61	\$11,401,860	\$11,401,860

Recommended future year total cost support, subject to the availability of funds and satisfactory progress of the project

Fiscal Information:

CFDA Name: Research Infrastructure Programs
 CFDA Number: 93.351
 EIN: 1946036494A1
 Document Number: POD011107K
 PMS Account Type: P (Subaccount)
 Fiscal Year: 2019

IC	CAN	2019	2020	2021	2022
OD	8014499	\$11,263,864	\$11,263,859	\$11,263,852	\$11,263,858
AG	8470701	\$138,002	\$138,002	\$138,002	\$138,002

Recommended future year total cost support, subject to the availability of funds and satisfactory progress of the project

NIH Administrative Data:

PCC: CMP01 / OC: 414E / Released: 05/22/2019
 Award Processed: 05/23/2019 12:13:32 AM

SECTION II – PAYMENT/HOTLINE INFORMATION – 5P51OD011107-58

For payment and HHS Office of Inspector General Hotline information, see the NIH Home Page at <http://grants.nih.gov/grants/policy/awardconditions.htm>

SECTION III – TERMS AND CONDITIONS – 5P51OD011107-58

This award is based on the application submitted to, and as approved by, NIH on the above-titled project and is subject to the terms and conditions incorporated either directly or by reference in the following:

- The grant program legislation and program regulation cited in this Notice of Award.
- Conditions on activities and expenditure of funds in other statutory requirements, such as those included in appropriations acts.

- c. 45 CFR Part 75.
- d. National Policy Requirements and all other requirements described in the NIH Grants Policy Statement, including addenda in effect as of the beginning date of the budget period.
- e. Federal Award Performance Goals: As required by the periodic report in the RPPR or in the final progress report when applicable.
- f. This award notice, INCLUDING THE TERMS AND CONDITIONS CITED BELOW.

(See NIH Home Page at <http://grants.nih.gov/grants/policy/awardconditions.htm> for certain references cited above.)

Research and Development (R&D): All awards issued by the National Institutes of Health (NIH) meet the definition of "Research and Development" at 45 CFR Part§ 75.2. As such, auditees should identify NIH awards as part of the R&D cluster on the Schedule of Expenditures of Federal Awards (SEFA). The auditor should test NIH awards for compliance as instructed in Part V, Clusters of Programs. NIH recognizes that some awards may have another classification for purposes of indirect costs. The auditor is not required to report the disconnect (i.e., the award is classified as R&D for Federal Audit Requirement purposes but non-research for indirect cost rate purposes), unless the auditee is charging indirect costs at a rate other than the rate(s) specified in the award document(s).

This institution is a signatory to the Federal Demonstration Partnership (FDP) Phase VI Agreement which requires active institutional participation in new or ongoing FDP demonstrations and pilots.

Carry over of an unobligated balance into the next budget period requires Grants Management Officer prior approval.

This award is subject to the requirements of 2 CFR Part 25 for institutions to receive a Dun & Bradstreet Universal Numbering System (DUNS) number and maintain an active registration in the System for Award Management (SAM). Should a consortium/subaward be issued under this award, a DUNS requirement must be included. See <http://grants.nih.gov/grants/policy/awardconditions.htm> for the full NIH award term implementing this requirement and other additional information.

This award has been assigned the Federal Award Identification Number (FAIN) P51OD011107. Recipients must document the assigned FAIN on each consortium/subaward issued under this award.

This award is not subject to the Transparency Act subaward and executive compensation reporting requirement of 2 CFR Part 170.

In accordance with P.L. 110-161, compliance with the NIH Public Access Policy is now mandatory. For more information, see NOT-OD-08-033 and the Public Access website: <http://publicaccess.nih.gov/>.

This award is funded by the following list of institutes. Any papers published under the auspices of this award must cite the funding support of all institutes.

Office Of The Director, National Institutes Of Health (OD)
National Institute On Aging (NIA)

In accordance with the regulatory requirements provided at 45 CFR 75.113 and Appendix XII to 45 CFR Part 75, recipients that have currently active Federal grants, cooperative agreements, and procurement contracts with cumulative total value greater than \$10,000,000 must report and maintain information in the System for Award Management (SAM) about civil, criminal, and administrative proceedings in connection with the award or performance of a Federal award that reached final disposition within the most recent five-year period. The recipient must also make

semiannual disclosures regarding such proceedings. Proceedings information will be made publicly available in the designated integrity and performance system (currently the Federal Awardee Performance and Integrity Information System (FAPIIS)). Full reporting requirements and procedures are found in Appendix XII to 45 CFR Part 75. This term does not apply to NIH fellowships.

Treatment of Program Income:

Additional Costs

SECTION IV – OD Special Terms and Conditions – 5P51OD011107-58

Clinical Trial Indicator: No

This award does not support any NIH-defined Clinical Trials. See the NIH Grants Policy Statement Section 1.2 for NIH definition of Clinical Trial.

SUBJECT FOA

This award is subject to the conditions set forth in PA/RFA PAR17-144, "Limited Competition: National Primate Research Centers (P51)", which are hereby incorporated by reference as special terms and conditions of this award. Copies of this Funding Opportunity Announcement can be found at the following link: <https://grants.nih.gov/grants/guide/pa-files/PA17-144.html> .

ORIP FUNDING PLAN FOR FY2019

This non-competing award reflects the NIH Fiscal Policy for Grant Awards for FY2019 (see NIH Guide Notice NOT-19-031) and the implementation of the ORIP FY2019 grants funding policy: <https://orip.nih.gov/funding/awards-funding-policy>

CO-FUNDING

This award reflects support from the Office of Research Infrastructure Programs (ORIP/OD/DPCPSI) in the amount of \$11,263,864 total costs and from the National Institute on Aging in the amount of \$138,002 total costs.

KEY PERSONNEL

In addition to the PI, the following individuals are named as key personnel (individuals who have effort that ORIP staff is tracking):

Redacted by agreement

Written prior approval is required if any of the individual(s) named above withdraws from the project entirely, is absent from the project during any continuous period of 3 months or more, or reduces time devoted to the project by 25 percent or more from the level that was approved at the time of award.

OTHER SUPPORT

The grantee institution is responsible for adjusting the effort as needed of any personnel participating on this award so that at no time any individual(s) total effort exceeds 12 CM.

CONSORTIUM

This award includes funds awarded for subcontractual/consortium activity with ARIZONA STATE UNIVERSITY in the amount of \$35,159 total costs. Consortia are to be established and administered as described in the NIH Grants Policy Statement (NIH GPS). The referenced section of the NIH GPS, Part II Chapter 15 is available at: <http://grants.nih.gov/grants/policy/nihgps/nihgps.pdf> .

CONSULTANT FUNDS INCREASE

Funds in the amount of \$6720.00 Direct Costs plus associated F&A have been added to support pay increases to personnel (Positions: Senior Technical Developer and Support Resource and Senior Business Analyst/Website Developer/Support Resource) for the Project Management and Informatics Group (PMIG). These funds may not be rebudgeted without the prior approval.

PRIOR APPROVAL REQUEST

Any prior approval request (e.g., changes to key personnel as noted on the award, changes in human and animal subjects requiring prior approval, carryover requests) must be submitted to the assigned Grants Management Specialist and Programmatic Official. Please refer to Part II

ANNUAL FEDERAL FINANCIAL REPORT REQUIREMENT

An annual Federal Financial Report (FFR, SF 425) is required on this award no later than 90 days after the end of the calendar quarter in which the budget period ends. The FFR must be submitted electronically through the NIH eRA Commons, available at <https://commons.era.nih.gov/commons/>. Additional information on electronic submission of FFRs is available at the Commons eRA Homepage or by contacting the eRA Helpdesk at: commons@od.nih.gov or (866) 504-9552.

STEM CELLS

This award involves the use of human embryonic stem cells (hESCs). The grantee may use only those hESCs that appear on the NIH Human Embryonic Stem Cell Registry as eligible for NIH funding (http://grants.nih.gov/stem_cells/registry/current.htm) and in accord with any restrictions placed on the use of those lines. No funds in this award may be used for any research involving human embryonic stem cells (hESCs) until the grantee has submitted to NIH information on the specific, approved hESC line(s) that will be used from the NIH Human Embryonic Stem Cell Registry http://grants.nih.gov/stem_cells/registry/current.htm). While the Registry will include lines pending review; only those hESCs listed on the Registry as eligible for NIH funding may be used in this award. Information should be submitted from an Authorized Organizational Representative to the assigned Grants Management Specialist noted below. For more information on the requirements regarding use of Human Embryonic Stem Cell (hESC) lines, see: <http://stemcells.nih.gov/info>.

INTRAMURAL RESEARCH PROGRAM INVOLVEMENT

Based upon the application submitted on 05/23/2017, involvement of the following Intramural Research Program Investigators from National Cancer Institute are approved:

Genovefa Franchini
Jeffrey Lifson

NON-COMPETING RENEWAL (NON-SNAP)

The NIH requires the use of the Research Performance Progress Report (RPPR) for all Type 5 progress reports. The RPPR and other documents applicable to this Non-SNAP grant are due the first of the month preceding the month in which the budget period ends (e.g., if the budget period ends 11/30, the due date is 10/1). Please see <http://grants.nih.gov/grants/rppr/index.htm> for additional information on the RPPR.

COMMUNICATIONS/PRESS RELEASE

If the grantee plans to issue a press release concerning the outcome of ORIP grant-supported research, it should notify Ms. Patricia Newman, ORIP Communications at 301-435-0744, in advance to allow for coordination.

The ORIP WWW home page is at <https://orip.nih.gov/>.

STAFF CONTACTS

The Grants Management Specialist is responsible for the negotiation, award and administration of this project and for interpretation of Grants Administration policies and provisions. The Program Official is responsible for the scientific, programmatic and technical aspects of this project. These individuals work together in overall project administration. Prior approval requests (signed by an Authorized Organizational Representative) should be submitted in writing to the Grants Management Specialist. Requests may be made via e-mail.

Grants Management Specialist: Stephanie Blackford
Email: stephanie.page@nih.gov **Phone:** 301-402-6737

Program Official: Sheri Ann Hild
Email: hildsa@mail.nih.gov **Phone:** 301-435-8382 **Fax:** 301-402-4104

SPREADSHEET SUMMARY

GRANT NUMBER: 5P51OD011107-58

INSTITUTION: Regents of the University of California

Budget	Year 58	Year 59	Year 60	Year 61
Salaries and Wages	\$2,559,452	\$2,571,757	\$2,571,757	\$2,571,757
Fringe Benefits	\$995,626	\$1,083,138	\$1,083,138	\$1,083,138
Personnel Costs (Subtotal)	\$3,555,078	\$3,654,895	\$3,654,895	\$3,654,895
Consultant Services		\$468,168	\$468,168	\$468,168
Equipment	\$582,399	\$582,424	\$582,449	\$582,421
Materials & Supplies		\$4,086,148	\$4,086,122	\$4,086,150
Travel	\$78,376	\$78,437	\$78,437	\$78,437
Other	\$4,876,884	\$502,701	\$502,701	\$502,701
Subawards/Consortium/Contractual Costs	\$315,195	\$35,159	\$35,159	\$35,159
TOTAL FEDERAL DC	\$9,407,932	\$9,407,932	\$9,407,931	\$9,407,931
TOTAL FEDERAL F&A	\$1,993,934	\$1,993,929	\$1,993,923	\$1,993,929
TOTAL COST	\$11,401,866	\$11,401,861	\$11,401,854	\$11,401,860

Facilities and Administrative Costs	Year 58	Year 59	Year 60	Year 61
F&A Cost Rate 1	22.7%	22.7%	22.7%	22.7%
F&A Cost Base 1	\$8,783,851	\$8,783,826	\$8,783,800	\$8,783,828
F&A Costs 1	\$1,993,934	\$1,993,929	\$1,993,923	\$1,993,929

A. OVERALL COVER PAGE

Project Title: California National Primate Research Center	
Grant Number: 5P51OD011107-58	Project/Grant Period: 05/01/1997 - 04/30/2023
Reporting Period: 07/09/2018 - 04/30/2019	Requested Budget Period: 05/01/2019 - 04/30/2020
Report Term Frequency: Annual	Date Submitted: 02/27/2019
Program Director/Principal Investigator Information: PRASANT MOHAPATRA , BS MS PHD Phone number: 530-754-7764 Email: pmohapatra@ucdavis.edu	Recipient Organization: UNIVERSITY OF CALIFORNIA AT DAVIS UNIVERSITY OF CALIFORNIA DAVIS OFFICE OF RESEARCH - SPONSORED PROGRAMS DAVIS, CA 956186153 DUNS: 047120084 EIN: 1946036494A1 RECIPIENT ID:
Change of Contact PD/PI: N/A	
Administrative Official: JINGER SNYDER 1850 Research Park Dr Suite 300 Davis, CA 95618 Phone number: 530-754-8091 Email: jssnyder@ucdavis.edu	Signing Official: AHMAD HAKIMELAHI 1850 Research Park Drive Suite 300 Davis, CA 95618 Phone number: (530) 747-3828 Email: ahakimelahi@ucdavis.edu
Human Subjects: No	Vertebrate Animals: Yes
hESC: Yes	Inventions/Patents: No

B. OVERALL ACCOMPLISHMENTS

B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?

The California National Primate Research Center (CNPRC) is one of seven NPRCs that together represent a "National network of dedicated teams fighting diseases from Alzheimer's to Zika and improving human health and lives worldwide". The recent hire of the CNPRC Director and the University's major commitment to recruitment of Core Scientists to the CNPRC present an extraordinary opportunity for rejuvenation and expansion of our infrastructure, resources, animal care programs, and research portfolio. Our vision and growth remain guided by our Mission: "To improve human health and quality of life through support of exceptional nonhuman primate research programs". The CNPRC base grant renewal reflects a strategic commitment to expand and strengthen current areas of emphasis as well as the development of new areas of research focus that are consistent with this Mission. We will continue to emphasize team science aimed at major human health problems across the lifespan, and with the goal of moving beyond traditional interdisciplinary efforts to true convergence on the problem being addressed. Success will require the highest quality nonhuman primate (NHP) colonies, state-of-the-art services and cores, a strong intellectual infrastructure provided by the Core Scientists, as well as careful financial planning. These crucial factors are all designed to promote optimal research opportunities through robust research collaborations including with Affiliate Scientists at a range of academic institutions nationally, and with industry partnerships. The goals for the next funding period are reflected in the following Specific Aims:

Specific Aim 1. Conduct state-of-the-art research and scientifically contribute to the understanding and treatment of human disease with NHP models across the age spectrum. The overriding objective is to advance the CNPRC resource through the highest quality research within the facility and to foster and facilitate robust internal and external collaborations that promote our role as a translational hub for research across the lifespan. Our primary foci are Neuroscience and Behavior; Infectious Diseases; Reproductive Sciences and Regenerative Medicine; and Respiratory Diseases. Each research unit will benefit from ongoing recruitments that will strengthen current research priorities and expand into new critically important arenas. Recruitments and establishing priorities are guided by four principles: 1) the NHP is uniquely well-suited to the question under investigation, 2) critically important health problem is being addressed, 3) the research is attractive to federal funding agencies, and 4) translation is feasible.

Specific Aim 2. Provide exceptional NHP expertise and services to investigators at the local, regional, and national levels to advance NIH-supported research excellence. Our Core Scientists serve a critically important role in establishing collaborations that facilitate NHP research across academic institutions including UC Davis and with industry partners. Interactions with UC Davis colleagues are greatly facilitated by the fact that our Core Scientists have academic appointments in one of the Colleges or Schools within UC Davis. Collaborative programs at the regional and national levels are facilitated by our Unit Leaders, Core Facilities, veterinarians, and technical staff with expertise in NHP research, and a centralized administration that coordinates funding and access to the facilities. We will maintain a supportive environment that provides unique opportunities for collaborative research, training, pilot projects, new NIH grants, and public-private partnerships.

Specific Aim 3. Mentor and train the next generation of translational investigators with NHP expertise. A central mission is to mentor and train new investigators, veterinarians, and technicians at all career stages to participate in, lead, and support NHP research aimed at improving human health.

Specific Aim 4. Ensure the highest standards of responsible conduct of research and animal care. The CNPRC is dedicated to excellence in NHP research design, veterinary care, and colony management, with multiple model programs that address the physical, medical, and psychological needs of our NHPs. Our over-arching goal is to achieve translational impact through the development of convergent biomedical programs housed at the CNPRC and through collaborative teams that reach out nationally and globally. We are committed to developing and providing research opportunities that maximize the use of the NHP model to improve human health.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File uploaded: Overall Accomplishments.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

For this reporting period, is there one or more Revision/Supplement associated with this award for which reporting is required?

Yes

Revision/ Supplements #	Revision/ Supplements Title	Specific Aims	Accomplishments
Supplement 3	A Tau-Based Monkey Model of Alzheimer's Disease	A novel model with an independent mechanism in which we inject an AAV vector encoding for mutant tau into the	The project has perfected several quantitative microscopy techniques that will be employed to analyze the

		<p>monkey entorhinal cortex. We expect this model to be more powerful than, but complementary to, the model with respect to the degenerative phase of AD characterized by transport of tau aggregates and NFT formation linked to neuron death. Based upon our success with the model in monkey, and success with the tau model in rodents, we are poised and confident that we can model the critical degenerative phase of AD in rhesus monkeys.</p>	<p>brains of our tau-based AD monkeys upon sacrifice. In addition, a collaboration with [Redacted by] at the University of Florida to obtain AAV vectors expressing a double tau mutant in human tau. January 2019, we injected this vector into the entorhinal cortex of 10 monkeys. Due to the time needed for transport of the tau, we need to wait until 3 months post-injection to sacrifice 4 monkeys, and the remaining 6 will be sacrificed at 6 months after injection. Microscopic analyses will commence immediately after perfusion, but due to this timeline, we will need to extend the project.</p>
Supplement 2	Specialized Housing/Testing Facilities to Enhance Social Interactions, for additional cage units	<p>The funds requested for the purchase of additional caging units will provide new state of the art indoor group housing. As described in the Rationale the acquisition of these thirty-six group housing units will support the research programs of investigators in the Neurosciences and Behavior Unit as well as the other three CNPRC Research Units.</p>	<p>Different cage systems have been evaluated by management and investigator staff and solicitation for bids have been submitted to University purchasing. By the end of this reporting period, the group housing units will be purchased and installed.</p>
Supplement 1	Investigating the Role of T Cells in Age-Related Neurodegeneration in HIV infection	<p>Determine the role of CD4 T cells in accelerating HIV-related glial, neuronal, and synaptic alterations that lead to cognitive decline.</p>	<p>To effectively interrogate CD4 T cell responses in the brain and effectively capture dynamic changes following infection, we have optimized flow cytometry panels for multi-parameter immune phenotyping using cerebrospinal fluid. We have obtained IACUC approval, procured antiretroviral drugs, and have infectious challenges planned. By the end of the reporting period, we will have generated comprehensive kinetic analysis of CD4 T cell inflammatory profile following infection and analyzed how these dynamic changes relate to neuro inflammation. These data will critically inform understanding of key immune players in neuroinflammation following HIV infection.</p>

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

File uploaded: Overall Training.pdf

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

Our results are communicated through peer-reviewed publications, book chapters and review articles, presentations at international conferences, university-sponsored seminars, and presentations to lay audiences.

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

We have already submitted dozens of proposals seeking funding to both continue and expand our on-site and collaborative research programs, and we will continue to publish in high impact journals and train the next generation of researchers working on nonhuman primate models of disease.

B.2. What was accomplished under these goals?

The CNPRC continues to conduct state-of-the-art research in our four research units through our exemplary team of Core Scientist, Affiliate Scientists, and outside research partnerships. Our research program continues to expand with an expected \$35M+ in research expenditures in FY'18-19. As part of our mission we engage with research teams at local, regional and national levels. Our scientists and staff participate on all NIH Consortium subcommittees and other workgroups. Since our base grant renewal we have brought on several new junior investigators and they are doing exceptionally well in their career development. Several of them have received K awards, several have also received their first R01 award. This is a testament to not only their talent but the support and mentorship they have received at the CNPRC through our team of Core Scientists and research support staff. In addition, in terms of excellence we just recertified our BSL3 lab for operation and conducted one new study in that space. We are gearing up to perform the next project in that space. The certification of a BSL3 facility is rigorous and our ability to ramp this up speaks to our attention to protocols, regulations and the coordination of our research team with on campus support counterparts. In addition, our core and affiliate scientists published a large number of peer-reviewed papers in 2018, with many in high impact journals and reflecting the large collaborative efforts typical of our research programs.

B.4 What opportunities for training and professional development has the project provided?

As Director, I have partnered with one of our new junior faculty [Redacted by agreement] on a project investigating AIDS-related cognitive decline that requires expertise in both immunology and neuroscience which was awarded under the base grant supplement program. Through this project, we will be pursuing a major health problem, but also providing her exposure to myself and my team so that she can learn from our experience in the field of neuroscience. This one year supplement has already been followed up by a 5 year RO1 from NIH that greatly expands this project. In addition, the Director has partnered with another new recruit, [Redacted by agreement] on successful NIH grants in both Zika and Alzheimer's disease research.

C. OVERALL PRODUCTS

C.1 PUBLICATIONS

Are there publications or manuscripts accepted for publication in a journal or other publication (e.g., book, one-time publication, monograph) during the reporting period resulting directly from this award?

Yes

Publications Reported for this Reporting Period

Public Access Compliance	Citation
Complete	Foster B, Boutin RD, Lenchik L, Gedeon D, Liu Y, Nittur V, Badawi RD, Li CS, Canter RJ, Chaudhari AJ. Skeletal Muscle Metrics on Clinical ^{18}F -FDG PET/CT Predict Health Outcomes in Patients with Sarcoma. <i>Journal of nature and science</i> . 2018;4(5). PubMed PMID: 29756042; PubMed Central PMCID: PMC5944355.
Complete	Santos Rocha C, Hirao LA, Weber MG, Méndez-Lagares G, Chang WLW, Jiang G, Deere JD, Sparger EE, Roberts J, Barry PA, Hartigan-O'Connor DJ, Dandekar S. Subclinical cytomegalovirus infection associates with altered host immunity, gut microbiota and vaccine responses. <i>Journal of virology</i> . 2018 April 18. PubMed PMID: 29669841; PubMed Central PMCID: PMC6002712.
Complete	Lindgren AA, Filipowicz AR, Hattler JB, Kim SO, Chung HK, Kuroda MJ, Johnson EM, Kim WK. Lentiviral infection of proliferating brain macrophages in HIV and simian immunodeficiency virus encephalitis despite sterile alpha motif and histidine-aspartate domain-containing protein 1 expression. <i>AIDS (London, England)</i> . 2018 May 15;32(8):965-974. PubMed PMID: 29698322; PubMed Central PMCID: PMC5943146.
Complete	Skoog EC, Morikis VA, Martin ME, Foster GA, Cai LP, Hansen LM, Li B, Gaddy JA, Simon SI, Solnick JV. CagY-Dependent Regulation of Type IV Secretion in <i>Helicobacter pylori</i> Is Associated with Alterations in Integrin Binding. <i>mBio</i> . 2018 May 15;9(3). PubMed PMID: 29764950; PubMed Central PMCID: PMC5954226.
Complete	Chan TE, Grossman YS, Bloss EB, Janssen WG, Lou W, McEwen BS, Dumitriu D, Morrison JH. Cell-Type Specific Changes in Glial Morphology and Glucocorticoid Expression During Stress and Aging in the Medial Prefrontal Cortex. <i>Frontiers in aging neuroscience</i> . 2018 May 23;10:146. PubMed PMID: 29875653; PubMed Central PMCID: PMC5974224.
Complete	Kuroda MJ, Sugimoto C, Cai Y, Merino KM, Mehra S, Araínga M, Roy CJ, Midkiff CC, Alvarez X, Didier ES, Kaushal D. High Turnover of Tissue Macrophages Contributes to Tuberculosis Reactivation in Simian Immunodeficiency Virus-Infected Rhesus Macaques. <i>The Journal of infectious diseases</i> . 2018 May 25;217(12):1865-1874. PubMed PMID: 29432596; PubMed Central PMCID: PMC5972562.
Complete	Berg E, Zhang X, Bec J, Judenhofer MS, Patel B, Peng Q, Kapusta M, Schmand M, Casey ME, Tarantal AF, Qi J, Badawi RD, Cherry SR. Development and Evaluation of mini-EXPLORER: A Long Axial Field-of-View PET Scanner for Nonhuman Primate Imaging. <i>Journal of nuclear medicine : official publication, Society of Nuclear Medicine</i> . 2018 June;59(6):993-998. PubMed PMID: 29419483; PubMed Central PMCID: PMC6004556.
Complete	Dufour JP, Russell-Lodrigue KE, Doyle-Meyers L, Falkenstein KP, Blair RV, Didier ES, Slisarenko N, Williams KC, Kuroda MJ. Hydrocephalus after Intrathecal Administration of Dextran to Rhesus Macaques (<i>Macaca mulatta</i>). <i>Comparative medicine</i> . 2018 June 1;68(3):227-232. PubMed PMID: 29776458; PubMed Central PMCID: PMC6008720.
Complete	Freeman SM, Rebout N, Bales KL. Effect of reward type on object discrimination learning in socially monogamous coppery titi monkeys (<i>Callicebus cupreus</i>). <i>American journal of primatology</i> . 2018 June;80(6):e22868. PubMed PMID: 29756654; PubMed Central PMCID: PMC6133243.
Complete	He Z, Allers C, Sugimoto C, Ahmed N, Fujioka H, Kim WK, Didier ES, Kuroda MJ. Rapid Turnover and High Production Rate of Myeloid Cells in Adult Rhesus Macaques with Compensations during Aging. <i>Journal of immunology (Baltimore, Md. : 1950)</i> . 2018 June 15;200(12):4059-4067. PubMed PMID: 29728510; PubMed Central PMCID: PMC6263173.

Complete	Coffey LL, Keesler RI, Pesavento PA, Woolard K, Singapuri A, Watanabe J, Cruzen C, Christe KL, Usachenko J, Yee J, Heng VA, Bliss-Moreau E, Reader JR, von Morgenland W, Gibbons AM, Jackson K, Ardeshir A, Heimsath H, Permar S, Senthamaraikannan P, Presicce P, Kallapur SG, Linnen JM, Gao K, Orr R, MacGill T, McClure M, McFarland R, Morrison JH, Van Rompay KKA. Intraamniotic Zika virus inoculation of pregnant rhesus macaques produces fetal neurologic disease. <i>Nature communications</i> . 2018 June 20;9(1):2414. PubMed PMID: 29925843; PubMed Central PMCID: PMC6010452.
Complete	Zhang X, Badawi RD, Cherry SR, Qi J. Theoretical study of the benefit of long axial field-of-view PET on region of interest quantification. <i>Physics in medicine and biology</i> . 2018 June 27;63(13):135010. PubMed PMID: 29799814; PubMed Central PMCID: PMC6097617.
Complete	Berg E, Cherry SR. Innovations in Instrumentation for Positron Emission Tomography. <i>Seminars in nuclear medicine</i> . 2018 July;48(4):311-331. PubMed PMID: 29852942; PubMed Central PMCID: PMC5986096.
PMC Journal - In process	Barger N, Keiter J, Kreutz A, Krishnamurthy A, Weidenthaler C, Martinez-Cerdeño V, Tarantal AF, Noctor SC. Microglia: An Intrinsic Component of the Proliferative Zones in the Fetal Rhesus Monkey (<i>Macaca mulatta</i>) Cerebral Cortex. <i>Cerebral cortex</i> (New York, N.Y. : 1991). 2018 July 10. PubMed PMID: 29992243.
Complete	Baxter MG, Santistevan AC, Bliss-Moreau E, Morrison JH. Timing of cyclic estradiol treatment differentially affects cognition in aged female rhesus monkeys. <i>Behavioral neuroscience</i> . 2018 August;132(4):213-223. PubMed PMID: 29952604; PubMed Central PMCID: PMC6062474.
Complete	Bliss-Moreau E, Baxter MG. Estradiol treatment in a nonhuman primate model of menopause preserves affective reactivity. <i>Behavioral neuroscience</i> . 2018 August;132(4):224-229. PubMed PMID: 29952606; PubMed Central PMCID: PMC6062447.
Complete	Dudley DM, Van Rompay KK, Coffey LL, Ardeshir A, Keesler RI, Bliss-Moreau E, Grigsby PL, Steinbach RJ, Hirsch AJ, MacAllister RP, Pecoraro HL, Colgin LM, Hodge T, Streblow DN, Tardif S, Patterson JL, Tamhankar M, Seferovic M, Aagaard KM, Martín CS, Chiu CY, Panganiban AT, Veazey RS, Wang X, Maness NJ, Gilbert MH, Bohm RP, Adams Waldorf KM, Gale M Jr, Rajagopal L, Hotchkiss CE, Mohr EL, Capuano SV 3rd, Simmons HA, Mejia A, Friedrich TC, Golos TG, O'Connor DH. Miscarriage and stillbirth following maternal Zika virus infection in nonhuman primates. <i>Nature medicine</i> . 2018 August;24(8):1104-1107. PubMed PMID: 29967348; PubMed Central PMCID: PMC6082723.
Complete	Midic U, VandeVoort CA, Latham KE. Determination of single embryo sex in <i>Macaca mulatta</i> and <i>Mus musculus</i> RNA-Seq transcriptome profiles. <i>Physiological genomics</i> . 2018 August 1;50(8):628-635. PubMed PMID: 29727590; PubMed Central PMCID: PMC6139635.
Complete	Shackman AJ, Weinstein JS, Hudja SN, Bloomer CD, Barstead MG, Fox AS, Lemay EP. Dispositional negativity in the wild: Social environment governs momentary emotional experience. <i>Emotion</i> (Washington, D.C.). 2018 August;18(5):707-724. PubMed PMID: 28604044; PubMed Central PMCID: PMC5726948.
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Complete	Walker CK, VandeVoort CA, Li CS, Chaffin CL, Capitanio JP. Adiposity and weight gain during pregnancy associate independently with behavior of infant rhesus monkeys (<i>Macaca mulatta</i>). <i>Developmental psychobiology</i> . 2018 September;60(6):629-638. PubMed PMID: 29900528; PubMed Central PMCID: PMC6107411.
Complete	Baxter A, Wood EK, Jarman P, Cameron AN, Capitanio JP, Higley JD. Sex Differences in Rhesus Monkeys' Digit Ratio (2D:4D Ratio) and Its Association With Maternal

	Social Dominance Rank. <i>Frontiers in behavioral neuroscience</i> . 2018 September 21;12:213. PubMed PMID: 30297989; PubMed Central PMCID: PMC6160532.
Complete	Smit-McBride Z, Nguyen J, Elliott GW, Wang Z, McBride RA, Nguyen AT, Oltjen SL, Yiu G, Thomasy SM, Pinkerton KE, Lee ES, Cunefare D, Farsiu S, Morse LS. Effects of aging and environmental tobacco smoke exposure on ocular and plasma circulatory microRNAs in the Rhesus macaque. <i>Molecular vision</i> . 2018 September 24;24:633-646. PubMed PMID: 30294202; PubMed Central PMCID: PMC6161805.
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Complete	Curtis AD 2nd, Jensen K, Van Rompay KKA, Amara RR, Kozłowski PA, De Paris K. A simultaneous oral and intramuscular prime/sublingual boost with a DNA/Modified Vaccinia Ankara viral vector-based vaccine induces simian immunodeficiency virus-specific systemic and mucosal immune responses in juvenile rhesus macaques. <i>Journal of medical primatology</i> . 2018 October;47(5):288-297. PubMed PMID: 30204253; PubMed Central PMCID: PMC6158111.
PMC Journal - In process	Ruebel ML, Schall PZ, Midic U, Vincent KA, Goheen B, VandeVoort CA, Latham KE. Transcriptome analysis of rhesus monkey failed-to-mature oocytes: deficiencies in transcriptional regulation and cytoplasmic maturation of the oocyte mRNA population. <i>Molecular human reproduction</i> . 2018 October 1;24(10):478-494. PubMed PMID: 30085220.
Complete	Milham MP, Ai L, Koo B, Xu T, Amiez C, Balezeau F, Baxter MG, Blezer ELA, Brochier T, Chen A, Croxson PL, Damatac CG, Dehaene S, Everling S, Fair DA, Fleysher L, Freiwald W, Froudust-Walsh S, Griffiths TD, Guedj C, Hadj-Bouziane F, Ben Hamed S, Harel N, Hiba B, Jarraya B, Jung B, Kastner S, Klink PC, Kwok SC, Laland KN, Leopold DA, Lindenfors P, Mars RB, Menon RS, Messinger A, Meunier M, Mok K, Morrison JH, Nacef J, Nagy J, Rios MO, Petkov CI, Pinski M, Poirier C, Procyk E, Rajimehr R, Reader SM, Roelfsema PR, Rudko DA, Rushworth MFS, Russ BE, Sallet J, Schmid MC, Schwiedrzik CM, Seidlitz J, Sein J, Shmuel A, Sullivan EL, Ungerleider L, Thiele A, Todorov OS, Tsao D, Wang Z, Wilson CRE, Yacoub E, Ye FQ, Zarco W, Zhou YD, Margulies DS, Schroeder CE. An Open Resource for Non-human Primate Imaging. <i>Neuron</i> . 2018 October 10;100(1):61-74.e2. PubMed PMID: 30269990; PubMed Central PMCID: PMC6231397.
Complete	Phillips B, Van Rompay KKA, Rodriguez-Nieves J, Lorin C, Koutsoukos M, Tomai M, Fox CB, Eudailey J, Dennis M, Alam SM, Hudgens M, Fouda G, Pollara J, Moody A, Shen X, Ferrari G, Permar S, De Paris K. Adjuvant-Dependent Enhancement of HIV Env-Specific Antibody Responses in Infant Rhesus Macaques. <i>Journal of virology</i> . 2018 October 15;92(20). PubMed PMID: 30089691; PubMed Central PMCID: PMC6158427.
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Complete	Huang G, Cherkerzian S, Loucks EB, Buka SL, Handa RJ, Lasley BL, Bhasin S, Goldstein JM. Sex Differences in the Prenatal Programming of Adult Metabolic Syndrome by Maternal Androgens. <i>The Journal of clinical endocrinology and metabolism</i> . 2018 November 1;103(11):3945-3953. PubMed PMID: 30113645; PubMed Central PMCID: PMC6182312.
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Complete	Seelke AM, Rhine MA, Khun K, Shweyk AN, Scott AM, Bond JM, Graham JL, Havel PJ, Wolden-Hanson T, Bales KL, Blevins JE. Intranasal oxytocin reduces weight gain in diet-induced obese prairie voles. <i>Physiology & behavior</i> . 2018 November 1;196:67-77. PubMed PMID: 30144467; PubMed Central PMCID: PMC6195438.
Complete	Keeffe JR, Van Rompay KKA, Olsen PC, Wang Q, Gazumyan A, Azzopardi SA, Schaefer-Babajew D, Lee YE, Stuart JB, Singapuri A, Watanabe J, Usachenko J,

	Ardeshir A, Saeed M, Agudelo M, Eisenreich T, Bournazos S, Oliveira TY, Rice CM, Coffey LL, MacDonald MR, Bjorkman PJ, Nussenzweig MC, Robbiani DF. A Combination of Two Human Monoclonal Antibodies Prevents Zika Virus Escape Mutations in Non-human Primates. <i>Cell reports</i> . 2018 November 6;25(6):1385-1394.e7. PubMed PMID: 30403995; PubMed Central PMCID: PMC6268006.
Complete	Freeman SM, Ngo J, Singh B, Masnaghetti M, Bales KL, Blevins JE. Effects of Chronic Oxytocin Administration and Diet Composition on Oxytocin and Vasopressin 1a Receptor Binding in the Rat Brain. <i>Neuroscience</i> . 2018 November 10;392:241-251. PubMed PMID: 30071278; PubMed Central PMCID: PMC6204308.
Complete	Hur J, Kaplan CM, Smith JF, Bradford DE, Fox AS, Curtin JJ, Shackman AJ. Acute alcohol administration dampens central extended amygdala reactivity. <i>Scientific reports</i> . 2018 November 12;8(1):16702. PubMed PMID: 30420682; PubMed Central PMCID: PMC6232084.
PMC Journal - In process	Smiley Evans T, Tutaryebwa L, Gilardi KV, Barry PA, Marzi A, Eberhardt M, Ssebide B, Cranfield MR, Mugisha O, Mugisha E, Kellermann S, Mazet JAK, Johnson CK. Suspected Exposure to Filoviruses Among People Contacting Wildlife in Southwestern Uganda. <i>The Journal of infectious diseases</i> . 2018 November 22;218(suppl_5):S277-S286. PubMed PMID: 29924324.
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Complete	Reis ES, Berger N, Wang X, Koutsogiannaki S, Doot RK, Gumas JT, Foukas PG, Resuello RRG, Tuplano JV, Kukis D, Tarantal AF, Young AJ, Kajikawa T, Soulika AM, Mastellos DC, Yancopoulou D, Biglarnia AR, Huber-Lang M, Hajishengallis G, Nilsson B, Lambris JD. Safety profile after prolonged C3 inhibition. <i>Clinical immunology (Orlando, Fla.)</i> . 2018 December;197:96-106. PubMed PMID: 30217791; PubMed Central PMCID: PMC6258316.
PMC Journal - In process	Wang Z, Wang L, Tapa S, Pinkerton KE, Chen CY, Ripplinger CM. Exposure to Secondhand Smoke and Arrhythmogenic Cardiac Alternans in a Mouse Model. <i>Environmental health perspectives</i> . 2018 December;126(12):127001. PubMed PMID: 30675795.
Complete	Freeman SM, Palumbo MC, Lawrence RH, Smith AL, Goodman MM, Bales KL. Effect of age and autism spectrum disorder on oxytocin receptor density in the human basal forebrain and midbrain. <i>Translational psychiatry</i> . 2018 December 4;8(1):257. PubMed PMID: 30514927; PubMed Central PMCID: PMC6279786.
Complete	Motley SE, Grossman YS, Janssen WGM, Baxter MG, Rapp PR, Dumitriu D, Morrison JH. Selective Loss of Thin Spines in Area 7a of the Primate Intraparietal Sulcus Predicts Age-Related Working Memory Impairment. <i>The Journal of neuroscience : the official journal of the Society for Neuroscience</i> . 2018 December 5;38(49):10467-10478. PubMed PMID: 30355632; PubMed Central PMCID: PMC6284109.
PMC Journal - In process	Seelke AMH, Bond JM, Simmons TC, Joshi N, Settles ML, Stolzenberg D, Rhemtulla M, Bales KL. Fatherhood alters gene expression within the MPOA. <i>Environmental epigenetics</i> . 2018 December 12;4(4):dvy026. PubMed PMID: 30568805.
In Process at NIHMS	Noctor SC, Penna E, Shepherd H, Chelson C, Barger N, Martínez-Cerdeño V, Tarantal AF. Periventricular microglial cells interact with dividing precursor cells in the nonhuman primate and rodent prenatal cerebral cortex. <i>The Journal of comparative neurology</i> . 2018 December 15. PubMed PMID: 30552670.

In Process at NIHMS	Srinivas N, Rosen EP, Gilliland WM Jr, Kovarova M, Remling-Mulder L, De La Cruz G, White N, Adamson L, Schauer AP, Sykes C, Luciw P, Garcia JV, Akkina R, Kashuba ADM. Antiretroviral concentrations and surrogate measures of efficacy in the brain tissue and CSF of preclinical species. <i>Xenobiotica</i> ; the fate of foreign compounds in biological systems. 2018 December 17;;1-10. PubMed PMID: 30346892.
Complete	Kentner AC, Bilbo SD, Brown AS, Hsiao EY, McAllister AK, Meyer U, Pearce BD, Pletnikov MV, Yolken RH, Bauman MD. Maternal immune activation: reporting guidelines to improve the rigor, reproducibility, and transparency of the model. <i>Neuropsychopharmacology</i> : official publication of the American College of Neuropsychopharmacology. 2019 January;44(2):245-258. PubMed PMID: 30188509; PubMed Central PMCID: PMC6300528.
Complete	Perkeybile AM, Carter CS, Wroblewski KL, Puglia MH, Kenkel WM, Lillard TS, Karaoli T, Gregory SG, Mohammadi N, Epstein L, Bales KL, Connelly JJ. Early nurture epigenetically tunes the oxytocin receptor. <i>Psychoneuroendocrinology</i> . 2019 January;99:128-136. PubMed PMID: 30227351; PubMed Central PMCID: PMC6231974.
Complete	Wang Z, Aguilar EG, Luna JI, Dunai C, Khuat LT, Le CT, Mirsoian A, Minnar CM, Stoffel KM, Sturgill IR, Grossenbacher SK, Withers SS, Rebhun RB, Hartigan-O'Connor DJ, Méndez-Lagares G, Tarantal AF, Isseroff RR, Griffith TS, Schalper KA, Merleev A, Saha A, Maverakis E, Kelly K, Aljumaity R, Ibrahim S, Mukherjee S, Machiorlatti M, Vesely SK, Longo DL, Blazar BR, Canter RJ, Murphy WJ, Monjazebe AM. Paradoxical effects of obesity on T cell function during tumor progression and PD-1 checkpoint blockade. <i>Nature medicine</i> . 2019 January;25(1):141-151. PubMed PMID: 30420753; PubMed Central PMCID: PMC6324991.
Complete	Grubaugh ND, Gangavarapu K, Quick J, Matteson NL, De Jesus JG, Main BJ, Tan AL, Paul LM, Brackney DE, Grewal S, Gurfield N, Van Rompay KKA, Isern S, Michael SF, Coffey LL, Loman NJ, Andersen KG. An amplicon-based sequencing framework for accurately measuring intrahost virus diversity using PrimalSeq and iVar. <i>Genome biology</i> . 2019 January 8;20(1):8. PubMed PMID: 30621750; PubMed Central PMCID: PMC6325816.
Complete	Van Rompay KKA, Hassounah S, Keele BF, Lifson JD, Ardesir A, Watanabe J, Pham HT, Chertova E, Sowder R, Balzarini J, Mesplède T, Wainberg MA. Dolutegravir Monotherapy of Simian Immunodeficiency Virus-Infected Macaques Selects for Several Patterns of Resistance Mutations with Variable Virological Outcomes. <i>Journal of virology</i> . 2019 January 15;93(2). PubMed PMID: 30381490; PubMed Central PMCID: PMC6321921.
Complete	Hung PH, Van Winkle LS, Williams CJ, Hunt PA, VandeVoort CA. Prenatal Bisphenol A Exposure Alters Epithelial Cell Composition in the Rhesus Macaque Fetal Oviduct. <i>Toxicological sciences</i> : an official journal of the Society of Toxicology. 2019 February 1;167(2):450-457. PubMed PMID: 30295897; PubMed Central PMCID: PMC6358242.
Complete	Moshiri A, Chen R, Kim S, Harris RA, Li Y, Raveendran M, Davis S, Liang Q, Pomerantz O, Wang J, Garzel L, Cameron A, Yiu G, Stout JT, Huang Y, Murphy CJ, Roberts J, Gopalakrishna KN, Boyd K, Artemyev NO, Rogers J, Thomas SM. A nonhuman primate model of inherited retinal disease. <i>The Journal of clinical investigation</i> . 2019 February 1;129(2):863-874. PubMed PMID: 30667376; PubMed Central PMCID: PMC6355306.
Complete	Vandeleest JJ, Capitanio JP, Hamel A, Meyer J, Novak M, Mendoza SP, McCowan B. Social stability influences the association between adrenal responsiveness and hair cortisol concentrations in rhesus macaques. <i>Psychoneuroendocrinology</i> . 2019 February;100:164-171. PubMed PMID: 30342315; PubMed Central PMCID: PMC6333515.
Complete	Kovner R, Fox AS, French DA, Roseboom PH, Oler JA, Fudge JL, Kalin NH. Somatostatin Gene and Protein Expression in the Non-human Primate Central Extended Amygdala. <i>Neuroscience</i> . 2019 February 21;400:157-168. PubMed PMID: 30610938; PubMed Central PMCID: PMC6361692.
Complete	Crimins JL, Puri R, Calakos KC, Yuk F, Janssen WGM, Hara Y, Rapp PR, Morrison JH. Synaptic distributions of pS214-tau in rhesus monkey prefrontal cortex are associated with spine density, but not with cognitive decline. <i>The Journal of comparative neurology</i> . 2019 March 1;527(4):856-873. PubMed PMID: 30408169; PubMed Central PMCID: PMC6333519.

PMC Journal - In process	Dennis M, Eudailey J, Pollara J, McMillan AS, Cronin KD, Saha PT, Curtis AD, Hudgens MG, Fouda GG, Ferrari G, Alam M, Van Rompay KKA, De Paris K, Permar S, Shen X. Coadministration of CH31 Broadly Neutralizing Antibody Does Not Affect Development of Vaccine-Induced Anti-HIV-1 Envelope Antibody Responses in Infant Rhesus Macaques. Journal of virology. 2019 March 1;93(5). PubMed PMID: 30541851.
Complete	Heller AS, Fox AS, Davidson RJ. Parsing affective dynamics to identify risk for mood and anxiety disorders. Emotion (Washington, D.C.). 2019 March;19(2):283-291. PubMed PMID: 29863379; PubMed Central PMCID: PMC6279626.

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Category	Explanation
Other	The CNPRC has kept up its external and internal websites and contributed to the central NPRC website. Refer to individual components for specific websites.

C.3 TECHNOLOGIES OR TECHNIQUES

Category	Explanation
Models	We have launched an effort to develop two novel nonhuman primate models of Alzheimer's Disease. Refer to section G, SPID # 57004.

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Have inventions, patent applications and/or licenses resulted from the award during the reporting period? No

If yes, has this information been previously provided to the PHS or to the official responsible for patent matters at the grantee organization? No

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Category	Explanation
Research Material	We have continued to contribute to a comprehensive tissue bank of aged monkey organs that is available to all potential collaborators.
Other	Since the RPPR was not required for the last base grant period, we are reporting for the period May 1, 2017 through December 31, 2018. During this time, our core and affiliate faculty published 172 publications which met the standard for NIH Public Access Compliance. In addition, our core and affiliate faculty published another 32 publications which were non-compliant for the NIH Public Access Compliance standards. Our complete list of compliant and non-compliant publications for the period May 1, 2017 through December 31, 2018 are attached in Section G of this component.

D. OVERALL PARTICIPANTS

D.1 WHAT INDIVIDUALS HAVE WORKED ON THE PROJECT?

Commons ID	S/K	Name	Degree(s)	Role	Cal	Aca	Sum	Foreign Org	Component(s)	Country	SS
PMOHAPATRA	Y	Mohapatra, Prasant	BS,MS,PHD	PD/PI	EFFORT				Admin Core-6646 (ADMINISTRATION OVERVIEW (GENERALNANCE UNIT))		NA
Redacted by agreement			DVM	Postdoctoral Scholar, Fellow, or Other Postdoctoral Position					Core-6662 (PRIMATE MEDICINE SERVICES)		NA
			DVM,MPH,BS	Postdoctoral Scholar, Fellow, or Other Postdoctoral Position					Core-6663 (ANATOMIC AND CLINICAL PATHOLOGY SERVICES)		NA
			DVM	Postdoctoral Scholar, Fellow, or Other Postdoctoral Position					Core-6662 (PRIMATE MEDICINE SERVICES)		NA
			BS	Undergraduate Student					Core-6671 (INFECTIOUS DISEASES RESEARCH UNIT)		NA
			DVM	Postdoctoral Scholar, Fellow, or Other Postdoctoral Position					Core-6662 (PRIMATE MEDICINE SERVICES)		NA
			BS,DVM	Postdoctoral Scholar, Fellow, or Other Postdoctoral Position					Core-6663 (ANATOMIC AND CLINICAL PATHOLOGY SERVICES)		NA
			PHD	Postdoctoral Scholar, Fellow, or Other Postdoctoral Position					Core-6671 (INFECTIOUS DISEASES RESEARCH UNIT)		NA
			PHD,OTH,MS	Postdoctoral Scholar, Fellow, or Other Postdoctoral Position					Core-6663 (ANATOMIC AND CLINICAL PATHOLOGY SERVICES)		NA

Redacted by agreement	N	Redacted by agreement	PHD,BS, MS	Consultant	EFFORT		Core-6665 (GENETICS MANAGEMENT SERVICES)		NA
	N		DVM,BS	Postdoctoral Scholar, Fellow, or Other Postdoctoral Position			Core-6662 (PRIMATE MEDICINE SERVICES)		NA
	N			IT System Administrator			Admin Core-6649 (INFORMATION TECHNOLOGY SERVICES)		NA
	N			Technical Support			Core-6671 (INFECTIOUS DISEASES RESEARCH UNIT)		NA
	N			Lab Specialist			Core-6663 (ANATOMIC AND CLINICAL PATHOLOGY SERVICES)		NA
	N			Operations Manager			Core-6667 (INHALATION EXPOSURE CORE)		NA
	N			Business Office Manager			Admin Core-6648 (ADMINISTRATION AND OPERATIONS SERVICES)		NA
	N			HR Specialist			Admin Core-6648 (ADMINISTRATION AND OPERATIONS SERVICES)		NA
	N			Technical Support			Core-6668 (MULTIMODAL IMAGING CORE), Core-6676 (REPRODUCTIVE SCIENCES AND ...RESEARCH UNIT)		NA
	N			HR Specialist			Admin Core-6648 (ADMINISTRATION AND OPERATIONS SERVICES)		NA

	N	Redacted by agreement		SRA Staff Research Associate	EFFORT		Core-6668 (MULTIMODAL IMAGING CORE)		NA
	N			SRA Staff Research Associate			Core-6668 (MULTIMODAL IMAGING CORE)		NA
	N			Grants Analyst			Admin Core-6646 (ADMINISTRATION OVERVIEW (GERMANANCE UNIT))		NA
	N			Purchasing Manager			Admin Core-6648 (ADMINISTRATION AND OPERATIONS SERVICES)		NA
	N			Technical Support			Core-6666 (PRIMATE ASSAY LABORATORY CORE)		NA
	N			Quality Assurance Specialist			Admin Core-6648 (ADMINISTRATION AND OPERATIONS SERVICES)		NA
	N			SRA Staff Research Associate			Core-6663 (ANATOMIC AND CLINICAL PATHOLOGY SERVICES)		NA
	N			Administrative Assistant			Core-6670 (NEUROSCIENCE AND BEHAVIOR RESEARCH UNIT)		NA
	N			Facilities Manager			Admin Core-6648 (ADMINISTRATION AND OPERATIONS SERVICES)		NA
	N			IT Manager			Admin Core-6649 (INFORMATION TECHNOLOGY SERVICES)		NA
	N			Colony Manager			Core-6651 (COLONY MANAGEMENT AND		NA

									RESEARCH SERVICES)		
	N	Redacted by agreement		IT Desktop Support	EFFORT				Admin Core-6649 (INFORMATION TECHNOLOGY SERVICES)		NA
	N			Administrative Assistant					Core-6651 (COLONY MANAGEMENT AND RESEARCH SERVICES)		NA
	N			IT Application Developer					Admin Core-6649 (INFORMATION TECHNOLOGY SERVICES)		NA
	N			SRA Staff Research Associate					Core-6668 (MULTIMODAL IMAGING CORE)		NA
	N			Lab Manager					Core-6666 (PRIMATE ASSAY LABORATORY CORE)		NA
	N			HR Specialist					Admin Core-6648 (ADMINISTRATION AND OPERATIONS SERVICES)		NA
	N			SRA Staff Research Associate					Core-6651 (COLONY MANAGEMENT AND RESEARCH SERVICES)		NA
	N			Occupational Health and Safety Officer					Admin Core-6648 (ADMINISTRATION AND OPERATIONS SERVICES)		NA
	N			Purchasing Specialist					Admin Core-6648 (ADMINISTRATION AND OPERATIONS SERVICES)		NA
	N			Lab Specialist					Core-6663 (ANATOMIC AND CLINICAL PATHOLOGY SERVICES)		NA

	N	Redacted by agreement		Purchasing Assistant	EFFORT		Admin Core-6648 (ADMINISTRATION AND OPERATIONS SERVICES)		NA
	N			Contracts & Grants Manager			Admin Core-6648 (ADMINISTRATION AND OPERATIONS SERVICES)		NA
	N			Research Scientist			Core-6670 (NEUROSCIENCE AND BEHAVIOR RESEARCH UNIT)		NA
	N			SRA Staff Research Associate			Core-6668 (MULTIMODAL IMAGING CORE)		NA
	N			Project Support			Core-6668 (MULTIMODAL IMAGING CORE)		NA
	N			IT Application Developer			Admin Core-6648 (ADMINISTRATION AND OPERATIONS SERVICES)		NA
	N			Public Relations Assistant			Other-6686 (OUTREACH – PUBLIC INFORMATION OFFICE)		NA
	N			Administrative Assistant			Admin Core-6647 (DIRECTOR'S OFFICE)		NA
	N			SRA Staff Research Associate			Core-6668 (MULTIMODAL IMAGING CORE), Core-6678 (RESPIRATORY DISEASES RESEARCH UNIT)		NA
	N			Training Manager			Core-6651 (COLONY MANAGEMENT AND RESEARCH SERVICES)		NA
	N			HR Specialist			Admin Core-6648 (ADMINISTRATION AND OPERATIONS SERVICES)		NA

										TION AND OPERATIONS SERVICES)		
	N	Redacted by agreement		SRA Staff Research Associate	EFFORT					Core-6666 (PRIMATE ASSAY LABORATORY CORE)		NA
	N			HR Manager						Admin Core- 6648 (ADMINISTRA TION AND OPERATIONS SERVICES)		NA
	N			Purchasing Specialist						Admin Core- 6648 (ADMINISTRA TION AND OPERATIONS SERVICES)		NA
	N			Purchasing Specialist						Admin Core- 6648 (ADMINISTRA TION AND OPERATIONS SERVICES)		NA
	N			Technical Manager						Core-6664 (POPULATION AND BEHAVIORAL ...ALTH SERVICES)		NA
	N			Animal Technician						Core-6662 (PRIMATE MEDICINE SERVICES)		NA
	N			Administrativ e Support for the Directors Office						Admin Core- 6647 (DIRECTOR'S OFFICE)		NA
	N			SRA Staff Research Associate						Core-6669 (FLOW CYTOMETRY CORE)		NA
	N			Administrativ e Support						Admin Core- 6649 (INFORMATIO N TECHNOLOG Y SERVICES)		NA
	N			IT System Administrator						Admin Core- 6649 (INFORMATIO N TECHNOLOG Y SERVICES)		NA
	N			Assistant Director for Colony						Core-6651 (COLONY MANAGEMEN		NA

				Management & Research Services					T AND RESEARCH SERVICES)		
	N	Redacted by agreement		Operations Manager	EFFORT				Core-6667 (INHALATION EXPOSURE CORE)		NA
	N			Lab Manager					Core-6663 (ANATOMIC AND CLINICAL PATHOLOGY SERVICES)		NA
	N			Administrative Assistant					Core-6651 (COLONY MANAGEMENT AND RESEARCH SERVICES)		NA
	N			Technical Support					Core-6665 (GENETICS MANAGEMENT SERVICES)		NA
	N			HR Specialist					Admin Core-6648 (ADMINISTRATION AND OPERATIONS SERVICES)		NA
	N			Public Relations Officer					Other-6686 (OUTREACH – PUBLIC INFORMATION OFFICE)		NA
	N			Grants Manager					Admin Core-6648 (ADMINISTRATION AND OPERATIONS SERVICES)		NA
	N			Financial Analyst					Admin Core-6648 (ADMINISTRATION AND OPERATIONS SERVICES)		NA
	N			Lab Technician					Core-6663 (ANATOMIC AND CLINICAL PATHOLOGY SERVICES)		NA
	N			IT Programmer					Admin Core-6649 (INFORMATION TECHNOLOGY SERVICES)		NA
	N			Public					Other-6686		NA

				Relations Assistant					(OUTREACH – PUBLIC INFORMATION OFFICE)		
	N	Redacted by agreement		Lab Manager	EFFORT				Core-6666 (PRIMATE ASSAY LABORATORY CORE)		NA
	N			SRA Staff Research Associate					Core-6666 (PRIMATE ASSAY LABORATORY CORE)		NA
eRA Commons User Name	Y		BS	Associate Director Operations					Admin Core-6646 (ADMINISTRATION OVERVIEW (GERMANANCE UNIT)), Admin Core-6647 (DIRECTOR'S OFFICE), Admin Core-6649 (INFORMATION TECHNOLOGY SERVICES), Admin Core-6650 (ALTERATIONS AND RENOVATIONS IMPROVEMENT), Other-6681 (NPRC CONSORTIUM), Other-6686 (OUTREACH – PUBLIC INFORMATION OFFICE), Project-6688 (PILOT RESEARCH PROGRAM)		NA
eRA Commons User Name	Y	eRA Commons User Name	PHD	Core Leader, Core Scientist	EFFORT	0.0	0.0		Core-6668 (MULTIMODAL IMAGING CORE), Core-6676 (REPRODUCTIVE		NA

									SCIENCES AND ...RESEARCH UNIT)		
eRA Commons User Name	Y	Redacted by agreement	OTH,MS, MS,PHD	Core Co- Leader, Core Scientist	EFFORT				Core-6668 (MULTIMODAL IMAGING CORE), Core-6676 (REPRODUCTIVE SCIENCES AND ...RESEARCH UNIT)		NA
	Y		PHD,BS	Core Scientist					Core-6670 (NEUROSCIENCE AND BEHAVIOR RESEARCH UNIT)		NA
	Y		PHD	Core Scientist, Emeritus					Core-6666 (PRIMATE ASSAY LABORATORY CORE), Core-6676 (REPRODUCTIVE SCIENCES AND ...RESEARCH UNIT)		NA
	Y		PHD	Core Scientist, Emeritus					Core-6676 (REPRODUCTIVE SCIENCES AND ...RESEARCH UNIT)		NA
	Y		BS,DVM,PHD	Core Manager					Core-6667 (INHALATION EXPOSURE CORE)		NA
	Y		DVM,PHD	Core Scientist					Core-6671 (INFECTIOUS DISEASES RESEARCH UNIT)		NA
	Y		DVM	Senior Veterinarian					Core-6662 (PRIMATE MEDICINE SERVICES)		NA
	Y		PHD	Core Scientist					Core-6670 (NEUROSCIENCE AND BEHAVIOR RESEARCH UNIT)		NA

eRA Commons User Name	Y	Redacted by agreement	BS,MD,PHD	Core Leader, Core Scientist	EFFORT		Core-6669 (FLOW CYTOMETRY CORE), Core-6671 (INFECTIOUS DISEASES RESEARCH UNIT), Core-6676 (REPRODUCTIVE SCIENCES AND ...RESEARCH UNIT)		NA
	Y		PHD	Core Scientist			Core-6670 (NEUROSCIENCE AND BEHAVIOR RESEARCH UNIT)		NA
	N		BS	Financial Analyst			Admin Core-6648 (ADMINISTRATION AND OPERATIONS SERVICES)		NA
	Y		PHD,BS,MA	Core Scientist			Core-6678 (RESPIRATORY DISEASES RESEARCH UNIT)		NA
	Y		BA,PHD	Core Scientist			Core-6670 (NEUROSCIENCE AND BEHAVIOR RESEARCH UNIT)		NA
	Y		MPH,BS,DVM	Senior Veterinarian			Core-6662 (PRIMATE MEDICINE SERVICES)		NA
	Y		BS,PHD	Core Scientist			Core-6678 (RESPIRATORY DISEASES RESEARCH UNIT)		NA
	Y		DVM	Associate Director Primate Services			Admin Core-6647 (DIRECTOR'S OFFICE), Core-6651 (COLONY MANAGEMENT AND RESEARCH SERVICES), Core-6661		NA

									(NATIONAL INSTITUTE ON AGING COLONY), Core-6662 (PRIMATE MEDICINE SERVICES), Core-6663 (ANATOMIC AND CLINICAL PATHOLOGY SERVICES), Core-6664 (POPULATION AND BEHAVIORAL ...ALTH SERVICES), Core-6665 (GENETICS MANAGEMEN T SERVICES)		
eRA Commons User Name	Y	Redacted by agreement	PHD	Director, Core Scientist	EFFORT				Admin Core-6647 (DIRECTOR'S OFFICE), Core-6670 (NEUROSCIENCE AND BEHAVIOR RESEARCH UNIT)		NA
	Y		PHD,DVM ,BS	Genetics Manager					Core-6665 (GENETICS MANAGEMEN T SERVICES)		NA
	Y		PHD,BS, MA	Core Scientist, Emeritus					Core-6670 (NEUROSCIENCE AND BEHAVIOR RESEARCH UNIT)		NA
	Y		MD,PHD, BA	Core Scientist					Core-6671 (INFECTIOUS DISEASES RESEARCH UNIT)		NA
	Y		PHD,BS, MS	Core Scientist					Core-6678 (RESPIRATORY DISEASES RESEARCH UNIT)		NA
	Y		BS,DVM	Senior Veterinarian					Core-6663 (ANATOMIC AND CLINICAL PATHOLOGY		NA

									SERVICES)		
eRA Commons User Name	Y	Redacted by agreement	DVM,PHD	Core Leader, Core Scientist	EFFORT				Core-6666 (PRIMATE ASSAY LABORATORY CORE), Core-6671 (INFECTIOUS DISEASES RESEARCH UNIT)		NA
	Y		PHD,MA, BA	Unit Leader					Core-6670 (NEUROSCIE NCE AND BEHAVIOR RESEARCH UNIT)		NA
	Y		DVM,BS	Senior Veterinarian					Core-6662 (PRIMATE MEDICINE SERVICES)		NA
	Y		BS,PHD	Associate Director Research					Admin Core- 6647 (DIRECTOR'S OFFICE), Core-6667 (INHALATION EXPOSURE CORE), Core-6678 (RESPIRATOR Y DISEASES RESEARCH UNIT), Project-6688 (PILOT RESEARCH PROGRAM)		NA
	Y		DVM,BS	Senior Veterinarian					Core-6666 (PRIMATE ASSAY LABORATORY CORE)		NA
	Y		MD,PHD	Unit Leader, Core Scientist					Core-6671 (INFECTIOUS DISEASES RESEARCH UNIT)		NA
	Y		DVM	Senior Veterinarian					Core-6662 (PRIMATE MEDICINE SERVICES)		NA
	Y		AB,PHD	Core Scientist, Emeritus					Core-6671 (INFECTIOUS DISEASES RESEARCH UNIT)		NA

eRA Commons User Name	Y	Redacted by agreement	PHD,BA	Core Scientist, Emeritus	EFFORT		Core-6671 (INFECTIOUS DISEASES RESEARCH UNIT)		NA
	N		DVM	Veterinarian			Core-6662 (PRIMATE MEDICINE SERVICES)		NA
	Y		DVM,BS	Senior Veterinarian			Core-6663 (ANATOMIC AND CLINICAL PATHOLOGY SERVICES)		NA
	Y		DVM,BS	Senior Veterinarian			Core-6662 (PRIMATE MEDICINE SERVICES)		NA
	Y			Senior Veterinarian			Core-6663 (ANATOMIC AND CLINICAL PATHOLOGY SERVICES)		NA
	Y		BS,DVM	Unit Manager, Senior Veterinarian			Core-6663 (ANATOMIC AND CLINICAL PATHOLOGY SERVICES)		NA
	Y		PHD	Core Scientist			Core-6676 (REPRODUCT IVE SCIENCES AND ...RESEARCH UNIT)		NA
	Y		MS,PHD, BS	Core Scientist			Core-6671 (INFECTIOUS DISEASES RESEARCH UNIT)		NA
	Y		PHD	Core Scientist			Core-6671 (INFECTIOUS DISEASES RESEARCH UNIT)		NA

Glossary of acronyms:

S/K - Senior/Key
 DOB - Date of Birth
 Cal - Person Months (Calendar)
 Aca - Person Months (Academic)
 Sum - Person Months (Summer)

Foreign Org - Foreign Organization Affiliation

SS - Supplement Support

RE - Reentry Supplement

DI - Diversity Supplement

OT - Other

NA - Not Applicable

D.2 PERSONNEL UPDATES**D.2.a Level of Effort**

Will there be, in the next budget period, either (1) a reduction of 25% or more in the level of effort from what was approved by the agency for the PD/PI(s) or other senior/key personnel designated in the Notice of Award, or (2) a reduction in the level of effort below the minimum amount of effort required by the Notice of Award?

Yes

On 7/2/2018, the University of California Davis hired a Vice Chancellor for Research (VCR), Dr. Prasant Mohapatra. Historically, the VCR serves as the Principal Investigator for the CNPRC P51. [Redacted by agreement] was the Interim Vice Chancellor for Research and was in that role for over a year during the formal recruitment for the VCR role.

D.2.b New Senior/Key Personnel

Are there, or will there be, new senior/key personnel?

Yes

File uploaded: D2b New SeniorKey Personnel.pdf

D.2.c Changes in Other Support

Has there been a change in the active other support of senior/key personnel since the last reporting period?

Yes

File uploaded: Other Support RPPR YR58.pdf

D.2.d New Other Significant Contributors

Are there, or will there be, new other significant contributors?

No

D.2.e Multi-PI (MPI) Leadership Plan

Will there be a change in the MPI Leadership Plan for the next budget period?

NA

Pages 26 to 98 have been removed (biographical sketches)

Per agreement with requester (FOIA 52657) to exclude (11/19/19).

E. OVERALL IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

NOTHING TO REPORT

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

Not Applicable

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

NOTHING TO REPORT

F. OVERALL CHANGES

F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

NOTHING TO REPORT

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subjects**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. OVERALL SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS

File(s) uploaded:
RPPR P51OD011107-57 (2-22-19).pdf

G.2 RESPONSIBLE CONDUCT OF RESEARCH

Not Applicable

G.3 MENTOR'S REPORT OR SPONSOR COMMENTS

Not Applicable

G.4 HUMAN SUBJECTS

G.4.a Does the project involve human subjects?

No

G.4.b Inclusion Enrollment Data

Not Applicable

G.4.c ClinicalTrials.gov

Does this project include one or more applicable clinical trials that must be registered in ClinicalTrials.gov under FDAAA?

G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT

Are there personnel on this project who are newly involved in the design or conduct of human subjects research?

G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)

Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?

Yes

hESC Registration number(s) from the NIH Registry:

0043
0062

The explanation of a change in the use of hESCs

G.7 VERTEBRATE ANIMALS

Does this project involve vertebrate animals?

Yes

G.8 PROJECT/PERFORMANCE SITES

Organization Name:	DUNS	Congressional District	Address
Primary: University of California Davis	047120084	CA-003	University of California, Davis 1850 Research Park Drive Davis CA 956165270

G.9 FOREIGN COMPONENT

No foreign component

G.10 ESTIMATED UNOBLIGATED BALANCE**G.10.a** Is it anticipated that an estimated unobligated balance (including prior year carryover) will be greater than 25% of the current year's total approved budget?

No

G.11 PROGRAM INCOME

Is program income anticipated during the next budget period?

Yes

Anticipated Amount	Source(s)
23024677	Program Income from P51
5118963	Campus resources to complete CNPRC large infrastructures

G.12 F&A COSTS

Not Applicable

California NPRC
Information Requested in P51 RPPR Instructions

1.A. Nonhuman primates (NHPs) housed at NPRC supported partially, or in whole, by the P51 grant¹.

Census Date: 2/5/2019

Genus/Species	Breeding Colony ²				Animals Not in Breeding Colony ³				Total Colony Census
	M	F	U ⁴	Total	M	F	U ⁴	Total	
Callicebus moloch	45	43	2	90	4	6		10	100
Macaque mulatta (Indian)	1,056	1,808	6	2,870	214	189		403	3,273
Macaque fascicularus					16	16		32	32
Total	1,101	1,851	8	2,960	234	211		445	3,405

¹This entry does not include animals supported by a U24 or U42 SPF grant.

²Total number of animals in breeding colony including adult breeding animals and designated juvenile replacements at time of report.

³Animals on protocol or otherwise not in the breeding colony at the time of report.

⁴Sex undetermined.

1.B. Nonhuman primates housed at NPRC - supported by U24 or U42 or other sources¹.

Census Date: 2/5/2019

Genus/Species	Breeding Colony ²				Animals Not in Breeding Colony ³				Total Colony Census
	M	F	U ⁴	Total	M	F	U ⁴	Total	
Macaque mulatta (Indian)	221	291	1	513					513
Total	221	291	1	513					513

¹This entry does not include animals supported by a U24 or U42 SPF grant.

²Total number of animals in breeding colony including adult breeding animals and designated juvenile replacements at time of report.

³Animals on protocol or otherwise not in the breeding colony at the time of report.

⁴Sex undetermined.

1.C. Total Nonhuman primates housed at NPRC, irrespective of source of support.

Genus/Species	Total Number of Animals
Callicebus moloch	100
Macaque fascicularus	32
Macaque mulatta (Indian)	3,786
Total	3,918

2. Tissue Distribution Program Information. It is not necessary to report samples broken down by species.

Dates covered by the report: 5/1/2017 – 2/4/2019

Obtained by Rise for Animals.
 Uploaded to Animal Research Laboratory Overview (ARLO) on 07/22/2021

Sample Type	Number of Samples Distributed
Tissue	2,752
Other	870
Total	3,622

Comments: Reporting period 5/1/17 - 2/4/2019

Other = "Blood"

We have mainly Indian macaques, but we have some Chinese as well as some Indian-Chinese hybrids.

3. Types of project. Include all projects performed in whole, or in part, during the reporting period.

Project Type	Number of Projects
Research	106
Management	12
Pilot	18
Total	136

Comments: Reporting period 5/1/17 - 4/30/19

4. Percentage of AIDS-related P51 grant dollars.

AIDS - related P51 %: 19

Description: Financial calculation based on AIDS related P51 grant dollars divided by all active grant's dollars for reporting period 5/1/17 - current.

Comments: Reporting period 5/1/17 - 4/30/19

5. Information regarding the number of investigators by type.

Type of Investigator	Number
Core	23
Affiliate	70
Visiting	10
Total	103

Comments: Reporting period 5/1/17 - 4/30/19

6. The number of peer reviewed publications directly attributed to P51 activity. Explain how this number was derived; e.g., publications that directly cite the P51 grant, or other types of citation or information.

Source	Number
Articles	169
Book Chapters	26
Reviews	15
Total	210

Comments: List of peer reviewed publications for compliant and non-compliant is uploaded in section "12. Feedback from users."

Reporting period 5/1/17 - 1/31/2019

7. The number of individuals trained during the reporting period by type.

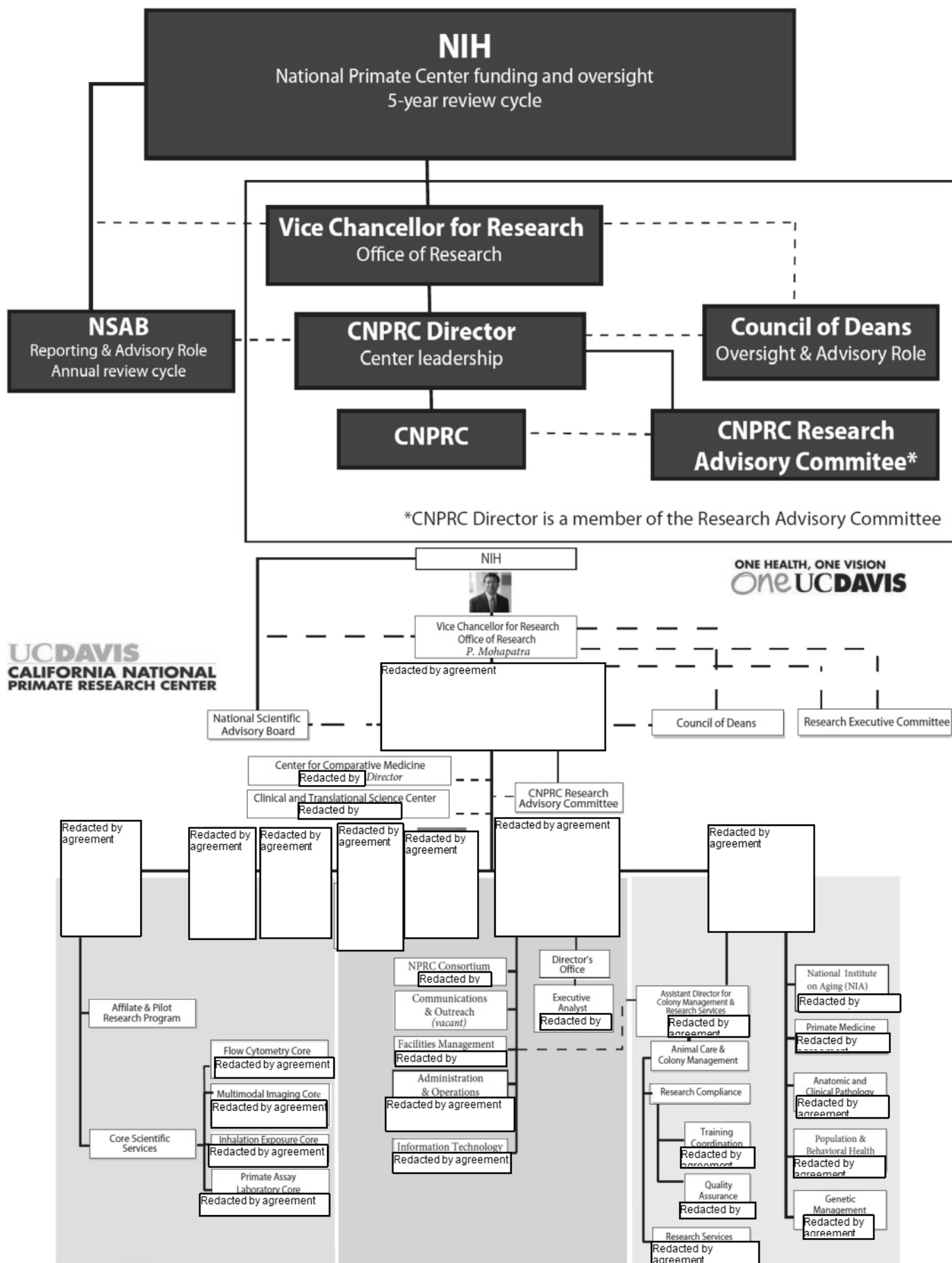
Type of Trainee	Number of Trainees
Post-doctoral	72
Graduate student	92
Undergraduate student	166
Other trainee	62
Total	392

Description: Other includes staff, faculty, research investigators, and visitors.

Reporting period 5/1/17 - 4/30/19

8. Organizational chart that show the relationship of the NPRC to the Institution and the major organizational divisions within the NPRC.

See Next Page



Obtained by Rise for Animals.

Uploaded to Animal Research Laboratory Overview (ARLO) on 07/22/2021

9. Individual projects performed during the reporting period.

See Next Page

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: BIOBEHAVIORAL CHARACTERIZATION OF INFANT RHESUS MONKEYS

SPID#: 136

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE:

END DATE:

GENERAL CATEGORY: Behavior

SUB-CATEGORY: Development

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R24OD010962

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Psychology, UC Davis
Prin. NPRC Core Sci.		Psychology, UC Davis
Other Core and Affil.		

PROJECT DESCRIPTION:

The objective of this project is to implement a colony--wide assessment program that will identify animals differing in biobehavioral organization, and to provide this information to a) colony managers to aid in decision--making in the areas of health, reproduction, and enrichment, and (b) investigators for use in scientific studies.

PROGRESS REPORT:

In 2017 and 2018, a total of 483 animals were assessed. Twenty data sets were provided to investigators, sets of DNA samples were provided to two investigators, and plasma was provided to one investigator. Data and samples were provided to investigators at UC Davis, Indiana University, Baylor College of Medicine, University of Utah, UC-San Francisco, Stanford University, Max-Planck in Munich, and Brigham Young University. In additions, evaluations of biobehavioral data were conducted for two separate scientists at Stanford that were purchasing monkeys from CNPRC in order to screen out individuals with unusual biobehavioral characteristics.

PUBLICATIONS:

PMID	Title
28521247	Cognitive performance of juvenile monkeys after chronic fluoxetine treatment.
28369889	Maternal rearing environment impacts autonomic nervous system activity.
29021623	Preference for novel faces in male infant monkeys predicts cerebrospinal fluid oxytocin concentrations later in life.

Obtained by Rise for Animals.
Uploaded to Animal Research Laboratory Overview (ARLO) on 07/22/2021

PMID	Title
28895116	Age at reproductive debut: Developmental predictors and consequences for lactation, infant mass, and subsequent reproduction in rhesus macaques (<i>Macaca mulatta</i>).
28472500	Naturally Occurring Nonhuman Primate Models of Psychosocial Processes.
29720452	Arginine vasopressin in cerebrospinal fluid is a marker of sociality in nonhuman primates.
30152539	Personality, environmental stressors, and diarrhea in Rhesus macaques: An interactionist perspective.
30103289	Paternal line effects of early experiences persist across three generations in rhesus macaques.
29900528	Adiposity and weight gain during pregnancy associate independently with behavior of infant rhesus monkeys (<i>Macaca mulatta</i>).
30342315	Social stability influences the association between adrenal responsiveness and hair cortisol concentrations in rhesus macaques.
30480316	Coping style and cortisol levels in infancy predict hair cortisol following new group formation in captive rhesus macaques (<i>Macaca mulatta</i>).

FUNDING SOURCES:

R24--OD010962

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: PREVENTION OF PRIMARY HCMV INFECTION BY VACCINATING AGAINST HCMV ENCODED IL-10

SPID#: 218

UNIT/DIVISION: Infectious Diseases

TYPE: Research

START DATE: 5/1/2017

END DATE: 2/28/2019

GENERAL CATEGORY: Infectious Disease

SUB-CATEGORY: Vaccine

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01AI049342

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Med:Path
Prin. NPRC Core Sci.		Med:Path
Other Core and Affil.		University of Alabama at Birmingham

PROJECT DESCRIPTION:

The objective of this project is to (a) characterize the roles of the RhCMV interleukin-10 and US28 proteins in the RhCMV replication cycle, and (b) develop novel vaccine designs against human cytomegalovirus by constructing RhCMV variants containing deletions in the viral interleukin-10 and US28 genes.

PROGRESS REPORT:

Human cytomegalovirus (HCMV) can cause severe disease in infants and immunocompromised people. There is no approved vaccine to prevent primary HCMV acquisition. Vaccine strategies are complicated by both viral persistence and re-infection of people with prior viral immunity. Considerable emphasis has been placed on reducing transmission to seronegative pregnant women to prevent vertical transmission and potentially severe congenital sequelae. Increasing evidence suggests that the earliest host-HCMV interactions establish conditions for viral persistence, including evasion of host immune responses to the virus. Using a nonhuman primate model of HCMV infection, we show that rhesus macaques immunized against the viral IL-10 protein manifest delayed rhesus CMV (RhCMV) acquisition and altered immune responses to the infection when it does occur. Among animals with the greatest anti-viral IL-10 neutralizing activity, RhCMV acquisition was delayed by an average of twelve weeks. After acquisition, such animals displayed an antibody response to the new infection, which peaked as expected after two weeks but then declined rapidly, suggesting failure to develop long-lived memory B cells. In contrast, surprisingly, vaccination with gB protein had no discernible impact on these outcomes. Our results demonstrate that viral IL-10 is a key regulator of successful host immune responses to RhCMV. Viral IL-10 is therefore an important target for vaccine strategies against CMV. Furthermore, given the immunoregulatory function of viral IL-10, targeting this protein may prove synergistic with other vaccine therapies and targets. Our study also provides further evidence that the earliest host-CMV interactions can have a

significant impact on the nature of persistent infection.

A manuscript describing this work has just been submitted for review.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

R01-AI049342

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: NEUROBEHAVIORAL RELATIONS IN SENESCENT HIPPOCAMPUS

SPID#: 295

UNIT/DIVISION: BMB

TYPE: Research

START DATE: 7/1/2003

END DATE: 11/30/2020

GENERAL CATEGORY: Aging

SUB-CATEGORY: Neural

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01AG003376

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Univeristy of Arizona/UC Davis Affiliate Faculty
Prin. NPRC Core Sci.		Psychology
Other Core and Affil.		

PROJECT DESCRIPTION:

The objective of this research program is to understand the basis of memory impairments that result from normal aging. Over the past 30 years of this grant we have discovered links between spatial memory deficits and age-related changes in hippocampal connectivity and plasticity at the cellular and network levels. While empirical focus on the hippocampus is justified because of this structure's critical role in memory, the extent to which changes in upstream cortico-hippocampal inputs contribute to these age-related behavioral deficits is unknown. The perirhinal cortex is at the highest level of the ventral visual processing stream. It carries polymodal sensory information to the hippocampus, is extensively reciprocally connected with it, and is critical for memory in its own right. Whether it transmits degraded information to the aged hippocampus, resulting in deficits in visual perception or stimulus associations is thus a major question addressed in the present grant. A complementary question is whether the breakdown during aging in the connectivity and plasticity mechanisms of hippocampal circuits leads to defective associative binding among neocortical areas, and hence less robust stabilization of episodic memories. Understanding how the bidirectional interactions between these structures are altered by the aging process, and how such failures in network communication may contribute to behavioral deficits, could provide insights into the neural mechanisms of memory at all ages.

PROGRESS REPORT:

1) We published a manuscript on the behavioral impact of long-term chronic implantation of neural recording devices in young and old rhesus macaques. In spite of invasive recording methods to localize seizure origin or in patients to alleviate Parkinson's disease symptoms or neuropsychiatric disorders, very little is known about the effect of chronic implants on behavior in healthy populations. We were able to use our valuable population of rhesus macaques to analyze data collected in these animals before implantation of our hyperdrive recording devices and then at the end of the electrophysiological experiments. Our results indicate that recognition memory performance is not impaired after implantation, suggesting that the initial tissue damage and subsequent foreign body response caused by hyperdrive implant is not sufficient to disrupt hippocampal circuits to impair cognition in

the tasks examined (Kyle et al., 2018).).

2) We also published a manuscript that describes species similarities and differences in macaques – namely the rhesus versus bonnet macaques. The cognitive functions that were tested included visuospatial short-term memory, object recognition memory, and object reward association memory. In general, bonnet macaques at all ages outperformed rhesus macaques on tasks thought to rely primarily on the prefrontal cortex and were more resilient to age-related deficits in these behaviors. In contrast, both species were comparably impaired by age on tasks thought to preferentially engage the medial temporal lobe. (Comrie et al., 2018).

3) We are continuing our study of aligning demarcated subfields on serial sectioned histological tissue of young and aged, behaviorally-characterized animals, by projecting the boundaries obtained from each individual animal onto their own in vivo acquired MRI scans. In addition to the 5 young and 5 old published in our last manuscript (Kyle et al., 2017), we have now demarcated subfields on 17 additional (9 young and 8 old) animals and have refined our methods by making them fully automated. The new method relies on using “Spatial Transformer” networks, a convolutional neural network that accurately registers images many times faster than the standard registration algorithms we used previously.

PUBLICATIONS:

PMID	Title
27368416	Attentional updating and monitoring and affective shifting are impacted independently by aging in macaque monkeys.
28174334	Evidence for an Evolutionarily Conserved Memory Coding Scheme in the Mammalian Hippocampus.
28659785	The Impact of Aging on Brain Pituitary Adenylate Cyclase Activating Polypeptide, Pathology and Cognition in Mice and Rhesus Macaques.
29072793	Cytoarchitectonically-driven MRI atlas of nonhuman primate hippocampus: Preservation of subfield volumes in aging.
29432794	Different macaque models of cognitive aging exhibit task-dependent behavioral disparities.
30198011	Tract-Specific White Matter Correlates of Age-Related Reward Devaluation Deficits in Macaque Monkeys.
30016006	Behavioral Impact of Long-Term Chronic Implantation of Neural Recording Devices in the Rhesus Macaque.
29679704	A separable two-dimensional random field model of binary response data from multi-day behavioral experiments.

Pyon, W., Gray, D.T., Ashford, S., and Barnes, C.A. (2018) A direct comparison of dye- and imaging-based removal of lipofuscin-induced autofluorescence from primate brain tissue. Program No. 245.04. 2018 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience. Online.

Kyle, C., Stokes, J., Melzter, J., Permenter, M.R., Vogt, J.A., Ekstrom, A.D., and Barnes, C.A. (2018) Convolutional neural networks for fast and accurate 3D reconstruction of histological sections. Program No. 245.01. 2017 Neuroscience Meeting Planner. San Diego, CA: Society for Neuroscience. Online.

FUNDING SOURCES:

Redacted by [redacted] Ph.D. funded by NIA
 Redacted by [redacted] Ph.D. funded by NIA

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: BEHAVIORAL MANAGEMENT OF DELETERIOUS AGGRESSION IN RHESUS MACAQUES, GRANT # R24-OD011136

SPID#: 423

UNIT/DIVISION:

TYPE:

START DATE:

END DATE:

GENERAL CATEGORY: Behavior

SUB-CATEGORY: Behavior

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R24OD011136

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

Name

Dept

Principal Investigator

Redacted by agreement

Prin. NPRC Core Sci.

Other Core and Affil.

PROJECT DESCRIPTION:

In the NIH/NCRR sponsored breeding programs of the NPRCs, rhesus macaques are housed in multimale-multifemale social groups in large outdoor corrals which simulates the natural social and environmental features characteristic of the species, enhancing their reproductive performance as well as their psychological well-being. Despite the importance of this naturalistic social housing, one of the most difficult problems in socially-housed macaques is their propensity for spontaneous bouts of deleterious aggression. The long-term goal of this project is to reduce the rates of deleterious aggression in captive breeding colonies of rhesus macaques. The objective of this particular application is to enhance current behavioral management techniques by developing a set of predictive models of the within-group social and group-level management factors that lead to deleterious aggression and aggression-based morbidity and mortality in group-housed rhesus macaques to develop mitigation strategies. Development of beneficial management practices that reduce aggression-based morbidity and mortality in rhesus breeding groups will contribute to public health by enhancing the health and welfare of rhesus macaques in breeding colonies that provide the animal resources critical for conducting biomedical research on nonhuman primates.

PROGRESS REPORT:

Our research to date indicates that the use of social network theory has allowed us to uncover hidden patterns in

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relationships that can be used to both detect and predict social instability in rhesus social groups. Frequencies and rates of behaviors have failed to provide us with such predictive power. Indeed, both the structure of direct and, more importantly, indirect relationships across aggression, grooming, alliance, and status networks are important to social group stability in rhesus; yet, the real key to understanding the architecture of stable social networks is through a detailed understanding of the interconnected pathways underlying the status signaling networks, which are also related to other important networks such as dominance certainty, aggression, and grooming in significant and complex ways. In addition, the joint modeling of status and aggression networks can be used to determine when a tipping point occurs in groups heading toward instability by identifying the point of decoupling of status and aggression networks. We have experimentally shown that this status signaling network provides the backbone of rhesus society and can be used, if monitored on a systematic and focused basis, to detect and predict social collapse in rhesus social groups. In addition, manipulation of social groups such as matriline defragmentation and the removal of high ranking males challenging this status network can proactively prevent social instability and collapse in rhesus social groups. Furthermore the addition of foraging enrichment and visual barriers reduce aggression especially during the breeding season.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: SOCIAL REGULATION OF GENE EXPRESSION

SPID#: 538

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE:

END DATE:

GENERAL CATEGORY: Behavior

SUB-CATEGORY: Immunology

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R37AG033590

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	University of Chicago
Prin. NPRC Core Sci.		Psychology, UC Davis
Other Core and Affil.		UC-Los Angeles

PROJECT DESCRIPTION:

Research has repeatedly shown that a lack of social ties increases risk for poor health. Recent research has demonstrated that poor mental and physical health outcomes are distally associated with social isolation, are more proximally associated with perceived social isolation (PSI), and are not explicable in terms of differences in health behaviors. Recent studies have identified alterations in hypothalamic--pituitary-- adrenal (HPA) axis regulation of inflammatory biology in leukocytes as a potential mechanism of isolation--related health risks. Individuals reporting chronically high levels of subjective social isolation have shown a heightened rise in morning cortisol levels, and alterations in genome--wide transcription of glucocorticoid target genes and NF--!B target genes. These isolation--related alterations in leukocyte biology might stem from a functional desensitization of the glucocorticoid receptor (GR) in isolated people, which in turn, is reciprocally related to NF--B expression, a key factor in regulation of cellular responses to infection, cancer, and inflammation. Impaired transcription of glucocorticoid response genes and increased activity of pro--inflammatory transcription control pathways provide a functional genomic explanation for elevated risk of inflammatory disease in individuals who experience chronically high levels of perceived social isolation.

In the second five--year period for the monkey component of this project, we are leveraging our earlier findings that a) established a monkey model of naturally occurring PSI, and b) demonstrated evidence of a transcriptional response in these animals that involved reduced antiviral and humoral immune gene expression and upregulation of inflammation compared to controls. Specifically, we will determine whether the presence of a non-- threatening conspecific can alleviate some of the biological consequences of PSI. In particular, we propose that PSI is associated with heightened perceptions of social threat that results in elevated sympathetic nervous system activity, and consequent alteration in immune cell development in lymphoid tissue. We will examine cellular components of primary and secondary lymphoid tissue to test our hypotheses of differences between PSI

and control animals, and differences in the effects of a companion on lymphoid tissue cell dynamics.

PROGRESS REPORT:

Data collection was completed on all n=21 animals in this study in early February, 2019. Samples will be sent to collaborators' laboratories, and data analysis will begin in the upcoming year.

PUBLICATIONS:

PMID	Title
28472500	Naturally Occurring Nonhuman Primate Models of Psychosocial Processes.

FUNDING SOURCES:

Redacted by [redacted] Ph.D., PI: funded by National Institute on Aging.

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: VA GORDON MANSFIELD SPINAL CORD INJURY CONSORTIUM NHP CONTRACT

SPID#: 542

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE: 5/1/2017

END DATE: 2/28/2019

GENERAL CATEGORY: Neural

SUB-CATEGORY: Regenerative Medicine

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER: # VA268-16-R-0010

SUPPORTING ORGANIZATION: VA San Diego

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Center for Neural Repair UC San Diego
Prin. NPRC Core Sci.		Primate Services
Other Core and Affil.		

PROJECT DESCRIPTION:

This is the continuation at the CNRPC of the VA Gordon Mansfield Spinal Cord Injury (SCI) Consortium non-human primate (NHP) contract. In this project, the NHP model of SCI will be used to address several key issues prior to the translation of the cell therapy to humans, including efficacy and safety, transition to the contusion model of SCI, and use of rehabilitation to optimize functional outcome. This avenue of study is necessary to elucidate efficacy in the NHP model. Many cell therapies have undergone clinical testing in humans and none have demonstrated clinically meaningful motor or sensory functional recovery. Thus, rigorous testing of hNPCs must be conducted to demonstrate efficacy in a clinically relevant model of SCI. Funding from the Veterans Administration Rehabilitation Research and Development (RR&D) Service in the Office of Research and Development will support both the continued development of this model and the testing of multiple therapies simultaneously.

The goal of this study is to test the efficacy of hNPC and NHP induced pluripotent stem cell (iPSC) for the treatment of acute and chronic SCI in NHPs, emphasizing return of function to the upper limbs.

This study will test a therapy comprised of the following three components:

- 1) A cell graft of human neuroprogenitor or NHP induced pluripotent stem cells into the lesion site.
- 2) A matrix consisting of fibrin and thrombin.
- 3) Growth factors.

PROGRESS REPORT:

We refined a broad range of behavioral testing procedures, including treadmill, chair, and exercise cage testing.

We implemented a series of in--cage testing devices and are in the process of developing an automated in--cage testing apparatus that will enable animals to continue their rehabilitation on their own in their home cages. Grafted animals have gone out several months with survival of stem cell grafts.

PUBLICATIONS:

PMID	Title
29480894	Restorative effects of human neural stem cell grafts on the primate spinal cord.

FUNDING SOURCES:

San Diego VA

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: MATERNAL TEMPERAMENT, STRESS, AND INFLAMMATION IN PRETERM BIRTH

SPID#: 594

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE:

END DATE:

GENERAL CATEGORY: Reproductive

SUB-CATEGORY: Psychiatric

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01HD078127

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Cincinnati Children's Medical Center
Prin. NPRC Core Sci.		Psychology, UC Davis
Other Core and Affil.		Cincinnati Children's Medical Center

PROJECT DESCRIPTION:

Preterm birth is a major public health burden that remains the leading cause of neonatal morbidity and mortality worldwide. Our long-term goal is to determine the mechanisms that disrupt the normal timing for parturition and lead to preterm birth. Numerous factors influence the likelihood of preterm birth, such as bacterial infection/colonization, maternal stress, and genetic predisposition. While these factors increase the frequency of preterm birth, the majority of women with these factors in isolation deliver at term. In this proposal, we will test a new hypothesis -- similar to insights that have been established in cancer biology -- that to manifest a preterm delivery, multiple detrimental "hits" acting together are required. Proving that this is the case is not possible with observational studies in humans, with many uncontrollable variables confounding causal relationships. We will use a nonhuman primate (rhesus) model system, with pregnancy characteristics more similar to humans than typical non-primate systems, to determine whether stress and infection interact to promote early labor and delivery. We propose that individual temperament, inflammation, and stress will each provide an additive "hit", of which two or more will be required to end pregnancy prematurely. We will test the specific hypotheses that: (1) maternal stress and inflammation synergize to induce preterm birth; (2) the individual susceptibility to psychological stressors plays a key role in the induction of preterm birth; and (3) maternal peripheral blood or amniotic fluid hormones and inflammatory responses will differ prior to and following IL-1 α administration during pregnancy depending on underlying temperament and exposure to chronic stress. To test these hypotheses, our Specific Aims will determine: (1) The interactions between maternal stress, inflammation, and the influence of individual susceptibility due to anxious temperament, in preterm birth in rhesus macaques. (2) The interactions of maternal temperament and stress on maternal immunity and hormones before and after an inflammatory challenge. (3) The effects of maternal temperament and chronic stress on amniotic fluid cytokines, prostaglandins and microbial community structure before and after an inflammatory challenge. Our trans-

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disciplinary team will integrate expertise in the physiology of pregnancy, immunology/inflammation, primate behavior/psychology, the neurobiology of stress, biostatistics and the microbiome to more comprehensively investigate the heterogeneous pathways increasing preterm birth risk and yield important new insights into causal mechanisms and avenues for prematurity prevention.

PROGRESS REPORT:

All data have been collected; assays and data analysis are underway, and publications should appear in 2019.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: HOW DID A VACCINE ENHANCE

SPID#: 637

UNIT/DIVISION:

TYPE: Research

START DATE: 5/5/2017

END DATE: 2/28/2019

GENERAL CATEGORY: AIDS

SUB-CATEGORY: AIDS

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01AI118590

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	CCM, PMI, IM
Prin. NPRC Core Sci.		CCM, PMI, IM
Other Core and Affil.		

PROJECT DESCRIPTION:

Specific Aims:

Aim 1: Characterize adenovirus persistence and Ad vector localization in tissues of Ad5+ male RM immunized with the MRKAd5 SIV vaccine. Hypothesis: Ad5 persistence in tissues of the foreskin leads to increased T cell recruitment to, and retention in, the foreskin that is amplified by Ad5 vector immunizations.

Aim 2: Characterize T cell populations in blood and tissues from Ad5+ and Ad5- male RM immunized with the Merck Ad5 SIV vaccine. Hypothesis: Ad5+ RM have increased numbers of Th17 and/or activated CD4+ T cells in the foreskin after immunization compared to Ad5- RM.

Aim 3: Characterize Ad5 specific CD4+ T cell responses and vaccine-induced anti-SIV CD8+/CD4+ T cell responses in blood and tissues from Ad5+ and Ad5- male RM immunized with the Merck Ad5 SIV vaccine. Hypothesis: Ad5+ RM have more Ad5 specific CD4+ T cells and less SIV-specific CD4+ T cells in the foreskin after immunization compared to Ad5- RM.

Aim 4: Characterize the proteome in foreskin lavages and tissues from Ad5+ and Ad5- male RM immunized with the Merck Ad5 SIV. Hypothesis: Ad5+ RM have more innate immune signals emanating from the foreskin that drive T cell recruitment and survival after immunization compared to Ad5- RM. Further, these signals can be used as biomarkers of enhanced HIV transmission due to vaccination.

PROGRESS REPORT:

Rhesus macaques (RM) have been infected Ad5Hr and immunized one time with the MRK Ad5 SIV Gag/Pol/Nef vaccine and another group of Ad5- RM were immunized with the MRK Ad5 SIV Gag/Pol/Nef vaccine. The RM have been necropsied and immune cell subsets are being analyzed.

PUBLICATIONS:

Obtained by Rise for Animals.
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PMID	Title
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FUNDING SOURCES:

NIH R01-AI 118590

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: DETECTING AND TREATING SOCIAL IMPAIRMENTS IN A MONKEY MODEL

SPID#: 641

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE:

END DATE:

GENERAL CATEGORY: Behavior

SUB-CATEGORY: Psychiatric

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER:

SUPPORTING ORGANIZATION: Private Source

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Stanford University
Prin. NPRC Core Sci.		Psychology, UC Davis
Other Core and Affil.		

PROJECT DESCRIPTION:

Autism spectrum disorder (ASD), which is characterized by core social impairments, remains poorly understood. Few biomarkers (molecules that indicate a disease state) have been identified, and there are no effective medications. A better understanding of ASD has been hindered by the inability to study relevant tissues directly in patients, and animal models such as mice simply do not possess the complex social abilities found in humans and other primates. These two limitations underscore the tremendous value in developing the first monkey model of social impairments with reliable biological and behavioral correlates to the human disease, to accelerate discovery of ASD biomarkers and streamline development of effective therapeutics. Rhesus monkeys are an ideal model for this long-term objective, as, like humans, they are a highly social species which displays stable and pronounced individual differences in social behavior. Research by our group at the California National Primate Research Center has shown that, at the behavioral extremes, low social vs. high social male monkeys initiate fewer affiliative interactions and display more inappropriate social behavior in their home corrals. With previous funding from Private Source our group developed a powerful behavioral screening tool to rapidly identify low social monkeys in this large population. We have also demonstrated in two independent cohorts that low social monkeys exhibit biomarker irregularities previously implicated in ASD patients, and that the degree of these biological irregularities is related to the degree of observed social deficits. In the current project Redacted by agreement and her team will develop objective and sensitive primate social behavior tests to better characterize the range and severity of impairments in low social monkeys and identify which biomarkers predict test performance. Redacted by agreement and her team will also begin biomarker-informed therapeutic testing in low social monkeys with the ultimate goal of improving social functioning in people with ASD.

PROGRESS REPORT:

Animals have been observed in the field corrals, low- and high-social animals were identified and tested in our

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social test battery. Plasma and cerebrospinal fluid (CSF) biomarkers have been obtained. Vasopressin concentrations in CSF have been identified as strongly co-varying with social abilities, and a treatment trial is underway to determine whether intra-nasal administration of vasopressin can affect social cognitive abilities.

PUBLICATIONS:

PMID	Title
29720452	Arginine vasopressin in cerebrospinal fluid is a marker of sociality in nonhuman primates.
29021623	Preference for novel faces in male infant monkeys predicts cerebrospinal fluid oxytocin concentrations later in life.

FUNDING SOURCES:

Redacted by Ph.D., PI: Private Source

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: FUNCTIONAL PLASTICITY IN THE HELICOBACTER PYLORI TYPE IV SECRETION SYSTEM, GRANT # R01-AI108713

SPID#: 643

UNIT/DIVISION: Infectious Diseases

TYPE: Research

START DATE: 7/7/2014

END DATE: 6/30/2019

GENERAL CATEGORY: Infectious Disease

SUB-CATEGORY: Gastrointestinal

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01AI108713

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Medicine; Microbiology and Immunology
Prin. NPRC Core Sci.		Medicine; Microbiology and Immunology
Other Core and Affil.		

PROJECT DESCRIPTION:

Helicobacter pylori causes clinical disease primarily in those individuals infected with a strain that carries the cytotoxin associated gene pathogenicity island (cagPAI). The cagPAI encodes a type IV secretion system (T4SS) that is required for injection of the CagA oncoprotein into epithelial cells and induction of the pro-inflammatory cytokine, interleukin-8 (IL-8). CagY is an essential component of the H. pylori T4SS that has an unusual sequence structure, in which an extraordinary number of direct DNA repeats is predicted to cause rearrangements that invariably predict in-frame insertions or deletions. We have demonstrated in murine and non-human primate models that immune-driven host selection of rearrangements in CagY is sufficient to cause gain or loss of function in the H. pylori T4SS. We hypothesize that CagY functions as a sort of molecular rheostat that alters the function of the T4SS and "tunes" the host inflammatory response so as to maximize persistent infection. We propose three specific aims to test this hypothesis. In Aim 1 we will determine the mechanism by which recombination in CagY alters the function of the H. pylori T4SS. Isogenic strains expressing variant CagY proteins that confer a functional or non-functional T4SS will be used to determine the capacity of CagY to bind and signal through $\beta 1$ integrins and through TLR5, characterize the topology of CagY in the bacterial membrane, examine the interaction between CagY and other essential PAI proteins, and determine if the DNA repeats are essential for T4SS function. In Aim 2 we will characterize the role of host immunity in selection for CagY-mediated modulation of function in the H. pylori T4SS using knockout and transgenic mouse models. The goal of Aim 3 is to better understand the physiological role of CagY and T4SS function using the highly relevant rhesus macaque model and strains from chronically infected patients. Completion of these experiments will characterize a novel strategy by which a bacterial secretion system alters the host immune response, and identify the mechanisms where the T4SS and host immunity intersect. These experiments will also enhance our understanding of the relationship between the PAI and the clinical outcome of infection, and

lead to a broader understanding of the relationship between chronic infection and inflammation.

PROGRESS REPORT:

Our focus during this reporting period was to characterize the mechanism by which changes in CagY alter intern binding (Aim 1), and to better understand the physiological role of cagY recombination in *H. pylori* infection (Aim 3). Aim 1 studies demonstrated that cagY recombination produces changes in specific binding to $\alpha 5\beta 1$ integrin, which parallel changes in Type IV secretion, suggesting that modulation in intern binding is the mechanism. We propose that CagY-dependent binding to $\alpha 5\beta 1$ integrin acts like a molecular rheostat that alters T4SS function and modulates the host immune response to promote persistent infection. These studies were published in 2018 in mBio. Aim 3 studies have focused on a model of *H. pylori* and *Salmonella* co-infection. The results suggest that *Salmonella* infection causes anemia, which deprives *H. pylori* of iron, and selects for cagY-dependent functional status of the type IV secretion system. These results are in preparation for publication.

PUBLICATIONS:

PMID	Title
29764950	CagY-Dependent Regulation of Type IV Secretion in <i>Helicobacter pylori</i> Is Associated with Alterations in Integrin Binding.

FUNDING SOURCES:

NIAID

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: ADOLESCENT AND ADULT OUTCOMES OF EARLY LIFE LACTOCRINE EXPOSURE

SPID#: 653

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE:

END DATE:

GENERAL CATEGORY: Metabolic

SUB-CATEGORY: Development

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER:

SUPPORTING ORGANIZATION: NSF

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Arizona State University
Prin. NPRC Core Sci.		Psychology, UC Davis
Other Core and Affil.		

PROJECT DESCRIPTION:

Who we are – our behavior, physiology, and health throughout our lives – is strongly influenced by our early life. Decades of experimental research in animal taxa and epidemiological studies of humans have demonstrated that nutrition in the womb and behavioral care after birth are instrumental for the developing young. Mother's milk sustains infant growth, development, and behavioral activity, but little is known about the effects of milk on offspring brain and behavior, especially after weaning during adolescence and adulthood. This project will investigate how mother's milk ingested in infancy influences neurobiology and social behavior in adolescence and adulthood by programming behavior during early life. Longitudinal, interdisciplinary research on how mother's milk shapes offspring, not only addresses key theoretical questions in animal behavior, but has important implications for infant nutrition, clinical recommendations, and human well-being. Such knowledge will inform maternal decisions about breast-feeding initiation and duration, improve replacement and supplemental formula compositions, influence clinical interventions during early life, and can shape institutional policy (e.g. parental leave).

PROGRESS REPORT:

Age of reproductive debut in macaques varies as a function of the timing of their birth in the birth season, social rank, and juvenile growth (Pittet et al. 2017). Additionally, macaque age of reproductive debut is associated with milk production- typical age of debut is associated with better milk production than is early or delayed reproductive debut (Pittet et al. 2017). Offspring of first time mothers experience deficits in long-term capacities including lower mass and status in adulthood, and compromised milk synthesis as both primiparous and multiparous mothers (Hinde et al. in prep). All adolescent behavioral observations are entered, data-cleaned, and preliminary analyses completed in preparation for modeling with neurobiological measures (N=36). MRI neuroimages are undergoing mapping for regions of interest (N=25/36 completed), and will be co-registered with

PET neuroenergetics data in Spring 2019. Assays for neurotransmitters in plasma and CSF are scheduled for Spring 2019.

PUBLICATIONS:

PMID	Title
28895116	Age at reproductive debut: Developmental predictors and consequences for lactation, infant mass, and subsequent reproduction in rhesus macaques (<i>Macaca mulatta</i>).

FUNDING SOURCES:

Redacted by
agreement

Ph.D., PI: funded by National Science Foundation, grant IOS1456174.

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: EPIGENETIC PROGRAMMING OF INNATE IMMUNITY IN PEDIATRIC AIRWAY
EPITHELIUM

SPID#: 660

UNIT/DIVISION: Respiratory

TYPE: Research

START DATE: 5/1/2017

END DATE: 2/28/2019

GENERAL CATEGORY: Respiratory

SUB-CATEGORY: Pediatric

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R21AI116129

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Anatomy, Physiology & Cell Biology, UCD School of Veterinary Medicine
Prin. NPRC Core Sci.		anatomy, Physiology & Cell Biology, UCD School of Veterinary Medicine
		anatomy, Physiology & Cell Biology, UCD School of Veterinary Medicine
Other Core and Affil.		

PROJECT DESCRIPTION:

The major goal of this study is to investigate the epigenetic mechanisms that regulate development of innate immune function in pediatric airway epithelium.

PROGRESS REPORT:

Study has been completed and manuscript has been submitted.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

NIH

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: ANTENATAL STEROID TREATMENT STRATEGIES FOR LOW RESOURCE COUNTRIES

SPID#: 661

UNIT/DIVISION: Respiratory

TYPE: Research

START DATE: 5/1/2017

END DATE: 2/28/2019

GENERAL CATEGORY: Respiratory

SUB-CATEGORY: Pediatric

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER: Grant # 136748

SUPPORTING ORGANIZATION: Private Source

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Anatomy, Physiology & Cell Biology, UCD School of Veterinary Medicine
Prin. NPRC Core Sci.		Anatomy, Physiology & Cell Biology, UCD School of Veterinary Medicine
Other Core and Affil.		Cincinnati Children's Hospital

PROJECT DESCRIPTION:

The major goal of this project is to test the dose and effectiveness of multiple steroid formulations during pregnancy, with the goal of preventing preterm birth.

PROGRESS REPORT:

Studies have been completed. Manuscript in preparation.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

Private Source

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: IMPACT OF CHRONIC VIRAL INFECTIONS AND ALTERED MICROBIOTA ON HIV VACCINE EFFICACY

SPID#: 668

UNIT/DIVISION:

TYPE:

START DATE:

END DATE:

GENERAL CATEGORY: Infectious Disease

SUB-CATEGORY: Adult

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R56AI120739

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Medical Microbiology and Immunology
Prin. NPRC Core Sci.		Infectious Disease Unit
		Infectious Disease Unit
Other Core and Affil.		Veterinary Medicine

PROJECT DESCRIPTION:

The gut microbiota are important in human health and disease due to their potential ability to influence host immune response to pathogens and environmental stimuli. The gut microbiota dysbiosis is found in inflammatory non-infectious and infectious diseases including chronic HIV disease. Altered microbiome due to preexisting infections or inflammatory conditions have been implicated in increased HIV transmission. Most microbiome studies during vaccinations were correlative and focused on the changes in the microbiota following the immunizations. Our understanding remains limited regarding the impact of the microbiome on inducing the host immune responses to vaccines and to the viral transmission. This study investigated the influence of the gut microbiome on the induction of the host immune responses to HIV vaccine. The study capitalized on the unique resource of the specific pathogen free (SPF) animals and non-SPF animals at the California National Primate Center (CNPRC) that have distinct gut microbiota that correlate with phenotypically and functionally diverse T and B cells. We examined the impact of the gut microbiome composition on the immunogenicity of flu vaccine and RhCMV-SIV vaccine in the SPF and non-SPF rhesus macaques.

PROGRESS REPORT:

Subclinical viral infections (SVI), including cytomegalovirus (CMV), are highly prevalent in humans, resulting in lifelong persistence. However, the impact of SVI on the interplay between the host immunity and gut microbiota in the context of environmental exposures is not well defined. We utilized the preclinical nonhuman primate (NHP) model consisting of SVI-free (specific-pathogen-free [SPF]) rhesus macaques and compared

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them to the animals with SVI (non-SPF) acquired through natural exposure and investigated the impact of SVI on immune cell distribution and function, as well as on gut microbiota. These changes were examined in animals housed in the outdoor environment compared to the controlled indoor environment. We found that SVI are associated with altered immune cell subsets and gut microbiota composition in animals housed in the outdoor environment. Non-SPF animals harbored a higher proportion of potential butyrate-producing Firmicutes and higher numbers of lymphocytes, effector T cells, and cytokine-producing T cells. Surprisingly, these differences diminished following their transfer to the controlled indoor environment, suggesting that non-SPFs had increased responsiveness to environmental exposures. An experimental infection of indoor SPF animals with CMV resulted in an increased abundance of butyrate-producing bacteria, validating that CMV enhanced colonization of butyrate-producing commensals. Finally, non-SPF animals displayed lower antibody responses to influenza vaccination compared to SPF animals. Our data show that subclinical CMV infection heightens host immunity and gut microbiota changes in response to environmental exposures. This may contribute to the heterogeneity in host immune response to vaccines and environmental stimuli at the population level.

Immunization of SPF and non-SPF animals with RhCMV-SIV vaccine showed that SIV specific immune responses were higher in SPF animals. Our data suggest that the presence of subclinical CMV may alter vaccine responses in the host.

PUBLICATIONS:

PMID	Title
29669841	Subclinical cytomegalovirus infection associates with altered host immunity, gut microbiota and vaccine responses.

FUNDING SOURCES:

R56AI120739, P51OD011107, AI123105

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: EFFECTIVE LETHAL AGENTS FOR CCR5-EXPRESSING MEMORY T CELLS

SPID#: 671

UNIT/DIVISION: Infectious Disease

TYPE: Research

START DATE: 9/1/2014

END DATE: 8/31/2018

GENERAL CATEGORY: AIDS

SUB-CATEGORY: Therapy

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R21AI116230

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Medical Microbiology and Immunology
Prin. NPRC Core Sci.		Medical Microbiology and Immunology
Other Core and Affil.		

PROJECT DESCRIPTION:

Design immunotoxins and bispecific antibodies that can kill the CCR5+ cells that likely harbor HIV.

PROGRESS REPORT:

Effect therapeutic agents were designed and are being tested.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: DEVELOPMENT OF A NONHUMAN PRIMATE MODEL AS A TOOL TO EVALUATE STEM CELL DERIVED REPLACEMENT THERAPIES

SPID#: 672

UNIT/DIVISION: Primate Medicine

TYPE: Research

START DATE: 7/30/2015

END DATE: 6/26/2019

GENERAL CATEGORY: Neural

SUB-CATEGORY: Model

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER:

SUPPORTING ORGANIZATION: CNPRC

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Veterinary Medicine and Epidemiology
Prin. NPRC Core Sci.		
Other Core and Affil.		Department of Neurology, David Geffen School of Medicine at UCLA

PROJECT DESCRIPTION:

This protocol includes studies of a unilateral L6-S3 ventral root avulsion injury, surgical root replantation using a peripheral nerve bridging graft, and injection of human stem cell-derived motor neurons into the L6-S1 spinal cord segment. The unilateral L6-S3 ventral roots will be avulsed in all animals. The avulsed L6-S1 ventral roots will be surgically replanted into the spinal cord using an intercostal nerve segment harvested from the T11 intercostal nerve. Human stem cell-derived motor neurons will be injected into the L6-S1 spinal cord segments. The animals will be immuno-suppressed pharmacologically. At 2 or 7 months post-operatively, animals will be euthanized and spinal cord tissues preserved for morphological studies to determine the survival and differentiation of transplanted cells in the spinal cord. Studies of treadmill locomotion, urodynamic function, pain behavior, magnetic resonance imaging, and electromyography (EMG) of the external anal sphincter will be performed to assess effects of ventral root injury, repair and cell transplantation on neurological functions associated with the lumbosacral spinal cord.

PROGRESS REPORT:

All animal related procedures have been completed; however, the tissues are still being extensively analyzed at this time.

PUBLICATIONS:

PMID	Title
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PMID	Title
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In manuscript preparation at this time.

FUNDING SOURCES:

Private Source

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: DETERMINING THE DYNAMIC INFLUENCE OF SOCIAL NETWORKS ON DEVELOPMENT AND HEALTH TRAJECTORIES

SPID#: 674

UNIT/DIVISION:

TYPE:

START DATE:

END DATE:

GENERAL CATEGORY: Behavior

SUB-CATEGORY: Behavior

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER: R01GM114017

SUPPORTING ORGANIZATION: Dr.

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	SVM: Population Health & Reproduction
Prin. NPRC Core Sci.		Neuroscience and Behavior Unit, CNPRC
Other Core and Affil.		

PROJECT DESCRIPTION:

The ability to treat and prevent illness and improve human health requires not only a detailed understanding of the complex interplay of biological systems contributing to disease processes but also the mechanisms underlying the influence of social complexity on biological systems. A developmental systems science approach provides methods uniquely suited to elucidate the mechanisms by which social systems influence health by investigating their effects on modulating the interplay among biological systems during development. The proposed research adopts this approach by modeling multi-level networked systems over time in a well-established nonhuman primate model. We predict that the coordination and regulation of biological systems within individuals are critical to shaping health trajectories and are dynamically modulated by the complex network structure of individuals' social relationships.

PROGRESS REPORT:

Data collection is ongoing. This project includes following 2 cohorts of animals for 3 years. We are completing the fourth year of study in which data collection will be completed for the first cohort of animals and year 3 of the second cohort of animals in the study is underway. Health data will be analyzed during this and the final year of study. Publications will be prepared and submitted starting this and continuing into next year.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: INDIVIDUAL DIFFERENCES IN EARLY AUTONOMIC NERVOUS SYSTEM ACTIVITY

SPID#: 677

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE: 12/4/2015

END DATE: 11/30/2018

GENERAL CATEGORY: Behavior

SUB-CATEGORY: Development

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R21HD086356

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Neuroscience and Behavior (CNPRC), Psychology (UCD)
Prin. NPRC Core Sci.		Neuroscience and Behavior (CNPRC), Psychology (UCD)
		Neuroscience and Behavior (CNPRC), Psychology (UCD)
Other Core and Affil.		

PROJECT DESCRIPTION:**PROGRESS REPORT:****PUBLICATIONS:**

PMID	Title
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FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: EPITHELIAL STEM CELLS AS REPAIR AGENTS IN DIFFUSE ALVEOLAR DAMAGE

SPID#: 679

UNIT/DIVISION: Respiratory

TYPE: Research

START DATE: 3/1/2017

END DATE: 2/28/2019

GENERAL CATEGORY: Respiratory

SUB-CATEGORY: Regenerative Medicine

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01HL127002

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Anatomy, Physiology, & Cell Biology, UCD School of Veterinary Medicine
Prin. NPRC Core Sci.		Anatomy, Physiology, & Cell Biology, UCD School of Veterinary Medicine
Other Core and Affil.		Boston University
		University of Texas Southwestern

PROJECT DESCRIPTION:

The major goal of this subcontract is to investigate the growth of alveoli in a nonhuman primate model of lung resection.

PROGRESS REPORT:

We are currently completing data collection and conducting analysis in preparation for a manuscript.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

NIH

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: THE INTERPLAY OF ORAL VACCINES, ORAL IMMUNITY AND THE ORAL MICROBIOME IN INFANTS

SPID#: 681

UNIT/DIVISION: CNPRC-Infectious Diseases

TYPE: Research

START DATE: 9/1/2016

END DATE: 8/31/2018

GENERAL CATEGORY: AIDS

SUB-CATEGORY: Immunology

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R56DE026321

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	University of North Carolina, Chapel Hill
Prin. NPRC Core Sci.		CNPRC-Infectious Diseases
Other Core and Affil.		

PROJECT DESCRIPTION:

HIV-1 is primarily mucosally transmitted. The human HIV-1 vaccine trials have taught us important lessons about vaccine vectors, immunogen design, and immune responses important for protective efficacy. Yet, none of the human HIV-1 vaccine trials tested whether a mucosal route of immunization could contribute to protection against HIV-1 acquisition at the portals of entry. Despite some unique challenges that mucosal vaccines present, several oral vaccines against infectious diseases have been successfully developed and licensed. The success of oral vaccines is based on the rich regional lymphatic network of the Waldeyer's Ring that provides an easily accessible portal for oral vaccine uptake, and, as an intrinsic part of the systemic lymphatic network, enables the induction of local and systemic protective immune responses. An oral HIV-1 vaccine would be particularly relevant for the prevention of mother-to-child-transmission of HIV-1. As part of these studies, we will also study the interplay of oral immune responses and the oral microbiome.

PROGRESS REPORT:

A number of oral SIV inoculation experiments were performed in infant macaques to better investigate early immune responses and sites of viral entry.

PUBLICATIONS:

PMID	Title
29237287	Early Sites of Virus Replication After Oral SIV Infection in Infant Macaques: Implications for Pathogenesis.

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FUNDING SOURCES:

NIH

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: EVALUATION OF A BMS ANTIBODY IN THE FRUCTOSE-FED RHESUS MONKEY MODEL OF DYSLIPEDEMIA

SPID#: 683

UNIT/DIVISION: Affiliate Scientist - VM: Molecular Biosciences and CNPRC - Associate Director

TYPE: Research

START DATE: 10/7/2015

END DATE: 7/3/2018

GENERAL CATEGORY: Metabolic

SUB-CATEGORY: Cardiovascular

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER: Grant #201600048

SUPPORTING ORGANIZATION: Private Source

SPECIFIC INFORMATION: Private Source

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement DVM, PhD	VM: Molecular Biosciences and Nutrition
Prin. NPRC Core Sci.	 DVM	Associate Director, CNPRC
Other Core and Affil.		

PROJECT DESCRIPTION:

The purpose of this project was to evaluate the effects of a novel proprietary antibody formulated by BMS to lower circulating (plasma) triglyceride (TG) concentration in adult rhesus monkeys with high triglycerides resulting from consumption of moderate fat diet accompanied by high sugar (fructose) beverages sweetened with high fructose corn syrup (HFCS). This diet-induced nonhuman model of dyslipidemia was developed by Dr. Redacted by agreement laboratory at the California National Primate Research Center, in part with funding from the National Institutes of Health and the Private Source

PROGRESS REPORT:

A pilot study was performed in 10 adult male rhesus monkeys to determine magnitude of the effects of a moderate fat typical American diet (TAD) that we had had specifically formulated for the study along with 500 ml/day of HFCS to raise plasma TG levels during a 4 week intervention period. Eighty percent (8 of 10) animals consumed the diet readily and in these animals there were substantial increases of plasma concentrations of TG and apolipoprotein-C3. Therefore, this diet regimen was appropriate for inducing hypertriglyceridemia in animals used for the main study. The full study was completed in April 2018. Eight animals received the BMS antibody via intravenous injections and six animals received vehicle injection. Circulating levels of the target protein were decreased following administration of the antibody and there was a moderate lowering of TG and VLDL-TG, particularly in animals with higher baseline fasting TG levels. The half-life of the antibody was also determined. BMS has been provided with samples and data and are determining future steps for development as of the antibody as a therapeutic for patients with very high TG levels who are at risk for developing pancreatitis a serious and potentially life-threatening condition.

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PUBLICATIONS:

PMID	Title
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None at this time.

FUNDING SOURCES:

Research contract with

Private Source

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: SILK-BASED FORMULATION FOR MICROBICIDE DELIVERY

SPID#: 685

UNIT/DIVISION:

TYPE:

START DATE:

END DATE:

GENERAL CATEGORY: Infectious Disease

SUB-CATEGORY: AIDS

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01AI112011

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Medical Microbiology and Immunology
Prin. NPRC Core Sci.		Infectious Disease Unit
Other Core and Affil.		

PROJECT DESCRIPTION:

Topical microbicides are well recognized to be an important part of HIV prevention. However, to be used as a practical regimen, microbicides must meet certain requirements including superior functionality, stability without refrigeration and user acceptability. Protein HIV entry inhibitors are highly promising microbicide candidates with picomolar to nanomolar effectiveness and excellent pre-clinical properties. However, such inhibitors often require refrigeration due to a lack of stability at prolonged high temperatures. We propose a novel strategy to address this challenge using recent advances in the use of an FDA approved biomaterial, silk protein, to stabilize HIV inhibitors without refrigeration. The goal of this project is to study topical HIV microbicides in silk-based film forms that will provide both stability and sustained release of the inhibitors. The objective is to determine the microbicidal effectiveness of potent HIV entry inhibitors such as Griffithsin, in combination with silk films, to provide stabilization without refrigeration in a film material format for direct use by patients. We will use the preclinical rhesus macaque model for assessing the efficacy of the silk platform for the delivery of HIV inhibitor in vaginal and rectal mucosa.

PROGRESS REPORT:

During the reporting period, we optimized the methodology of administering the silk inserts into the vaginal and rectal mucosa in rhesus macaques, optimized the viral entry inhibitor payload in the delivery silk platform. We investigated the resistance/prevention of the viral infection in the vaginal and rectal mucosal tissues ex vivo and found that silk embedded griffithsin was highly effective in protecting the tissue against SHIV viral challenge. These findings support further investigations on the silk delivery platform for enhancing mucosal protection and specifically for women's health and protection against viral infection. A manuscript is being prepared describing our findings.

PUBLICATIONS:

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PMID	Title
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FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: ARE ADVERSE HEALTH EFFECTS FROM AIR POLLUTION EXPOSURE PASSED FROM MOTHER TO CHILD?

SPID#: 687

UNIT/DIVISION: Respiratory Diseases Unit

TYPE: Research

START DATE: 5/1/2017

END DATE: 2/28/2019

GENERAL CATEGORY: Respiratory

SUB-CATEGORY: Pediatric

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER: Study Contract # 15-303

SUPPORTING ORGANIZATION: CA Air Res Board

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Anatomy, Physiology & Cell Biology, UCD School of Veterinary Medicine
Prin. NPRC Core Sci.		Anatomy, Physiology & Cell Biology, UCD School of Veterinary Medicine
Other Core and Affil.		

PROJECT DESCRIPTION:

The major goal of this project is to assess whether wildfire PM and ozone exposure in rhesus monkeys housed outdoors at the California National Primate Research Center elicits transgenerational effects in offspring.

PROGRESS REPORT:

Completed data collection and conducting analysis for manuscript preparation.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: GLUTAMATE RECEPTORS IN AGING CORTICAL CIRCUITS

SPID#: 688

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE: 4/1/2016

END DATE: 3/31/2019

GENERAL CATEGORY: Neural

SUB-CATEGORY: Aging

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R37AG006647

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Neurology, Primate Center
Prin. NPRC Core Sci.		Neurology, Primate Center
Other Core and Affil.		

PROJECT DESCRIPTION:

This is a long-standing RO1 that became a MERIT Award in 2007, and is currently in no-cost extension. The grant is from NIA. This project is directed at characterizing the age-related synaptic alterations that lead to cognitive decline in rhesus monkeys. In recent years, we have expanded into new cortical regions such as primary visual cortex and inferior parietal cortex, but the majority of the work over the years has focused on hippocampus and prefrontal cortex. We have discovered structural, molecular, and bioenergetic synaptic alterations that compromise synaptic and cognitive health.

PROGRESS REPORT:

We recently reported novel findings regarding synaptic aging in the intraparietal sulcus (area 7a), an area tightly interconnected with the prefrontal cortex (PFC). We had shown previously that a particular class of highly plastic spines, thin spines, were uniquely vulnerable to aging in PFC and the degree to which they are lost is predictive of age-related cognitive decline. We have now shown that area 7a shows the same pattern of synaptic aging, and it is also predictive of cognitive decline, whereas primary visual cortex shows no such synaptic vulnerability.

PUBLICATIONS:

PMID	Title
30355632	Selective Loss of Thin Spines in Area 7a of the Primate Intraparietal Sulcus Predicts Age-Related Working Memory Impairment.

FUNDING SOURCES:

NIH/NIA

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: CHNF PARTNERSHIP WITH DEPT OF VA: GORDON MANSFIELD SPINAL CORD INJURY CONSORTIUM WITH UC DAVIS

SPID#: 690

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE: 8/31/2016

END DATE: 9/30/2020

GENERAL CATEGORY: Neural

SUB-CATEGORY: Regenerative Medicine

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER: 608397

SUPPORTING ORGANIZATION: Private Source

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Primate Services CNPRC
Prin. NPRC Core Sci.		Primate Services CNPRC
Other Core and Affil.		

PROJECT DESCRIPTION:

This project seeks to develop a stem cell-based therapy to repair the chronically injured non-human primate (NHP) spinal cord and to maximize functional recovery, using cell-based therapy combined with innovative rehabilitation strategies to maximize functional outcomes.

The proposal focuses on the transplantation of multipotent neural progenitor cells derived from approved embryonic stem cell lines, in a chronic (3-6 month delay) hemiconfusion spinal cord injury NHP model. The emphasis will be on recovery of hand function in the affected limb. The work proposed is a needed transitional step between initial results obtained from rodent studies to clinical trials in humans.

PROGRESS REPORT:

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: PRODUCTION OF PEDIGREED SPF RHESUS MACAQUES

SPID#: 691

UNIT/DIVISION: Primate Services

TYPE: Management

START DATE: 2/1/2016

END DATE: 1/31/2020

GENERAL CATEGORY:

SUB-CATEGORY:

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: U42OD010990

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Primate Services CNPRC
Prin. NPRC Core Sci.		Primate Services CNPRC
Other Core and Affil.		

PROJECT DESCRIPTION:

The objective of this project is to implement a colony--wide assessment program that will identify animals differing in biobehavioral organization, and to provide this information to (a) colony managers to aid in decision--making in the areas of health, reproduction, and enrichment, and (b) investigators for use in scientific studies.

PROGRESS REPORT:

The breeding colony of Indian-origin SPF animals now totals 537 animals, and is self-sustaining through natural breeding and maternal rearing in existing social groups. There are currently 3 breeding corrals each representing a stable social group of macaques that are producing offspring on annual basis. These animals are then available for harvest and assignment as needed. There were 88 infants born in the 2018 season and we expect similar numbers in 2019. Animals are screened twice yearly at scheduled roundups along with physical exams, weights, TB testing, vaccinations and tattooing. We anticipate this colony will continue to be self-sustaining and stable.

PUBLICATIONS:

PMID	Title
PMID: 29669841	PMID not found in PubMed

FUNDING SOURCES:

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**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: MATERNAL OBESITY AND WEIGHT CHANGE IN NEUROBEHAVIORAL DEVELOPMENT

SPID#: 698

UNIT/DIVISION: RSRM

TYPE: Research

START DATE: 8/1/2016

END DATE: 4/30/2020

GENERAL CATEGORY: Metabolic

SUB-CATEGORY: Development

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01HD084203

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Obstetrics and Gynecology
Prin. NPRC Core Sci.		Obstetrics and Gynecology
		Psychology
Other Core and Affil.		Obstetrics and Gynecology
		Internal Medicine
		Psychiatry and Behavioral Sciences

PROJECT DESCRIPTION:

The proposed research plan will use the non-human primate (NHP) model to elucidate obesity-associated physiological mechanisms in pregnancy likely to be involved in ASD-like neurodevelopmental compromise. Additionally, we will evaluate the effectiveness of two maternal intervention strategies – restricted gestational weight gain and use of the pharmacologic agent pravastatin – in reversing the effects of maternal obesity on the maternal, fetal and infant physiology. Weight management has been recommended by both the Institute of Medicine and the American Congress of Obstetricians and Gynecologists for management of obesity in pregnancy. Pravastatin has been shown to reduce angiogenic imbalance, endothelial injury, inflammation, and oxidative stress, providing biological plausibility for its use in preventing the systemic, placental and fetal consequences of maternal obesity.

PROGRESS REPORT:

1. We enrolled 40 dams in equal numbers to four groups: Obese, Obese weight maintenance, Obese pravastatin, Healthy weight control. Serial data and biological samples were collected during pregnancy. Infant social, adaptive and cognitive behavioral parameters were measured to 6 months of age, at which time necropsy was performed for creation of a tissue archive.
2. All Project Labs are analyzing data and / or biological samples.
 - a. Walker / VandeVoort - Pregnancy data, infant growth, hematology, housing and pairing data

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- b. Bauman / Golub - Infant social and cognitive behavioral data
- c. Capitanio - Infant biobehavioral assessment data
- d. Van de Water - Maternal, fetal and infant immune markers
- e. Slupsky - Maternal, fetal and infant metabolome profiles
- f. Taha - Maternal, fetal and infant lipidome profiles
- g. LaSalle - Maternal, placental and infant methylome profiles

PUBLICATIONS:

PMID	Title
29900528	Adiposity and weight gain during pregnancy associate independently with behavior of infant rhesus monkeys (<i>Macaca mulatta</i>).

FUNDING SOURCES:

NICHHD

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: GI-ARS NHP MODEL ASSESSMENT WITH RX100

SPID#: 699

UNIT/DIVISION: CNPRC Infectious Diseases

TYPE: Research

START DATE: 1/31/2016

END DATE: 5/31/2018

GENERAL CATEGORY: Animal

SUB-CATEGORY: Gastrointestinal

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER:

SUPPORTING ORGANIZATION: RxBio

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	CNPRC Infectious Diseases
Prin. NPRC Core Sci.		CNPRC Infectious Diseases
Other Core and Affil.		

PROJECT DESCRIPTION:

There is a large threat for a nuclear attack by terrorists or a nuclear war instigated by incompetent governments, both domestically as well as internationally. There is currently no good strategy to mitigate the gastrointestinal acute radiation syndrome (GI-ARS). The goal of the study is to test the efficacy of Rx100 as medical countermeasure in a nonhuman primate model of the gastrointestinal acute radiation syndrome (GI-ARS). These studies are performed as part of a series of experiments to fulfill the animal rule as part of a future application to obtain FDA approval for Rx100.

PROGRESS REPORT:

We observed that Rx100 treatment, when initiated 24 hours after radiation, has a beneficial effect on the survival. This was supported by histology data.

PUBLICATIONS:

PMID	Title

FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: DEVELOPMENT OF A NONHUMAN PRIMATE MODEL OF FETAL ZIKA VIRUS INFECTION AND DISEASE

SPID#: 700

UNIT/DIVISION: CNPRC

TYPE: Research

START DATE: 11/14/2016

END DATE: 10/31/2019

GENERAL CATEGORY: Infectious Disease

SUB-CATEGORY: Viral

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R21AI129479

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	CNPRC-Infectious Diseases
Prin. NPRC Core Sci.		CNPRC-Infectious Diseases
Other Core and Affil.		

PROJECT DESCRIPTION:

Zika virus (ZIKV) infection of pregnant women is associated with the development of microcephaly and other neurological problems in their newborns. The project is aimed at developing a nonhuman primate model of maternal and fetal Zika virus infection. Such a model is critical to develop better tools to monitor infection and to develop safe and effective treatments and vaccines.

PROGRESS REPORT:

We infected 10 pregnant macaques with zika virus during different times of gestation, and observed an increased rate of fetal loss, and development of brain and/or ocular lesions in fetuses that made it to term.

PUBLICATIONS:

PMID	Title
29967348	Miscarriage and stillbirth following maternal Zika virus infection in nonhuman primates.
29925843	Intraamniotic Zika virus inoculation of pregnant rhesus macaques produces fetal neurologic disease.

FUNDING SOURCES:

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**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: RECIPIENT EPIDEMIOLOGY AND DONOR EVALUATION STUDY III (REDS-III) - CHARACTERIZATION OF BLOOD TRANSFUSION-TRANSMISSION OF ZIKA VIRUS

SPID#: 701

UNIT/DIVISION:

TYPE: Research

START DATE: 9/16/2016

END DATE: 8/31/2018

GENERAL CATEGORY: Infectious Disease

SUB-CATEGORY: Blood Disease

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER: HHSN2682011000011

SUPPORTING ORGANIZATION: Private Source

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Blood Systems Research Institute
Prin. NPRC Core Sci.		CNPRC
Other Core and Affil.		

PROJECT DESCRIPTION:

Zika virus can be transmitted via blood transfusions. There is an urgent need to better understand the risks associated with blood transfusion, and whether current diagnostics are sufficient to consider a blood product safe. In addition, there is a need to pathogen reduction technologies to reduce the potential. The study will develop a nonhuman primate model to mimic transmission through blood transfusion, including the minimal infectious dose, the effect of antibodies, and the efficacy of pathogen reduction technologies.

PROGRESS REPORT:

A number of studies have been performed that evaluated the minimal dose of zika to induce infection by the intravenous route.

PUBLICATIONS:

PMID	Title

FUNDING SOURCES:

HHSN

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**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: THE NEURAL BASIS OF PAIR-BONDING IN FEMALE TITI MONKEYS

SPID#: 56001

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE: 7/14/2017

END DATE: 4/30/2022

GENERAL CATEGORY: Neural

SUB-CATEGORY: Behavior

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01HD092055

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	<div style="border: 1px solid black; padding: 5px; min-height: 80px;"> Redacted by agreement </div>	Psychology
Prin. NPRC Core Sci.		Psychology
Other Core and Affil.		Psychology

PROJECT DESCRIPTION:

The neurobiology of social behavior is of crucial importance not only in order to understand our own basic biology, but also for cases in which social behavior is impaired (for example, autism spectrum disorder and schizophrenia). The effects of social support on long-term health are now largely undisputed; and the dangers of loneliness are also increasingly well-recognized. For instance, a recent meta-analysis found that poor social relationships led to 29% increased risk for coronary heart disease, and a 32% increased risk for stroke. Our own prior investigations on the neurobiology of primate social bonds, like many others, have focused on males. Females represent a crucial and under-studied population when it comes to both psychiatric disorders of social behavior and studies of primate pair-bonding. Females are also more likely to be diagnosed with affective disorders, such as major depressive disorder, which may have critically understudied social risk factors, such as social stress. Here we propose a series of investigations into the neurobiological basis of attachment in female titi monkeys, a socially monogamous New World primate, using pharmacology and functional imaging to address fundamental questions about the substrates for sociality. Our overarching hypothesis is that the transition from attachment to parents to attachment to a pair-mate, may rely on neuropeptide receptor function, particularly the neuropeptides oxytocin and vasopressin. We will study these questions in adolescent and adult female titi monkeys. We will use behavioral pharmacology to investigate the effects of oxytocin and vasopressin manipulation on the fundamental traits of an attachment (preference for the partner/parent, distress upon separation, and social buffering). We use functional imaging to examine dynamic changes in glucose uptake in areas that we know to have oxytocin or vasopressin receptors in titi monkeys, in response to manipulations including the presence or absence of an attachment figure. Finally, we will use molecular techniques to examine changes in methylation of the oxytocin and vasopressin receptors across the course of pair-bonding, separation, and buffering from stress.

PROGRESS REPORT:

During this grant year, we have made significant progress on all Specific Aims.

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Specific Aim 1 focuses on the neural basis of social bonding between juvenile females and their fathers. Because we enroll the subjects as they reach the appropriate age, this particular aim will take several years to complete. We have now finished 5 of 10 subjects for Experiment 1.1; 6 of 10 subjects for Experiment 1.2; and 4 of 10 subjects for Experiment 1.3. We will be actively testing 3 additional subjects this summer, and we project finishing Aim 1 by summer 2020.

Specific Aim 2 focuses on the neural basis of social bonding between adult females and their partners. For Experiment 2.1, we have completely finished data collection and are starting to co-register scans and quantify regions of interest. Experiments 2.2 and 2.3 will be started in Years 3 and 4 of the project.

Specific Aim 3 focuses on the epigenetic regulation of attachment. Samples for Experiments 3.2 and 3.3 are being collected simultaneously with the experiments in Aims 1 and 2. Meanwhile, we have been slicing archived brain tissue in order to perform Experiment 3.1. We should finish tissue slicing and initial assays of DNA methylation this summer.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

NICHD

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: NEURAL MECHANISMS OF SOCIAL AFFECT INDUCTION

SPID#: 56002

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE: 3/24/2017

END DATE: 2/28/2019

GENERAL CATEGORY: Neural

SUB-CATEGORY: Behavior

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R21MH112539

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Neuroscience and Behavior (CNPRC), Psychology (UCD)
Prin. NPRC Core Sci.		Neuroscience and Behavior (CNPRC), Psychology (UCD)
Other Core and Affil.		

PROJECT DESCRIPTION:

PROGRESS REPORT:

PUBLICATIONS:

PMID	Title

FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: QUANTITATIVE NEUROANATOMICAL ANALYSIS OF ZIKA-EXPOSED
MACAQUE BRAINS

SPID#: 56003

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE: 9/25/2017

END DATE: 8/31/2019

GENERAL CATEGORY: Neural

SUB-CATEGORY: Development

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R21NS104692

**SUPPORTING
ORGANIZATION:** NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	<div style="border: 1px solid black; padding: 5px;"> Redacted by agreement </div>	Neuroscience and Behavior
Prin. NPRC Core Sci.		Neuroscience and Behavior
		Neuroscience and Behavior
		Infectious Disease
Other Core and Affil.		

PROJECT DESCRIPTION:

PROGRESS REPORT:

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: NHP GENE BASED NEUROMODULATION

SPID#: 56006

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE: 4/13/2018

END DATE: 12/31/2019

GENERAL CATEGORY: Neural

SUB-CATEGORY: Therapy

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER: Private Source

SUPPORTING ORGANIZATION:

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Neurology, Primate Center
Prin. NPRC Core Sci.		Neurology, Primate Center
Other Core and Affil.		

PROJECT DESCRIPTION:

This project aims to develop a new therapeutic approach based on gene therapy for chronic pain.

PROGRESS REPORT:

The surgeries have been initiated and expression of the viral vector has been demonstrated

PUBLICATIONS:

PMID	Title

FUNDING SOURCES:

Private Source

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: A MONKEY MODEL OF NATURALLY OCCURRING SOCIAL IMPAIRMENTS

SPID#: 56007

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE:

END DATE:

GENERAL CATEGORY: Behavior

SUB-CATEGORY: Development

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01HD087048

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Stanford University
Prin. NPRC Core Sci.		Psychology, UC Davis
Other Core and Affil.		

PROJECT DESCRIPTION:

Autism spectrum disorder (ASD) is characterized by social impairments and affects 1 in 68 US children, but remains poorly understood. Few biomarkers of ASD have been identified, hindering the understanding of its basic biology; nor are there any medications that treat the social deficits of ASD. Progress has been impeded by 1) the difficulty of obtaining relevant tissue samples from patients and matched controls, and 2) in mouse models, the discordance between complex human behavior and laboratory-based mouse behavior, even with shared genetic etiologies. These two limitations underscore the tremendous value in developing an animal model of social deficits with more reliable behavioral and biological correlates to the human disease. Rhesus monkeys are an ideal model organism. At the behavioral extremes, low-social compared to high-social male rhesus monkeys initiate fewer affiliative interactions and display more inappropriate social behavior, suggesting both lower social motivation and poorer social skills. Naturally occurring low-social behavior in male rhesus monkeys therefore presents an exceptional opportunity to study the biology of social impairments.

On the basis of promising pilot data, we will collect quantitative social behavior data in a larger validation cohort of 1-5 year old male monkeys. We will also test: whether our candidate biomarkers of social functioning (e.g., oxytocin and arginine-vasopressin; kinase signaling) correctly classify monkeys as low-social vs. high-social and whether the degree of biomarker dysregulation co-varies with the degree of social deficits. We will also test, for the first time, whether the same or different biomarkers predict social deficits in low-social females. Finally, we will create the first standardized primate social behavior test battery to better characterize the impairments of low-social monkeys with direct relevance to core autism symptoms (e.g., deficits in joint attention, face recognition, social learning, social competence, theory of mind, peer social preferences).

PROGRESS REPORT:

More than 200 animals were observed in our field cages, and low- and high-social animals were identified. Blood and cerebrospinal fluid were obtained and analyzed for a variety of biomarkers. The social test battery was

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developed and piloted, and all male subjects from our study were run through this standardized battery.

PUBLICATIONS:

PMID	Title
29720452	Arginine vasopressin in cerebrospinal fluid is a marker of sociality in nonhuman primates.
29021623	Preference for novel faces in male infant monkeys predicts cerebrospinal fluid oxytocin concentrations later in life.

FUNDING SOURCES:

Redacted by agreement

PI: funded by NICHD.

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: NEUROIMMUNE MECHANISMS OF PSYCHIATRIC DISORDERS - PROJECT 3

SPID#: 56008

UNIT/DIVISION: Neuroscience and Behavior, CNPRC

TYPE: Research

START DATE: 4/1/2018

END DATE: 3/31/2019

GENERAL CATEGORY: Neural

SUB-CATEGORY: Psychiatric

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: P50MH106438

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Psychiatry and Behavioral Sciences
Prin. NPRC Core Sci.		Neuroscience and Behavior, CNPRC
Other Core and Affil.		Psychiatry and Behavioral Sciences

PROJECT DESCRIPTION:

The overarching goal of Project 3 of the UC Davis Conte Center is to monitor brain development following maternal immune activation during pregnancy. This will primarily be accomplished by carrying out magnetic resonance imaging of nonhuman primates. Ultimately, the nonhuman primate studies will be compared and contrasted with studies carried out in MIA exposed mice and in human patients undergoing their first episode of schizophrenia. We have proposed the following specific aims:

Specific Aim 1: Determine normal and abnormal trajectories of structural brain development for non-human primate controls and individuals exposed to MIA during gestation. Longitudinal, multimodal structural MRI analyses will be carried out on age-matched controls and MIA-exposed rhesus monkeys to detect abnormal trajectories of brain development. Monkeys will be scanned at 1, 6, and 12 months and 2, 3 and 4 years after birth. Structural MRI scans will enable regional volumetric analyses of grey and white matter and diffusion tensor weighted imaging will be used to evaluate the organization of major fiber bundles. These techniques will provide a comprehensive assessment of potential structural alterations of brain development due to MIA.

Specific Aim 2: Identify atypical functional connectivity in nonhuman primate controls and individuals exposed to MIA during gestation. Resting-state functional magnetic resonance imaging (rsfMRI) of age-matched controls and MIA exposed rhesus monkeys will be carried out. rsfMRI is an accepted method for probing functional connectivity in the brain of organisms even during sleep and anesthesia; this makes it ideal for probing the functional organization of the nonhuman primate brain. We will employ independent component analysis and region of interest seed analyses to evaluate whether MIA leads to alterations of established functional networks.

Specific Aim 3: Compare the MIA-induced abnormal brain organization signature established in nonhuman primates to brain abnormalities observed in MIA exposed mice and human patients undergoing their first episode of SZ. 3.a. Identify alterations in structure and functional connectivity in the brains of mice exposed to MIA and compare with those observed in MIA- exposed rhesus monkeys. In collaboration with Project 1 scientists, high-resolution structural and resting-state functional MRI will be carried out in MIA exposed mice and alterations will

be compared to those observed in MIA exposed rhesus monkeys. 3.b. Identify alterations in structure and functional connectivity in the brains of individuals undergoing their first episode of SZ and compare with those observed in MIA-exposed rhesus monkeys. In collaborations with Project 4 scientists, individuals will be recruited through the Early Diagnosis and Preventive Treatment (EDAPT) clinic run by Center Director, [Redacted by agreement]. [Redacted by agreement] Multimodal MRI will be carried out on these patients as well as healthy, age-matched control individuals.

PROGRESS REPORT:

Structural, resting state functional and diffusion MRI scans were acquired longitudinally at four time points (Table 1). All images were processed knowing only age at scan (blind to experimental condition).

Table 1. Number of subjects per each time point:

Time point	1 month	6 months	12 months	24 months
N of subjects	22	27	27	27

Structural MRI:

Tissue segmentation of images from the 1 month time point with the current processing pipeline had poor quality due to low contrast between white matter and grey matter at this neurodevelopmental stage. To overcome this issue, an updated pipeline for scans at this time point is under development. T1 and T2 weighted images from 6, 12 and 24 months time points have been processed. Processing included: co-registration, registration to a common space, bias field correction and automatic brain masking. After that all brain masks were manually corrected and Neoseg pipeline was used for brain tissue segmentation into grey matter (GM), white matter (WM) and cerebrospinal fluid (CSF). Probabilistic tissue maps from unbiased structural multi-atlas templates were applied jointly to each subject's T1 and T2 weighted images with affine and deformable registrations. UNC Primate Brain Atlas was used for parcellation into 24 lobar brain regions (WM and GM) and 8 subcortical GM structures: amygdala, hippocampus, caudate and putamen (16 regions per each hemisphere). Volumetric measurements for total GM and WM tissue and regions of interest were extracted using AutoSeg pipeline. Based on previous literature about animal maternal immune activation (MIA) models and brain alterations associated with schizophrenia, 5 regions of interest (ROI) were selected for each hemisphere (10 in total): lateral ventricles, GM and WM in prefrontal cortex, frontal, cingulate and temporal limbic brain regions (Fig. 2). Other brain regions have not yet been analyzed to minimize the need for multiple measure corrections. Preliminary statistical analysis was performed on ROI volumetric measurements.

Results.

Preliminary statistical analysis was performed for 6, 12 and 24 months time points. No significant group by time point interactions were identified, with groups displaying parallel trajectories from 6 to 24 months. In unadjusted analysis, the MIA-treated (PolyICLC) group had smaller volumes than the control group in Prefrontal (LH: by 414 mm³, $p=0.004$; RH: by 398 mm³, $p=0.006$), Frontal (by 407 mm³, $p=0.02$; RH: by 414 mm³, $p=0.01$), Cingulate (by 93 mm³, $p=0.08$; RH: by 88 mm³, $p=0.08$) and Temporal Limbic (by 31 mm³, $p=0.49$; RH: by 35 mm³, $p=0.48$) cortices. These estimates were attenuated after adjusting for total brain volume (TBV), but group differences remained significant. No significant group differences were found in lateral ventricles.

Diffusion MRI:

For the diffusion data processing in this project, the adapted version of the UNC-Utah NA-MIC framework for DTI fiber tract analysis is being used. The entire pipeline includes: 1) image reorientation to LPS coordinate system; 2) motion and distortion correction using FSL topup and eddy_openmp tools; 3) automatic removal of images with artifacts with the DTIPrep tool; 4) diffusion tensors image (DTI) reconstruction using a weighted least-square estimation; and 5) brain extraction of DTI images and building of two unbiased DTI atlases (one for 1 month time point and another one for 6 and 12 months time points data, Fig. 5) using DTIAtlasBuilder (Atlas building increases SNR, enhances the fiber tractography and allows for the resulting tracts to be propagated back into the original scans using the deformation fields computed during atlas building, see Fig. 4). 6) performing fiber tractography using propagated tracts from an existing normative atlas (The UNC-Wisconsin Rhesus Macaque Neurodevelopment Database) 7) propagate each track into each atlas for analysis by coregistering the respective images and using the resulting deformation field to propagate the tracts between atlas spaces. Additional tracts such as IFOF and CGH were traced in the atlas manually. These propagated tracts were voxelized and used as seed maps for fiber tractography. Tractography was performed automatically using AutoTract, followed by a manual inspection stage to refine the tract definitions. These processed tracts were then propagated from the atlas space back into the original DTI image space using the deformation fields calculated during the atlas building and parameterized along their arc length for DTI metrics: FA, AD, MD, and RD using DTIAtlasFiberAnalyzer. This allowed for the creation of a diffusion profile for each tract of interest. All data went through quality control inspection after each phase in order to ensure the integrity of the data processing and analysis.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: EPIGENETIC DISRUPTION OF THE "CYCLE OF VIOLENCE" IN RHESUS MACAQUES

SPID#: 56009

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE: 1/1/2018

END DATE: 12/31/2019

GENERAL CATEGORY: Behavior

SUB-CATEGORY: Genetic

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER:

SUPPORTING ORGANIZATION: Private Source

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Psychology
Prin. NPRC Core Sci.		
Other Core and Affil.		Psychology

PROJECT DESCRIPTION:

Childhood abuse is a potent predictor of aggressive behavior across the lifespan. One of the most exciting biological explanations that has emerged in the last decade is the early life re-organization of the epigenome in response to early abuse. SB is a dietary supplement with few reported side effects, and its histone deacetylase inhibiting properties have been demonstrated to reduce stress and enhance cognition in humans and animals. We theorize that SB reduces aggression by disrupting the epigenomic vestiges of maternal aggression, and augments the physiological, emotional, and cognitive deficiencies that may fuel aggression in challenging social settings. The proposed work will determine whether SB treatment reduces aggression and its proposed endophenotypes in at-risk adolescents, and identify the epigenetic mechanisms.

PROGRESS REPORT:

Subjects have been selected and observations begin this March.

PUBLICATIONS:

PMID	Title

FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: THE INTACT, LESIONED AND REHABILITATED PRIMATE CORTICOSPINAL CONNECTOME

SPID#: 56010

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE: 5/1/2017

END DATE: 2/28/2019

GENERAL CATEGORY: Neural

SUB-CATEGORY: Regenerative Medicine

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER: R01NS104442

SUPPORTING ORGANIZATION: UC San Diego

SPECIFIC INFORMATION: Prime Sponsor: NIH National Institutes of Health Center for Scientific Review

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	<div style="border: 1px solid black; padding: 5px; width: 150px;"> Redacted by agreement </div>	Center for Neural Repair UCSD
Prin. NPRC Core Sci.		Primate Services
Other Core and Affil.		

PROJECT DESCRIPTION:

This is a proposal to map the "connectome" of the primate corticospinal motor system involved in hand control. The corticospinal system is perhaps the most important motor system for voluntary muscle control in humans. This study will use a new, cre-dependent viral vector to map all of the efferents from layer V corticospinal neurons that project to C8-T1 spinal cord segments involved in hand control. The rhesus monkey intact (Aim 1) n= 4, and injured (Aim 2) n=6 corticospinal connectome involved in hand control. Results of this work have the potential to lead to a new and remarkably detailed understanding of anatomical mechanisms underlying motor control in primates, together with reorganization of motor systems after injury that are associated with functional loss and recovery. All of the work proposed herein has been accomplished in rodents, and we present preliminary data demonstrating feasibility in the rhesus monkey.

PROGRESS REPORT:

Initial work has been completed on mapping cortical pathways between the motor cortex and the hand. These results will help inform our current and future studies on stem cell repair of spinal cord injury.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

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**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: 3D PRINTED SCAFFOLDS FOR SPINAL CORD INJURY

SPID#: 56011

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE: 5/1/2017

END DATE: 2/28/2019

GENERAL CATEGORY: Neural

SUB-CATEGORY: Regenerative Medicine

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER: R03NS104972

SUPPORTING ORGANIZATION: UC San Diego

SPECIFIC INFORMATION: Prime Sponsor: NIH National Institute of Neurological Disorders Stroke (NINDS)

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Center for Neural Repair UCSD
Prin. NPRC Core Sci.		Primate Services CNPRC
Other Core and Affil.		

PROJECT DESCRIPTION:

Nearly 300,000 Americans have sustained some form of spinal cord injury (SCI), resulting in permanent and severe life disability. There are no effective therapies to promote regeneration, representing a great-unmet medical need.

We are creating an ex-vivo tissue that can replace the damaged spinal cord, using innovative 3D printing technology combined with neural stem cell therapy to form functional neural relays across sites of spinal cord injury and improve functional outcomes. We have determined that our 3D printed scaffolds support stem cell survival in acute implant (unlike injectable stem cell graft that do not survive an acute implant), guide regeneration of host and stem cell derived axons within the lesion site, and result in electrophysiological and functional recovery after complete spinal cord transection, the most severe model of spinal cord injury .

PROGRESS REPORT:

We have determined that our 3D printed scaffolds support stem cell survival in acute implant (unlike injectable stem cell graft that do not survive an acute implant), guide regeneration of host and stem cell derived axons within the lesion site, and result in electrophysiological and functional recovery after complete spinal cord transection, the most severe model of spinal cord injury .

PUBLICATIONS:

PMID	Title
30643285	Biomimetic 3D-printed scaffolds for spinal cord injury repair.

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Uploaded to Animal Research Laboratory Overview (ARLO) on 07/22/2021

FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: EARLY HIV EFFECTS ON GUT IMMUNITY AND INFLAMMATION FOR SEEDING VIRAL RESERVOIRS

SPID#: 56013

UNIT/DIVISION:

TYPE: Research

START DATE:

END DATE:

GENERAL CATEGORY: AIDS

SUB-CATEGORY: Gastrointestinal

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01AI123105

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Medical Microbiology and Immunology
Prin. NPRC Core Sci.		Medical Microbiology and Immunology
Other Core and Affil.		

PROJECT DESCRIPTION:

The main objective of this R01 application is to determine the early gut mucosal sensing and response to HIV infection that induces gut inflammation and support initial viral dissemination and establishes viral reservoirs. Gastrointestinal mucosa is an early target of HIV infection and a site of severe CD4+ T cell depletion and gut epithelial barrier dysfunction, which leads to immune dysfunction and persistent immune activation. While much is known about the pathogenesis of chronic HIV infection, our knowledge is limited about the initial host-virus interactions in the gut mucosa and their potential impact on the viral dissemination, anti-viral mucosal immunity and mucosal response to other pathogens and commensal microbiota. The overall goal of the proposed research is to investigate early host-virus interactions at the gut mucosal site by (a) identifying mucosal cells and molecular signaling responsible for early sensing and response to the virus and their role in the induction of gut inflammation and subsequent viral dissemination and (b) functional mapping through experimentally intervening these early host-viral interactions.

PROGRESS REPORT:

We performed studies to investigate mechanisms that define early establishment of HIV/SIV infection and viral reservoirs in the gut during initial stages of viral infection. Our data identified that early viral replication in the gut was driven by the activation of GCN2-ATF4 signaling as part of the mucosal innate response in response to the viral infection. These findings highlighted how SIV subverted mucosal anti-viral innate response for supporting the viral transcription.

Secondly, we found that administration of *Lactobacillus plantarum* or *Bifidobacter infantis* into intestinal loops from chronically SIV infected rhesus macaques rapidly reversed the gut epithelial barrier damage and supported its renewal with few hours. This correlated with the reduction of mucosal IL-1 β levels. We performed

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metabolomics analysis of the gut luminal contents and have identified potential bacterial metabolites that can reverse SIV induced gut epithelial barrier disruption. These findings have highlighted the impact of probiotic bacterial metabolites on the mucosal inflammation and viral infection.

Lastly, we performed a preliminary study to investigate the effect of anakinra for blocking IL-1beta in the gut mucosa and examine whether it had inhibitory effect on the levels of the viral infection. We found that a short-term treatment of anakinra by itself was not sufficient to suppress the spread of SIV infection in rhesus macaques.

PUBLICATIONS:

PMID	Title
PMID: 28465428	PMID not found in PubMed

Title: HIV Exploits Antiviral Host Innate GCN2-ATF4 Signaling for Establishing Viral Replication Early in Infection

FUNDING SOURCES:

AI-123105 and P51 OD-011107

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: RESERVOIR DEPLETION AND ANTI-RETROVIRAL THERAPY FOR INFANT FUNCTIONAL CURE

SPID#: 56014

UNIT/DIVISION: Infectious Disease

TYPE: Research

START DATE: 6/1/2015

END DATE: 5/31/2020

GENERAL CATEGORY: AIDS

SUB-CATEGORY: Therapy

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01AI118451

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Medical Microbiology and Immunology
Prin. NPRC Core Sci.		Medical Microbiology and Immunology
Other Core and Affil.		

PROJECT DESCRIPTION:

The goal of this project is to use monoclonal antibodies to dramatically reduce the lifespan of CD4+ T cells in infant rhesus macaques infected perinatally by the oral route. We hypothesize that this reduced T cell life span may be critical to robust suppression seen in the Mississippi baby.

PROGRESS REPORT:

The experiments are ongoing. Early results suggest that the therapy has cured 2/7 treated animals.

PUBLICATIONS:

PMID	Title
28918646	Depletion of Gut-Resident CCR5 ⁺ Cells for HIV Cure Strategies.

FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: VIRAL ETIOLOGY OF IDIOPATHIC CHRONIC DIARRHEA IN RHESUS MACAQUES

SPID#: 56015

UNIT/DIVISION: Infectious Disease

TYPE: Research

START DATE: 8/12/2016

END DATE: 7/31/2020

GENERAL CATEGORY: Immunology

SUB-CATEGORY: Gastrointestinal

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER: R01AI123376

SUPPORTING ORGANIZATION: Sub-contract

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Blood Systems Research Institute
Prin. NPRC Core Sci.		Medical Microbiology and Immunology
Other Core and Affil.		

PROJECT DESCRIPTION:

The major goal is to test if one or a combination of viruses are associated with idiopathic chronic diarrhea of rhesus macaques and if these pathogens can be identified using next-generation sequencing combined with a large case-control study.

PROGRESS REPORT:

Several novel viruses have been identified and their distribution in the gut characterized.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: NOVEL, SIMPLE, AND RAPID POINT OF CARE LATERAL FLOW IMMUNOASSAY
DIAGNOSIS OF ZIKA VIRUS

SPID#: 56016

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE: 5/1/2017

END DATE: 2/28/2019

GENERAL CATEGORY: Infectious Disease

SUB-CATEGORY: Immunology

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R43AI132041

**SUPPORTING
ORGANIZATION:** NIH

**SPECIFIC
INFORMATION:**

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	<div style="border: 1px solid black; padding: 5px;"> Redacted by agreement </div>	
Prin. NPRC Core Sci.		Neuroscience and Behavior
Other Core and Affil.		

PROJECT DESCRIPTION:

PROGRESS REPORT:

PUBLICATIONS:

PMID	Title

FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: SEQUELAE AND IMMUNOPATHOLOGY OF EBOLA VIRUS INFECTIONS

SPID#: 56017

UNIT/DIVISION: CNRPC-infectious diseases

TYPE: Research

START DATE: 10/1/2017

END DATE: 10/31/2019

GENERAL CATEGORY: Infectious Disease

SUB-CATEGORY: Viral

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER: HHSF223201610081C

SUPPORTING ORGANIZATION: Private Source

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Stanford University
Prin. NPRC Core Sci.		CNPRC-Infectious Diseases
Other Core and Affil.		

PROJECT DESCRIPTION:

As part of a collaboration with Stanford University to analyze tissue tropism, pathology, and immune signatures of Zika virus infection, investigators at the University of California, Davis (UCD) will provide tissue and blood samples from approximately 20 pregnant Rhesus macaques challenged with Zika virus or control. Tissues are available as part of both completed and ongoing studies at the (UCD) California National Primate Research Center (CNPRC). Tissue samples will be provided as snap-frozen tissue embedded in optimum cutting temperature (O.C.T.) compound. Blood samples from serial timepoints or at necropsy will be provided as cryopreserved viable peripheral blood mononuclear cells (PBMCs).

PROGRESS REPORT:

A number of tissues of zika studies have been provided to investigators at Stanford University. Analysis is still in progress.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: TRANSMISSION BLOCKING POTENTIAL OF NOVEL HIV ENVSPECIFIC MUCOSAL ANTIBODIES

SPID#: 56018

UNIT/DIVISION: CNPRC-Infectious Diseases

TYPE: Research

START DATE: 1/1/2017

END DATE: 4/30/2018

GENERAL CATEGORY: AIDS

SUB-CATEGORY: Pediatric

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01AI106380

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Duke University
Prin. NPRC Core Sci.		CNPRC-Infectious Diseases
Other Core and Affil.		

PROJECT DESCRIPTION:

Pediatric HIV infection is still a big problem especially in developing countries. Although daily administration of antiretrovirals is able to control disease progression, there is still the hope to achieve a functional cure in which virus replication remains controlled after antiretroviral drug therapy is stopped. A better understanding of viral persistence and viral reservoirs is key to developing functional cure strategies. While much research effort has focused on studying virus reservoirs in adult populations, very little is known about viral reservoirs in HIV-infected children on antiretroviral therapy.

Infection of infant macaques with simian immunodeficiency virus (SIV) has been shown to be a good animal model for pediatric HIV infection. In the proposed studies, we will infect infant macaques orally with SIV, and then treat them daily with antiretroviral drugs. Animals will be monitored closely for virus levels in blood, and also in tissues obtained via biopsies and at time of euthanasia. The insights obtained from this study will be beneficial to develop intervention strategies

PROGRESS REPORT:

We inoculated 6 infant macaques orally with SHIV, and once they were chronically infected, we started them on antiretroviral therapy. Antiretroviral therapy was then withdrawn to monitor for viral rebound. Blood and also tissues were collected for detailed analysis. These data are used to establish an infant macaque model to study viral reservoirs in pediatric infection and to then use this model to test intervention strategies aimed at reducing or flushing out this viral reservoir.

PUBLICATIONS:

Obtained by Rise for Animals.
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PMID	Title
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FUNDING SOURCES:

NIH

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: INNATE ANTIVIRAL FACTORS IN BREAST MILK AND THE ORAL HIV-1 RESERVOIR

SPID#: 56019

UNIT/DIVISION:

TYPE: Research

START DATE: 7/1/2017

END DATE: 6/30/2019

GENERAL CATEGORY: AIDS

SUB-CATEGORY: Viral

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01DE025444

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Duke University
Prin. NPRC Core Sci.		CNPRC-Infectious Diseases
Other Core and Affil.		CNPRC-Infectious Diseases

PROJECT DESCRIPTION:

Pediatric HIV infection is still a big problem especially in developing countries. Although daily administration of antiretrovirals is able to control disease progression, there is still the hope to achieve a functional cure in which virus replication remains controlled after antiretroviral drug therapy is stopped. A better understanding of viral persistence and viral reservoirs is key to developing functional cure strategies. While much research effort has focused on studying virus reservoirs in adult populations, very little is known about viral reservoirs in HIV-infected children on antiretroviral therapy.

Infection of infant macaques with simian immunodeficiency virus (SIV) has been shown to be a good animal model for pediatric HIV infection. In the proposed studies, we will infect infant macaques orally with SIV, and then treat them daily with antiretroviral drugs. Animals will be monitored closely for virus levels in blood, and also in tissues obtained via biopsies and at time of euthanasia. The insights obtained from this study will be beneficial to develop intervention strategies

PROGRESS REPORT:

We inoculated 6 infant macaques orally with SHIV, and once they were chronically infected, we started them on antiretroviral therapy. Antiretroviral therapy was then withdrawn to monitor for viral rebound. Blood and also tissues were collected for detailed analysis. These data are used to establish an infant macaque model to study viral reservoirs in pediatric infection and to then use this model to test intervention strategies aimed at reducing or flushing out this viral reservoir.

PUBLICATIONS:

Obtained by Rise for Animals.
Uploaded to Animal Research Laboratory Overview (ARLO) on 07/22/2021

PMID	Title
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FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: COMBINED HEPATITIS B AND HIV-1 ENVELOPE VACCINATION TO AUGMENT T CELL HELP VIA LINKED RECOGNITION OF UNRELATED ANTIGENS

SPID#: 56020

UNIT/DIVISION: CNPRC-Infectious Diseases

TYPE: Research

START DATE: 9/1/2017

END DATE: 8/31/2019

GENERAL CATEGORY: AIDS

SUB-CATEGORY: Vaccine

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: K01OD024877

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Duke University
Prin. NPRC Core Sci.		CNPRC-Infectious Diseases
Other Core and Affil.		

PROJECT DESCRIPTION:

There is a critical need for an effective HIV vaccine to prevent new infections and to end the global AIDS epidemic. Studies conducted to date not yet identified a safe, highly efficacious, and durable prophylactic HIV vaccine. Increasing CD4+ T cell help from T follicular helper cells (TFH) is one potential strategy for overcoming the shortcomings of previous HIV vaccines. TFH cells are essential for development of long-lived affinity-matured B cells and have recently been identified as a key component of immune responses that generate durable and effective antibodies, including those with the ability to broadly neutralize diverse HIV isolates. However, there is presently a gap in knowledge on the best approaches to increase vaccine-induced TFH responses. The overall objective of the proposal is to develop a novel HIV envelope (Env) vaccine regimen able to maximize T cell help by recruiting memory TFH cells elicited by childhood immunizations in addition to those specific for HIV Env. A novel Hepatitis B (HB) surface antigen (HBsAg) and HIV Env conjugate vaccine strategy will be used to augment the TFH response to HIV Env. The vaccine regimen will be initiated in neonatal macaques as a surrogate of human infancy, and will model a childhood immunization schedule that allows for completion of the regimen and induction of mature antibodies pre-adolescence, prior to sexual debut.

In the proposed studies, we will immunize 10 nursery-reared infant macaques (2 groups of 5) with 2 different vaccine regimens. Animals will be monitored closely the development of immune responses through collection of blood samples and lymph node biopsies. The insights obtained from this study will be beneficial to develop intervention strategies .

PROGRESS REPORT:

Animals were enrolled into the study and have received several doses of the vaccine. Data analysis is in

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progress.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

NIH

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: PRECLINICAL TESTING OF NEUTRALIZING ANTIBODIES AGAINST ZIKA VIRUS

SPID#: 56021

UNIT/DIVISION: CNPRC-Infectious Diseases

TYPE: Research

START DATE: 9/1/2018

END DATE: 1/31/2020

GENERAL CATEGORY: Infectious Disease

SUB-CATEGORY: Viral

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R37AI037526

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	<div style="border: 1px solid black; padding: 5px;"> Redacted by agreement </div>	Rockefeller University
Prin. NPRC Core Sci.		CNPRC-Infectious Diseases
Other Core and Affil.		Pathology, Microbiology and Immunology, School of Vet Med, UC-Davis

PROJECT DESCRIPTION:

Zika virus (ZIKV) infection of pregnant women is associated with a risk of microcephaly and other congenital birth defects in their infants, the so-called congenital zika syndrome. There is currently no licensed vaccine to prevent Zika virus (ZIKV). Therefore, there is an urgent need for prophylactic interventions that can protect people at risk, particularly pregnant women. ZIKV infection of rhesus macaques has been demonstrated to be useful animal model to study pathogenesis and provide proof-of-concept of antiviral interventions.

While potent neutralizing antibodies have the potential to be effective, there is also a risk that through binding to the Fc receptor, they may enhance infection of certain cell types. Therefore, antibodies that neutralize Zika virus in vitro, but do not bind the Fc receptor, have been engineered. The proposed studies are aimed at testing the efficacy of such anti-Zika antibodies in the macaque model.

PROGRESS REPORT:

We have performed several experiments using mutant forms of anti-zika neutralizing antibodies, that either bind or don't bind the Fc receptor, or have a prolonged half-life. The first experiments demonstrate that combinations of antibodies with the mutations that abrogate Fc binding are effective in reducing peak viremia. Other experiments are still in progress.

PUBLICATIONS:

Obtained by Rise for Animals.
Uploaded to Animal Research Laboratory Overview (ARLO) on 07/22/2021

PMID	Title
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FUNDING SOURCES:

NIH

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: IMMUNOGENICITY AND PROTECTIVE EFFICACY OF PXVX0317 AGAINST CHIKUNGUNYA VIRUS CHALLENGE IN RHESUS MACAQUES

SPID#: 56022

UNIT/DIVISION: CNPRC-Infectious Diseases

TYPE: Research

START DATE: 6/1/2018

END DATE: 5/31/2019

GENERAL CATEGORY: Infectious Disease

SUB-CATEGORY: Vaccine

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER:

SUPPORTING ORGANIZATION:

Private Source

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	CNPRC-Infectious Diseases
Prin. NPRC Core Sci.		CNPRC-Infectious Diseases
Other Core and Affil.		Pathology, Microbiology and Immunology, School of Veterinary Medicine, UC-Davis

PROJECT DESCRIPTION:

There is an urgent need for intervention strategies to prevent Chikungunya virus (CHIKV) infection of humans, as there is no licensed vaccine or any effective antiviral treatment.

CHIKV infection of rhesus macaques has been demonstrated to be useful animal model to study pathogenesis and provide proof-of-concept of antiviral interventions.

The proposed studies are aimed at testing the efficacy of a CHIKV vaccine in cynomolgus macaques.

PROGRESS REPORT:

We first performed a pilot study to determine the optimal dose of CHIKV. For the 2nd phase experiments, which are focused on vaccine efficacy study, animals have been enrolled and are being immunized with the CHIKV vaccine upcoming challenge with CHIKV.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

Private Source

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: TARGETING CD4 TFH CELLS TO ENHANCE HIV VACCINE-INDUCED HUMORAL IMMUNITY, GRANT # K01-OD023034

SPID#: 56023

UNIT/DIVISION: ID

TYPE: Research

START DATE: 7/1/2016

END DATE: 6/30/2019

GENERAL CATEGORY: AIDS

SUB-CATEGORY: Vaccine

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: K01OD023034

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Pathology Microbiology and Immunology
Prin. NPRC Core Sci.		Pathology Microbiology and Immunology
Other Core and Affil.		

PROJECT DESCRIPTION:

The objective of this proposal is to determine how skewing of the inflammatory response impacts CD4 T follicular help for HIV Env antibody responses. Specifically, the project is designed to interrogate Env antibody durability following Th1 versus Th2 vaccine regimens.

PROGRESS REPORT:

A total of 20 animals were vaccinated and 2 different vaccine regimens were evaluated. We have performed comprehensive T cell immunology and serology on these animals in sera, mucosal, and lymphoid tissues to determine immunogenicity of different vaccine regimens. Forthcoming experiments in the next month will determine relative vaccine efficacy across these vaccine regimens using a Clade C SHIV virus.

PUBLICATIONS:

PMID	Title
30277264	Comparison of sampling methods for profiling cervicovaginal microbiome in rhesus macaques.

Two manuscripts are being prepared for submission

FUNDING SOURCES:

K01OD023034

Obtained by Rise for Animals.
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R03 AI138792

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: MATERNAL AND INFANT IMMUNIZATION TO ELIMINATE BREAST MILK TRANSMISSION OF HIV-1

SPID#: 56024

UNIT/DIVISION: CNPRC-Infectious Diseases

TYPE: Research

START DATE: 4/1/2015

END DATE: 3/31/2020

GENERAL CATEGORY: AIDS

SUB-CATEGORY: Vaccine

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: P01AI117915

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Duke University
Prin. NPRC Core Sci.		CNPRC-Infectious Diseases
Other Core and Affil.		CNPRC-Infectious Diseases

PROJECT DESCRIPTION:

To achieve our goal of developing maternal and/or infant vaccination strategies to prevent postnatal HIV transmission requires preclinical testing to establish proof-of-concept of safety and efficacy in an appropriate animal model. For studies of HIV-1, the best animal model is SIV/SHIV infection of macaques. Indeed, this model is particularly well-suited for our proposed studies because pediatric models of postnatal transmission have previously been developed.. However, NHP studies require extensive infrastructure and unique expertise. Thus, we propose to establish the Nonhuman Primate (NHP) Core, which will coordinate and implement all the NHP experiments proposed by the Program's two Projects: Project 1: "Development of a maternal vaccine to passively immunize infants against clade C HIV-1 infection" (P.I. Redacted by agreement Duke University) aimed at studying the effects of maternal immunization, and Project 2: "Development of a pediatric vaccine to protect infants against clade C HIV-1 infection" Redacted by agreement Univ. of North Carolina, Chapel Hill), aimed at studying the effects of infant vaccination and combined maternal/infant immunization against oral SHIV transmission.

PROGRESS REPORT:

We have continued to perform optimization of HIV infant vaccine regimens, and are in the process of testing their efficacy against oral SHIV infection.

PUBLICATIONS:

PMID	Title
30541851	Co-administration of CH31 broadly neutralizing antibody does not affect development of vaccine-induced anti-HIV-1 envelope antibody responses in infant Rhesus macaques.
30089691	Adjuvant-Dependent Enhancement of HIV Env-Specific Antibody Responses in Infant Rhesus Macaques.
29359183	Maternal HIV-1 Env Vaccination for Systemic and Breast Milk Immunity To Prevent Oral SHIV Acquisition in Infant Macaques.
28814388	Impact of Poxvirus Vector Priming, Protein Coadministration, and Vaccine Intervals on HIV gp120 Vaccine-Elicited Antibody Magnitude and Function in Infant Macaques.

FUNDING SOURCES:

NIH

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: DELETION OF CRH EXPRESSION IN RHESUS PLACENTA

SPID#: 56025

UNIT/DIVISION:

TYPE: Research

START DATE: 9/1/2018

END DATE: 8/31/2019

GENERAL CATEGORY: Reproductive

SUB-CATEGORY: Genetic

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R21HD090196

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	OB/GYN and CNPRC
Prin. NPRC Core Sci.		OB/GYN and CNPRC
Other Core and Affil.		

PROJECT DESCRIPTION:

The fundamental molecular signals that initiate human parturition at term gestation, or lead to preterm birth, are unknown. The long-term goals of our research efforts are to elucidate the pathways that determine human birth timing. Our published work has demonstrated that anthropoid primate pregnancy has been subjected to evolutionary selective pressures that have left genomic signatures in parturition-related genes related to this divergence from other species. We have exploited these differences in regulation of birth timing between humans and other mammals by applying comparative and functional genomics to reveal primate and human adaptations that initiate labor and delivery. One compelling molecular target in the regulation of human parturition is corticotropin-releasing hormone (CRH). Relative maternal plasma CRH concentration, derived from placental synthesis and secretion, predicts the likelihood of preterm, term, and post-term birth. The specific functional role of CRH in the control of birth timing, or other aspects of pregnancy, has not been determined. CRH is only expressed in anthropoid placenta, and rodents do not express the CRH binding protein in their peripheral blood, making traditional model organisms for study of limited utility. With the advent of CRISPR/Cas9 technology, we are no longer limited to "traditional" model organisms for study, and have the potential for using non-human primates for genome editing and physiological analysis. Using comparative genomics, we computationally tested the hypothesis that anthropoids acquired a new regulatory element after the divergence from prosimians that confers the unique capacity of their placentae to make CRH. Surprisingly, we found a simian-specific THE1B retroviral long-terminal repeat (LTR) insertion approximately 2.5 kb 5' of the usual CRH transcriptional start site in anthropoid primates. We have generated 2 founder lines of transgenic mice that harbor a 180 kb bacterial artificial chromosome (BAC) containing the human CRH locus and its extended flanking regions. Both of these lines have been found to express human CRH mRNA in the placenta and other sites of normal CRH expression demonstrating the sufficiency of human cis-acting sequences to drive expression. Most recently, using CRISPR/Cas9 genome editing, we deleted the THE1B from the BAC transgenic mice, and proved this abolishes placental but not hypothalamic expression. Given this compelling information, we are uniquely poised to dissect the role of placental CRH by deleting the CRH THE1B element in a non-human primate, rhesus, in collaboration with the California National Primate Research Center. Our

Specific Aim will be to establish germline modification of the rhesus genome to generate animals that lose placental CRH expression without loss of CRH expression in other tissues. The outcome from this R21 application, to develop a novel, tractable, non-human primate system will provide the foundation for future investigation of the function and epigenetic regulation of placental CRH in primate pregnancy.

PROGRESS REPORT:

The retrieval of oocytes for gene editing is continuing. The CRISPR-Cas9 RNA for injection has been altered to contain the Cas9 protein rather than the RNA, with the intent of better targeting the CRH gene. We are also exploring the potential for electroporation of zygotes rather than injection of the guide RNAs into the fertilized oocytes.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: MULTISPECIES COMPARISON OF THE IMPACT OF OBESITY ON GVHD/GVT

SPID#: 56026

UNIT/DIVISION: Reproductive Sciences and Regenerative Medicine

TYPE: Research

START DATE: 1/12/2017

END DATE: 12/31/2021

GENERAL CATEGORY: Regenerative Medicine

SUB-CATEGORY: Transplant

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01CA214048

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Dermatology, School of Medicine
Prin. NPRC Core Sci.		Pediatrics and Cell Biology and Human Anatomy, School of Medicine
		Medical Microbiology and Immunology, School of Medicine
Other Core and Affil.		

PROJECT DESCRIPTION:

These studies build on data to modulate graft-versus-host disease (GVHD) and graft- versus-tumor (GVT) effects following hematopoietic stem cell transplantation by understanding the role of obesity in these two processes. Obesity is a dynamic process that has been well defined to be immunomodulatory, and characteristically contains a "meta-inflammatory" environment, defined as a state of low-grade, chronic, self-sustaining inflammation. As cytokine storms from inflammatory cytokines play a critical component in GVHD pathophysiology, these studies seek to delineate the effects of obesity as a pre-existing inflammatory condition on GVHD pathogenesis and GVT responses.

PROGRESS REPORT:

Studies are currently in progress.

PUBLICATIONS:

PMID	Title
30420753	Paradoxical effects of obesity on T cell function during tumor progression and PD-1 checkpoint blockade.

Obtained by Rise for Animals.
Uploaded to Animal Research Laboratory Overview (ARLO) on 07/22/2021

FUNDING SOURCES:

NIH, NCI

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: IPSC-DERIVED ALVEOLAR EPITHELIAL CELLS FOR INTRAPULMONARY THERAPIES

SPID#: 56027

UNIT/DIVISION: Reproductive Sciences and Regenerative Medicine

TYPE: Research

START DATE: 12/1/2015

END DATE: 11/30/2018

GENERAL CATEGORY: Regenerative Medicine

SUB-CATEGORY: Development

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R21HD086493

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	<div style="border: 1px solid black; width: 150px; height: 100px; display: flex; align-items: center; justify-content: center;"> Redacted by agreement </div>	Pediatrics and Cell Biology and Human Anatomy, School of Medicine
Prin. NPRC Core Sci.		Pediatrics and Cell Biology and Human Anatomy, School of Medicine
Other Core and Affil.		

PROJECT DESCRIPTION:

These studies assess the use of pluripotent stem cells to treat the abnormalities associated with inherited surfactant deficiencies, which account for approximately 10% of all childhood interstitial lung diseases.

PROGRESS REPORT:

Studies have shown increased efficiency in the differentiation of human induced pluripotent stem cells (hiPSC) towards early stages of lung differentiation in traditional and 3D organoid cultures. These studies have also developed new methods to obtain the quantity of cells needed for transplantation in vivo.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

NIH, NICHD

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: TARGETED MOLECULAR IMAGING OF PLECTIN-1: BENCH TO BEDSIDE AND BACK AGAIN

SPID#: 56028

UNIT/DIVISION: Reproductive Sciences and Regenerative Medicine

TYPE: Research

START DATE: 3/20/2017

END DATE: 2/28/2020

GENERAL CATEGORY: Imaging

SUB-CATEGORY: Cancer

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01CA216879

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	<div style="border: 1px solid black; width: 150px; height: 100px; display: flex; align-items: center; justify-content: center;"> Redacted by agreement </div>	Internal Medicine, School of Medicine, and Biomedical Engineering, College of Engineering
Prin. NPRC Core Sci.		Pediatrics and Cell Biology and Human Anatomy, School of Medicine
Other Core and Affil.		

PROJECT DESCRIPTION:

Molecular imaging has evolved into an important clinical tool to visualize the expression and activity of specific molecules in disease states and to provide insight towards effective diagnosis and treatment. Current limitations for the rapid development and translation of targeted molecular imaging agents for PET include but are not limited to: the complex design, synthesis, and screening approaches for both ligand identification and imaging agent development, as well as the documentation associated with preparing the agent for clinical use. These studies propose to mitigate some of these challenges by leveraging academic and industry expertise and resources to develop a high-throughput multiplex approach, initially focusing on Plectin-1, a marker for multiple cancers.

PROGRESS REPORT:

Studies have utilized advances made in combinatorial chemistry and microfluidic flow chemistry to rapidly identify, screen, and optimize lead candidates. Lead peptides with fluorine-18 for positron emission tomography (PET) imaging in vivo is currently under development for testing in nonhuman primates in order to advance a lead candidate through IND-enabling studies towards a first-in-human clinical study.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

NIH, NCI

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: AVB6-DIRECTED MOLECULAR IMAGING AND THERAPY

SPID#: 56029

UNIT/DIVISION: Reproductive Sciences and Regenerative Medicine

TYPE: Research

START DATE: 12/1/2015

END DATE: 11/30/2019

GENERAL CATEGORY: Imaging

SUB-CATEGORY: Cancer

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01CA199725

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Internal Medicine, School of Medicine, and Biomedical Engineering, College of Engineering
Prin. NPRC Core Sci.		Pediatrics and Cell Biology and Human Anatomy, School of Medicine
Other Core and Affil.		

PROJECT DESCRIPTION:

The overall goal is to investigate the integrin subtype $\alpha v \beta 6$ as a target for molecular imaging and therapy of cancer. The integrin $\alpha v \beta 6$ is an epithelial-specific cell surface receptor that is undetectable in healthy adult epithelium but is significantly up-regulated in a wide range of epithelial-derived cancers.

PROGRESS REPORT:

Compounds are screened in vitro and in vivo for affinity and selectivity, and lead compounds have been taken forward to in vivo imaging. The lead compounds, based on murine pharmacokinetics and radiolabeling strategies, are currently under investigation in nonhuman primates.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

NIH, NCI

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: CENTER FOR FETAL MONKEY GENE TRANSFER FOR HEART, LUNG, AND BLOOD DISEASES

SPID#: 56030

UNIT/DIVISION: Reproductive Sciences and Regenerative Medicine

TYPE: Research

START DATE: 9/1/2006

END DATE: 7/30/2019

GENERAL CATEGORY: Genetic

SUB-CATEGORY: Therapy

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R24HL085794

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Pediatrics and Cell Biology and Human Anatomy, School of Medicine
Prin. NPRC Core Sci.		Pediatrics and Cell Biology and Human Anatomy, School of Medicine
Other Core and Affil.		

PROJECT DESCRIPTION:

The goals of the program are to conduct gene transfer studies in nonhuman primates in order to evaluate the safety and efficiency of new strategies as they emerge, and to provide NHLBI-supported investigators with essential expertise to actively pursue gene transfer/gene therapy in their research programs. The overriding objective is to explore crucial questions in gene delivery in a relevant translational nonhuman primate model system. The program supports projects for NHLBI-funded investigators spanning institutions across the U.S., and develops new techniques and technologies for the greater research community.

PROGRESS REPORT:

The announcement for letters of intent is circulated to NHLBI-funded investigators annually and is available at NHLBI information booths at national meetings. The program fulfills a crucial role in exploring the safety of new gene transfer techniques and providing a vehicle for innovation in the gene therapy field.

PUBLICATIONS:

PMID	Title
28125921	Systemic and Persistent Muscle Gene Expression in Rhesus Monkeys with a Liver De-Targeted Adeno-Associated Virus Vector.

Obtained by Rise for Animals.
Uploaded to Animal Research Laboratory Overview (ARLO) on 07/22/2021

FUNDING SOURCES:

NIH, NHLBI

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: CONGENITAL ZIKA SYNDROME AND POSTNATAL OUTCOMES IN NONHUMAN PRIMATES

SPID#: 56031

UNIT/DIVISION: Reproductive Sciences and Regenerative Medicine

TYPE: Research

START DATE: 6/15/2017

END DATE: 5/31/2019

GENERAL CATEGORY: Infectious Disease

SUB-CATEGORY: Development

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R21NS103658

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Pediatrics and Cell Biology and Human Anatomy, School of Medicine
Prin. NPRC Core Sci.		Pediatrics and Cell Biology and Human Anatomy, School of Medicine
		Medical Microbiology and Immunology, School of Medicine
Other Core and Affil.		

PROJECT DESCRIPTION:

Environmental factors such as infectious teratogens and inflammation together exert a persistent and even lifelong impact on neurodevelopment and immune function. The major objective of these studies is to determine the immunologic effects of Zika virus in relation to neural precursors and related cell populations in the fetus and infant.

PROGRESS REPORT:

These studies are currently in progress.

PUBLICATIONS:

PMID	Title
29992243	Microglia: An Intrinsic Component of the Proliferative Zones in the Fetal Rhesus Monkey (Macaca mulatta) Cerebral Cortex.
30552670	Periventricular microglial cells interact with dividing precursor cells in the nonhuman primate and rodent prenatal cerebral cortex.

Obtained by Rise for Animals.
Uploaded to Animal Research Laboratory Overview (ARLO) on 07/22/2021

FUNDING SOURCES:

NIH, NINDS

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: IMAGING AND TRAFFICKING OF NEUROTROPIC VIRUS IN MATERNAL/FETAL NONHUMAN PRIMATES

SPID#: 56032

UNIT/DIVISION: Reproductive Sciences and Regenerative Medicine

TYPE: Research

START DATE: 9/1/2017

END DATE: 8/31/2019

GENERAL CATEGORY: Infectious Disease

SUB-CATEGORY: Imaging

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R21AI133548

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	<div style="border: 1px solid black; width: 150px; height: 100px; display: flex; align-items: center; justify-content: center;"> Redacted by agreement </div>	Pediatrics and Cell Biology and Human Anatomy, School of Medicine
Prin. NPRC Core Sci.		Pediatrics and Cell Biology and Human Anatomy, School of Medicine
Other Core and Affil.		

PROJECT DESCRIPTION:

The objective of these studies is to develop new and reliable methods to label and track Zika virus using positron emission tomography (PET).

PROGRESS REPORT:

Studies with new radiolabeling techniques are currently in progress.

PUBLICATIONS:

PMID	Title
29419483	Development and Evaluation of mini-EXPLORER: A Long Axial Field-of-View PET Scanner for Nonhuman Primate Imaging.

FUNDING SOURCES:

NIH, NIAID

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: TASK ORDERS

SPID#: 56033

UNIT/DIVISION: Reproductive Sciences and Regenerative Medicine

TYPE: Research

START DATE: 9/1/2017

END DATE: 11/30/2020

GENERAL CATEGORY: Imaging

SUB-CATEGORY: Radiolabel

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER:

SUPPORTING ORGANIZATION: Private sector

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Pediatrics and Cell Biology and Human Anatomy, School of Medicine
Prin. NPRC Core Sci.		Pediatrics and Cell Biology and Human Anatomy, School of Medicine
Other Core and Affil.		

PROJECT DESCRIPTION:

These studies focus on new radiolabeling techniques for positron emission tomography (PET) imaging.

PROGRESS REPORT:

Studies are currently in progress.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

Private sources

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: THERAPEUTIC PROTEIN EXPRESSION IN NONHUMAN PRIMATES

SPID#: 56034

UNIT/DIVISION: Reproductive Sciences and Regenerative Medicine

TYPE: Research

START DATE: 1/30/2018

END DATE: 2/1/2019

GENERAL CATEGORY: Genetic

SUB-CATEGORY: Blood Disease

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER:

SUPPORTING ORGANIZATION: Private sector

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	<div style="border: 1px solid black; padding: 5px; min-height: 80px;"> Redacted by agreement </div>	Pediatrics and Cell Biology and Human Anatomy, School of Medicine
Prin. NPRC Core Sci.		Pediatrics and Cell Biology and Human Anatomy, School of Medicine
Other Core and Affil.		

PROJECT DESCRIPTION:

The goal of this study is to assess human FIX expression and to validate the integration of a transgene and the durability of expression.

PROGRESS REPORT:

The study has recently been completed and data is under evaluation.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

Private sector

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: NEUTRALIZING ANTIBODY AND AAV FIX GENE THERAPY

SPID#: 56035

UNIT/DIVISION: Reproductive Sciences and Regenerative Medicine

TYPE: Research

START DATE: 2/1/2014

END DATE: 1/31/2019

GENERAL CATEGORY: Genetic

SUB-CATEGORY: Blood Disease

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: P01HL112761

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Pharmacology, University of North Carolina at Chapel Hill
Prin. NPRC Core Sci.		Pediatrics and Cell Biology and Human Anatomy, School of Medicine
Other Core and Affil.		

PROJECT DESCRIPTION:

The overall goal of this subproject is to utilize a nonhuman primate model for the study of Factor IX deficiency and the preclinical testing of therapeutic gene therapy approaches for the treatment of this disease.

PROGRESS REPORT:

The study has been completed and data evaluation is in progress.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

NIH, NHLBI

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: DEVELOPMENT OF PNEC INNERVATIONS AND NEUROPLASTICITY AFTER EARLY LIFE INSULT

SPID#: 56037

UNIT/DIVISION: Respiratory

TYPE: Research

START DATE: 5/2/2017

END DATE: 2/28/2019

GENERAL CATEGORY: Respiratory

SUB-CATEGORY: Pediatric

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01HL132991

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Anatomy, Physiology, & Cell Biology, UCD School of Veterinary Medicine
Prin. NPRC Core Sci.		Anatomy, Physiology, & Cell Biology, UCD School of Veterinary Medicine
Other Core and Affil.		Brigham and Women's Hospital

PROJECT DESCRIPTION:

The major goal of this subcontract is to determine whether early life allergen and/or air pollutant exposures alter the innervation of PNEC in the airways.

PROGRESS REPORT:

Initial study has been accepted for publication. New studies are ongoing.

PUBLICATIONS:

PMID	Title
30571139	Pulmonary Neuroendocrine Cells Secrete GABA to Induce Goblet Cell Hyperplasia in Primate Models.

FUNDING SOURCES:

NIH

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: DEVELOPMENT OF THE COPD PHENOTYPE: ROLE OF THE IL-22/IL- 22R1
AXIS

SPID#: 56038

UNIT/DIVISION: Respiratory

TYPE: Research

START DATE: 5/1/2017

END DATE: 2/28/2019

GENERAL CATEGORY: Respiratory

SUB-CATEGORY: Pediatric

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER: Private Source

SUPPORTING ORGANIZATION:

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Anatomy, Physiology, & Cell Biology, UCD School of Veterinary Medicine
Prin. NPRC Core Sci.		Anatomy, Physiology, & Cell Biology, UCD School of Veterinary Medicine
Other Core and Affil.		

PROJECT DESCRIPTION:

The major goal of this study is to investigate the contribution of IL-22 on repair mechanisms during early life environmental tobacco smoke exposure.

PROGRESS REPORT:

Studies are ongoing.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

Private Source

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: CLOSED LOOP NEURAL INTERFACE TO ENHANCE MOVEMENTS AFTER STROKE

SPID#: 56040

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE: 9/1/2016

END DATE: 12/31/2018

GENERAL CATEGORY: Neural

SUB-CATEGORY: Stroke

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER: 9971sc

SUPPORTING ORGANIZATION: CNPRC Pilot

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	<div style="border: 1px solid black; padding: 5px;"> Redacted by agreement </div>	UCSF
Prin. NPRC Core Sci.		Primate Services CNPRC
Other Core and Affil.		

PROJECT DESCRIPTION:

The goal of this study is to develop a systems neuroscience and computational model of the recovery process in a nonhuman primate model of stroke. This project will also develop and test a neural engineering translational framework for novel treatments to improve motor function.

PROGRESS REPORT:

Initial studies have demonstrated the feasibility of successful training and lesion induction. Results from the pilot study have been used for an RO1 submission.

PUBLICATIONS:

PMID	Title

FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: SCHWANN CELL HETEROGENEITY AND AUTONOMIC NERVE REGENERATION

SPID#: 56041

UNIT/DIVISION: Primate Medicine

TYPE: Research

START DATE: 11/3/2016

END DATE: 11/3/2019

GENERAL CATEGORY: Neural

SUB-CATEGORY: Model

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER:

SUPPORTING ORGANIZATION: CNPRC

SPECIFIC INFORMATION: Private Source

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	SVM, Department of Medicine and Epidemiology
Prin. NPRC Core Sci.		
Other Core and Affil.		Department of Neurology, UCLA

PROJECT DESCRIPTION:

This protocol included studies of ventral root avulsion injury and root replantation. The unilateral L6-S3 ventral roots were avulsed in all animals. In a subset of animals, avulsed ventral roots were then replanted into the spinal cord for repair purposes. Studies of treadmill locomotion, urodynamic studies, magnetic resonance imaging, and EMG were performed to assess additional effects of ventral root injury and repair. In addition, gene expression and anatomical studies will be performed on ventral roots and select peripheral nerves carrying motor, sensory, and autonomic fibers. Subjects are evaluated out to the 6 month post-surgery time point, then euthanized for tissue collection.

PROGRESS REPORT:

All animals had their surgery in October 2018. Additionally, they just completed their latest urodynamic and EMG testing. However, their project endpoint is scheduled for late April, after which their tissue will be analyzed.

PUBLICATIONS:

PMID	Title
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None thus far - we need the tissues analyzed at the end of the project in order to write our manuscripts.

FUNDING SOURCES:
Private Source

Obtained by Rise for Animals.
Uploaded to Animal Research Laboratory Overview (ARLO) on 07/22/2021

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: MAGNETIC DUODENO-ILEAL BYPASS FOR METABOLIC SYNDROME IN RHESUS MONKEYS

SPID#: 56042

UNIT/DIVISION: CNPRC - Affiliate Scientist

TYPE: Research

START DATE: 6/1/2017

END DATE: 5/31/2019

GENERAL CATEGORY: Metabolic

SUB-CATEGORY: Diabetes

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R44DK112453

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	VM: Molecular Biosciences and Department of Nutrition
Prin. NPRC Core Sci.		Associate Director - CNPRC
Other Core and Affil.		

PROJECT DESCRIPTION:

The purpose of this project was to evaluate the metabolic effects of a novel magnetic device-induced compression intestinal anastomosis between the duodenum and ileum in adult rhesus monkeys with metabolic syndrome (insulin resistance and hyperlipidemia) resulting from consumption of moderate fat diet accompanied by high sugar (fructose) beverages sweetened with high fructose corn syrup (HFCS). This diet-induced nonhuman model of dyslipidemia was developed by Redacted by agreement laboratory at the California National Primate Research Center, in part with funding from the National Institutes of Health and the Private Source

Private Source

PROGRESS REPORT:

The project is ongoing. To date, 5 rhesus monkeys have undergone magnetic duodeno-ileal bypass or sham surgery. Three animals have completed study and 2 more will be completed in March, 2019. There have been 23 fasting blood draws, 14 Meal Tolerance Tests (MTTs) and 7 Intravenous Glucose Tolerance Tests (IVGTTs). Four additional rhesus monkeys have been enrolled in the project and are scheduled for surgeries in March and April, 2019.

PUBLICATIONS:

PMID	Title
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None to date

FUNDING SOURCES:

NIH Grant: R44-DK112453-070117 to Magnamosis, Inc., Redacted by agreement PI

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: EFFECTS OF RNA INTERFERENCE WITH ARO-APOC3 AND ARO-ANG3 ON CIRCULATING LIPIDS IN A HIGH SUGAR (FRUCTOSE) DIET-INDUCED RHESUS MACAQUE MODEL OF DYSLIPIDEMIA.

SPID#: 56043

UNIT/DIVISION: CNPRC Affiliate Scientist

TYPE: Research

START DATE: 1/1/2018

END DATE: 3/31/2019

GENERAL CATEGORY: Metabolic

SUB-CATEGORY: Cardiovascular

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER:

Private Source

SUPPORTING ORGANIZATION:

SPECIFIC INFORMATION:

INVESTIGATORS:

Name

Dept

Principal Investigator

Redacted by agreement

VM: Molecular Biosciences and Department of Nutrition

Prin. NPRC Core Sci.

Associate Director - CNPRC

Other Core and Affil.

VM: Molecular Biosciences

VM: Molecular Biosciences

PROJECT DESCRIPTION:

The purpose of this project was to evaluate the effects of RNA interference (RNAi) targeting two proteins (Apo-lipoprotein-C3 (Apo-C3) and Angiopoetin-like protein-3 (ANGPTL-3) to lower circulating (plasma) triglyceride (TG) concentrations for the treatment of hyperlipidemia in adult rhesus monkeys with high triglycerides resulting from consumption of moderate fat diet accompanied by high sugar (fructose) beverages sweetened with high fructose corn syrup (HFCS). This diet-induced nonhuman model of dyslipidemia was developed by laboratory at the California National Primate Research Center, in part with funding from the National Institutes of Health and the

Redacted by agreement

Private Source

PROGRESS REPORT:

Two RNAi triggers were tested (ARO-APOC3 and ARO- ANG3) via subcutaneous injections in n=4 each adult male rhesus monkeys that had been consuming a moderate fat typical American diet (TAD) along with 1000 ml/day of HFCS to raise plasma TG levels during a 4 week pre-intervention period. Two additional animals consuming the high sugar diet received vehicle injections as controls. The animal portion of the study and initial

plasma sample analyses were completed in September, 2018. Circulating levels of both target proteins (Apo-C3 and ANGPTL-3), were decreased by the RNAi triggers and there was a marked lowering of fasting and non-fasting plasma TG in the RNAi treated animals over the course of the experiment. Plasma cholesterol was also lowered in the 4 animals that received ARO-ANG3. No adverse effects of the treatments were noted during the study. Private Source has been provided with samples and data from the project and is planning to take both RNAi therapies into clinical trials in humans, in part based on the positive results from this project.

PUBLICATIONS:

PMID	Title
30723097	Fructose-induced hypertriglyceridemia in rhesus macaques is attenuated with fish oil or apoC3 RNA interference.

Unpublished

FUNDING SOURCES:

Private Source

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: COGNITIVE, SOCIOAFFECTIVE AND NEURAL DEVELOPMENT FOLLOWING FETAL ZIKA VIRUS INFECTION

SPID#: 57001

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE: 8/19/2018

END DATE: 5/31/2023

GENERAL CATEGORY: Infectious Disease

SUB-CATEGORY: Development

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01HD096436

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Neuroscience and Behavior (CNPRC), Psychology (UCD)
Prin. NPRC Core Sci.		Neuroscience and Behavior
		Infectious Disease
Other Core and Affil.		Vision Program
		Infectious Diseases

PROJECT DESCRIPTION:

PROGRESS REPORT:

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: EFFECTS OF HUMAN NEURAL STEM CELL GRAFTS ON AUTONOMIC AND CARIOREGULATORY SYSTEMS AFTER SCI IN NON-HUMAN PRIMATES

SPID#: 57002

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE: 9/1/2018

END DATE: 8/31/2019

GENERAL CATEGORY: Neural

SUB-CATEGORY: Regenerative Medicine

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER: 00018917

SUPPORTING ORGANIZATION: UC San Diego

SPECIFIC INFORMATION: Prime Sponsor: Army Medical Research and Materiel Command

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	
Prin. NPRC Core Sci.		
Other Core and Affil.		

PROJECT DESCRIPTION:

Specific Aim 1: Procurement and training/testing of NHP's in the Redacted by agreement facility at the CNPRC. Collect baseline data.

Specific Aim 2: Ensure quality post-lesion, post-treatment, and post-tracer care; collect post-lesion data and arrange perfusions.

PROGRESS REPORT:

PUBLICATIONS:

PMID	Title

FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: VISUALIZATION OF OXYTOCIN RECEPTOR FOR TRANSLATIONAL SOCIAL NEUROSCIENCE

SPID#: 57003

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE: 7/1/2018

END DATE: 3/30/2020

GENERAL CATEGORY: Neural

SUB-CATEGORY: Neural

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R21MH115680

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	CNPRC
Prin. NPRC Core Sci.		Psychology
Other Core and Affil.		

PROJECT DESCRIPTION:

Oxytocin (OT) is a potent neuromodulator that influences complex social behaviors, including social bonding, affiliation, and social reward. Administering intranasal OT to humans affects a suite of social behaviors, such as trust, eye contact, emotion recognition, and pair-bonding-related behaviors. Due to the ability of OT to modulate social function in animals as well as humans, the OT system has been highly implicated in the biology and treatment of several psychiatric conditions that are characterized by deficits in sociality, including autism spectrum disorder, schizophrenia, and social anxiety disorder.

Because of this high translational potential for OT to benefit human health, it is crucial that research efforts focus on the fundamental neuroanatomy and physiology of the oxytocin system in the brains of both animals and humans. Thanks to the suite of transgenic tools available, research in mice has contributed considerably to our understanding of the function of OT in the regulation of social behavior. But non-mouse models are increasingly being used, including monogamous rodents as well as nonhuman primates. To complement the elegant behavioral pharmacology being done in these species, rigorous neuroanatomical work is required to characterize the underlying neural circuits responsible for OT's effects on behavior and cognition. Currently, the most reliable and widely available technique for the visualization of OXTR in brain tissue sections is receptor autoradiography, but this method has some limitations. It only resolves receptors at the gross anatomical level; it is not possible to analyze receptor expression on the cellular scale. The most common technique to visualize receptors on the cellular level is with immunohistochemistry, but there are no reliable, commercially-available antibodies for OXTR. So, the field of OXTR research has been left without a widely available and tractable technique to investigate these receptors on the cellular level.

Thus, the first aim of our proposal is to advance the field of OT research by developing a novel method for the cellular staining of OXTR in brain tissue. The second aim would apply the novel OXTR staining method to the

Obtained by Rise for Animals.

Uploaded to Animal Research Laboratory Overview (ARLO) on 07/22/2021

localization of OXTR on dopaminergic neurons in prairie voles.

PROGRESS REPORT:

This technique will use a novel biotinylated OXTR ligand provided by our chemist collaborator and will be optimized from prairie voles, titi monkeys, and humans. Our approach for Specific Aim 1 involves blending portions of the established protocols for autoradiography (which uses unfixed tissue sections and promotes ligand-receptor binding) and immunohistochemistry (which uses fixed tissues and allows for stain to be deposited at the site of the protein of interest). Because of the differences in tissue fixation between these two protocols, we expected that we would have to optimize the fixation timing, duration, and strength, and most of our efforts thus far since the project start date have focused on this issue. We have also been working with the chemists who designed the compound in order to understand the parameters that may influence its binding affinity to OXTR, and we have now begun some receptor pharmacology experiments to confirm that it behaves analogously in brain tissue as it does in cell culture assays. We have also optimized the best nuclear counterstain and the best post-mortem tissue processing protocol for cryoprotection.

At this time, we have not been able to make any progress on Aim 2, but we have acquired protocols for immunolabeling dopaminergic neurons in a way that is compatible with our approach in Aim 1, and we are planning to purchase the necessary reagents and pilot these protocols in the next few weeks.

This grant has provided full time employment for one research assistant and student research experience for one undergraduate volunteer. This grant also provided support for the contact PI Redacted by agreement to attend a National Academy of Sciences workshop on the use on nonhuman primates for the study of human neurological disease in January of 2019 at UC Irvine.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: A TAU-BASED MONKEY MODEL OF ALZHEIMER'S DISEASE

SPID#: 57004

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE: 9/1/2018

END DATE: 4/30/2019

GENERAL CATEGORY: Aging

SUB-CATEGORY: Aging

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: P51OD011107

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	<div style="border: 1px solid black; padding: 5px;"> Redacted by agreement </div>	Neurology, Primate Center
Prin. NPRC Core Sci.		Neurology, Primate Center
Other Core and Affil.		Rush University School of Medicine
		University of Florida

PROJECT DESCRIPTION:

This is a Supplement to the Base Grant provided by NIA. The goal is to develop a tau based model of the degenerative phase of Alzheimer's Disease through injecting a viral vector containing DNA with double tau mutants. We hypothesize that the tau mutant variants will be expressed and form aggregates with monkey tau, leading to tau-based pathology and neurodegeneration.

PROGRESS REPORT:

We have obtained the AAV vectors containing the tau mutations and have injected them into the entorhinal cortex of 10 rhesus monkeys. The first group will be perfused in April, with tissue then available for analysis. We have also been perfecting the quantitative microscopic techniques that will be employed to characterize the cellular pathology in these brains.

PUBLICATIONS:

PMID	Title

FUNDING SOURCES:

NIH/NIA

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: A TRANSLATIONAL MODEL OF HEALTH SOCIOEMOTIONAL AGING

SPID#: 57005

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE: 8/1/2018

END DATE: 5/31/2020

GENERAL CATEGORY: Aging

SUB-CATEGORY: Behavior

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R21AG058894

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Neuroscience and Behavior (CNPRC), Psychology (UCD)
Prin. NPRC Core Sci.		Neuroscience and Behavior (CNPRC), Psychology (UCD)
Other Core and Affil.		

PROJECT DESCRIPTION:**PROGRESS REPORT:****PUBLICATIONS:**

PMID	Title
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FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: NON-HUMAN PRIMATE MODELS OF CONE DISORDERS AND OTHER HERITABLE RETINAL DISEASES, GRANT # A19-1430

SPID#: 57006

UNIT/DIVISION: BMB

TYPE: Research

START DATE: 10/1/2018

END DATE: 9/30/2023

GENERAL CATEGORY: Vision

SUB-CATEGORY: Model

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: U24EY029904

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	VSR
Prin. NPRC Core Sci.		Primate Services
Other Core and Affil.		VSR Ophthalmology & Vision Science

PROJECT DESCRIPTION:

Retinal degeneration diseases are a common cause of untreatable blindness worldwide, affecting the lives of millions. The only FDA-approved treatment for these disorders is gene therapy for specific RPE65 mutations that cause Leber's congenital amaurosis and retinitis pigmentosa. One major limitation to the development of effective therapies is the use of animal models that poorly replicate the human condition. Particularly for cone disorders, studies that use animals with a rod-dominant retina and no true macula have substantive limitations. By contrast, the cone-rich macula of nonhuman primates (NHP) closely mirrors that of the human retina. Consequently, well-defined NHP models of heritable retinal diseases, particularly cone disorders, that are more predictive of human conditions are necessary to more efficiently advance new therapies. We propose to develop a series of novel and spontaneous NHP models of human inherited retinal diseases. Behavioral observations of rhesus macaques (*Macaca mulatta*) at the California National Primate Research Center identified a series of macaques that displayed apparent visual impairment. Genetic testing showed that four animals are homozygous for a damaging mutation in the PDE6C gene, which has previously been associated with cone dystrophy in humans. Scotopic and photopic full-field electroretinograms performed on macaques homozygous for the PDE6C mutation demonstrated a relatively normal rod response but no cone response whatsoever. A subtle but characteristic bullseye maculopathy was identified using fundus photography, blue autofluorescence, and fluorescein angiography with concurrent foveal thinning using spectral-domain optical coherence tomography. Our genetic survey of this population also identified macaques with mutations in 7 other human retinal disease genes that are predicted to severely damage gene or protein function, pointing to possible additional new models. To develop the PDE6C primate model of cone dystrophy, and make this and other new NHP models

available to the vision research community, we propose four Specific Aims: 1) to identify and genetically characterize new NHP models of human retinal disease via DNA sequencing, 2) to perform complete ophthalmic phenotyping of NHP models of retinal disease, 3) to breed a colony of NHPs with PDE6C cone dystrophy and 4) to compare cell-based and gene replacement therapies in macaques with PDE6C cone dystrophy mutations. Successful completion of this work will produce a well-characterized new animal model of inherited cone dystrophy with significantly greater similarity to human disease than existing models, thus providing substantially better translation to subsequent human trials. In addition, affected animals will be made available to the wider vision research community, and other new models with similar potential will be identified.

PROGRESS REPORT:

We have monitored 500 CNPRC macaques for possible vision impairment and identified 83 “eye pokers” for phenotyping. Currently, we have phenotyped 40 macaques with possible vision impairment (eye pokers) using detailed ophthalmic exams, electroretinography and multimodal ocular imaging and found several abnormalities including cuticular drusen (n = 4), abnormal ERG (n = 2), hyperopia (n = 3), endothelial disease (n = 3), congenital cataract (n = 1).

We have screened ~600 macaques for the PDE6C mutation and found 5 mutants & 56 heterozygotes identified (~10% allele frequency at CNPRC).

We have identified 2 male & 5 female heterozygotes in the indoor colony to be used for this breeding season.

We have submitted DNA from 200 CNPRC macaques to capture sequence for our retinal disease panel.

We are currently generating AAV viral vectors and iPSC cells for PDE6C therapy.

PUBLICATIONS:

PMID	Title
30667376	A nonhuman primate model of inherited retinal disease.

FUNDING SOURCES:

U24-EY029904

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: PROPHYLAXIS OF ADULT MACAQUES WITH ANTI-ZIKA ANTIBODIES

SPID#: 57007

UNIT/DIVISION: CNPRC-Infectious Diseases

TYPE: Research

START DATE: 3/1/2018

END DATE: 2/28/2019

GENERAL CATEGORY: Infectious Disease

SUB-CATEGORY: Viral

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R37AI037526

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Rockefeller University
Prin. NPRC Core Sci.		CNPRC-Infectious Diseases
Other Core and Affil.		Pathology, Microbiology and Immunology, School of Veterinary Medicine, UC-Davis

PROJECT DESCRIPTION:

women. ZIKV infection of rhesus macaques has been demonstrated to be useful animal model to study pathogenesis and provide proof-of-concept of antiviral interventions. While potent neutralizing antibodies have the potential to be effective, there is also a risk that through binding to the Fc receptor, they may enhance infection of certain cell types. Therefore, antibodies that neutralize Zika virus in vitro, but do not bind the Fc receptor, have been engineered. The proposed studies are aimed at testing the efficacy of such anti-Zika antibodies in the macaque model.

PROGRESS REPORT:

We have performed several experiments using mutant forms of anti-zika neutralizing antibodies, that either bind or don't bind the Fc receptor, or have a prolonged half-life. The first experiments demonstrate that combinations of antibodies with the mutations that abrogate Fc binding are effective in reducing peak viremia. Other experiments are still in progress.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

NIH

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: SUBLINGUAL-PARENTERAL VACCINATION TO PREVENT ORAL HIV TRANSMISION
IN INFANTS, GRANT # 1R01-DE028146

SPID#: 57008

UNIT/DIVISION: California National Primate Research Center, Infectious Diseases

TYPE: Research

START DATE: 9/6/2018

END DATE: 6/30/2023

**GENERAL
CATEGORY:** AIDS

SUB-CATEGORY: Vaccine

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01DE028146

**SUPPORTING
ORGANIZATION:** NIH

**SPECIFIC
INFORMATION:**

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Univ. of North Carolina, Chapel Hill
Prin. NPRC Core Sci.		CNPRC
Other Core and Affil.		CNPRC

PROJECT DESCRIPTION:

There is a critical need for a pediatric HIV vaccine that when given shortly after birth to breast-feeding infants in developing countries, can protect them against HIV infection. Oral SIV/SHIV infection of infant macaques has been shown to be a relevant animal model of postnatal HIV infection to study pathogenesis and provide proof-of-concept of intervention strategies, including immunizations. Previous studies indicated that adding a combined oral and intramuscular route of immunization gave better outcome than an intramuscular immunization only. The objective of the new studies is to optimize these vaccine regimens through rational selection of adjuvants and immunogens that can induce better antibody responses both systemically as well as mucosally.

PROGRESS REPORT:

The studies have not started yet, as infant macaques are born only in the Spring season.

PUBLICATIONS:

PMID	Title

FUNDING SOURCES:

Redacted by agreement

NIDCR

Obtained by Rise for Animals.
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**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: GENERATION OF PERSISTENT ANTI-RETROVIRAL IMMUNITY IN INFANT RHESUS MACAQUES

SPID#: 57009

UNIT/DIVISION: Infectious Disease

TYPE: Research

START DATE: 6/1/2018

END DATE: 5/31/2019

GENERAL CATEGORY: Infectious Disease

SUB-CATEGORY: AIDS

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: P30AI073961

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	University of Miami
Prin. NPRC Core Sci.		California National Primate Research Center
Other Core and Affil.		California National Primate Research Center

PROJECT DESCRIPTION:

The animal experiments will be performed at the California National Primate Research Center. In a series of experiments, one group of neonate rhesus macaques will be inoculated with will be orally vaccinated with live recombinant (r) forms of the γ 2-herpesvirus rhesus monkey rhadinovirus (rRRV) encoding SIV sequences, to generate active immunity against simian immunodeficiency virus (SIV), while the other group of neonates will be treated with recombinant adeno-associated virus (rAAV) vectors encoding the potent and broad HIV/SIV inhibitor eCD4-Ig, to generate passive anti-lentiviral immunity in RMs. Following inoculation, animals are monitored closely, and blood, saliva and urine samples are collected frequently to monitor the immune markers. Samples will be shipped to the laboratory of Redacted by agreement (University of Miami). Animals will be euthanized at the end of the experiments for tissue analysis.

PROGRESS REPORT:

We have obtained the IACUC protocol approval for the animal experiments. BUA application for the vectors has been approved. Serology assay has been developed and tested at the University of Miami using sham samples. We completed the screening over 100 females for rAAV-1. Dams that met our criteria are flagged in the database. Three new-born macaques will be assigned to the study upon deliver.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: RAAV-MEDIATED DELIVERY OF HIV-SPECIFIC BNMABS IN NEWBORN RHESUS MACAQUES

SPID#: 57010

UNIT/DIVISION: Infectious Disease

TYPE: Research

START DATE:

END DATE:

GENERAL CATEGORY: Infectious Disease

SUB-CATEGORY: AIDS

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER:

Private Source

SUPPORTING ORGANIZATION:

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Univ. of Miami
Prin. NPRC Core Sci.		California National Primate Research Center
Other Core and Affil.		California National Primate Research Center

PROJECT DESCRIPTION:

The animal experiments will be performed at the California National Primate Research Center. Three newborn RMs will be treated intramuscularly with two rAAV-1 vectors encoding "rhesusized" versions of the broadly neutralizing monoclonal antibodies (bnMAbs) 3BNC117 and 10-1074. Following inoculation, animals will be monitored closely, and blood samples will be collected frequently to monitor bnMAb levels and anti-bnMAb antibody responses. Samples will be shipped to the laboratory of Redacted by agreement (University of Miami). Animals will be euthanized at the end of the experiments for tissue analysis.

PROGRESS REPORT:

We have obtained the IACUC protocol approval for the animal experiments. BUA application for the vector has been approved. Serology assay has been developed and tested at the University of Miami using sham samples. We completed the screening over 100 females for rAAV-1. Dams that met our criteria are flagged in the database. Three new-born macaques will be assigned to the study upon deliver.

PUBLICATIONS:

PMID	Title

FUNDING SOURCES:

Subcontract from Univ. of Miami

Obtained by Rise for Animals.
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**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: OPTIMIZING ORAL PEDIATRIC HIV VACCINES TO PREVENT BREAST MILK TRANSMISSION

SPID#: 57011

UNIT/DIVISION: CNPRC-infectious Diseases

TYPE: Research

START DATE: 5/3/2012

END DATE: 3/31/2018

GENERAL CATEGORY: AIDS

SUB-CATEGORY: Vaccine

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01DE022287

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	<div style="border: 1px solid black; padding: 5px; min-height: 100px;"> Redacted by agreement </div>	University of North Carolina, Chapel Hill
Prin. NPRC Core Sci.		CNPRC-Infectious Diseases
Other Core and Affil.		

PROJECT DESCRIPTION:

The goal of the project is to optimize an oral pediatric HIV vaccine that can protect breast-feeding human infants against HIV infection. Using the SIV-macaque model, we will test different vaccine routes, vaccine adjuvants, and different vaccine combinations to determine the most effective strategy to induce long-lasting immune responses. In addition, we will try to determine the anatomical sites of viral entry and initial replication in infant macaques following oral SIV exposure, because such knowledge will guide the development of antiviral vaccines that target such sites.

PROGRESS REPORT:

Groups of juvenile macaques have been immunized with different SIV vaccines by different routes for comparison of local and systemic immune responses. In addition, infant macaques have been inoculated orally with SIV and euthanized at defined times within the first days after inoculation to determine the sites of viral entry. Immunological and virological analysis of all samples is currently ongoing.

We completed an infant oral SIV challenge study comparing an IM immunization regimen to a combined IM/sublingual (SL) regimen. The data show that infant macaques vaccinated by the IM/SL route required significantly more oral SIV exposures than the IM only vaccinated infants. IM/SL vaccinated macaques also had lower peak viremia compared to IM vaccinated infants. Control of viremia was associated with SIV Env-specific IgG antibody responses in fecal extracts.

PUBLICATIONS:

Obtained by Rise for Animals.
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PMID	Title
30303405	Oral Coadministration of an Intramuscular DNA/Modified Vaccinia Ankara Vaccine for Simian Immunodeficiency Virus Is Associated with Better Control of Infection in Orally Exposed Infant Macaques.
30204253	A simultaneous oral and intramuscular prime/sublingual boost with a DNA/Modified Vaccinia Ankara viral vector-based vaccine induces simian immunodeficiency virus-specific systemic and mucosal immune responses in juvenile rhesus macaques.

FUNDING SOURCES:

NIH

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: THE EFFECT OF BINDING OF FH TO MENINGOCOCCAL FHBP VACCINE ON ANTIBODY PROTECTION

SPID#: 57012

UNIT/DIVISION: CNPRC-Infectious Diseases

TYPE: Research

START DATE: 12/1/2016

END DATE: 3/31/2019

GENERAL CATEGORY: Infectious Disease

SUB-CATEGORY: Vaccine

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01AI114701

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	<div style="border: 1px solid black; padding: 5px; min-height: 100px;"> Redacted by agreement </div>	Children's Hospital Oakland Research Institute
Prin. NPRC Core Sci.		CNPRC-Infectious Diseases
Other Core and Affil.		

PROJECT DESCRIPTION:

We will test a highly promising experimental NOMV-FHbp vaccine based on the results from human FH transgenic mouse immunogenicity studies. In brief, animals will be pre-screened for measurement of binding of macaque FH to meningococcal Factor H binding protein (FHbp), then divided in groups and immunized with several doses of different vaccine regimens, including positive and negative control vaccines. Blood samples will be collected regularly to monitor immune responses.

PROGRESS REPORT:

All animals have been enrolled into the study and are receiving the immunizations. Samples are being collected regularly. Sample analysis is ongoing.

PUBLICATIONS:

PMID	Title

FUNDING SOURCES:

NIH

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: PRECISION NONHUMAN PRIMATE MODELS FOR CONGENITAL DISEASES

SPID#: 57013

UNIT/DIVISION: Reproductive Sciences and Regenerative Medicine

TYPE: Research

START DATE: 5/1/2018

END DATE: 4/30/2020

GENERAL CATEGORY: Reproductive

SUB-CATEGORY: Development

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R21NS104675

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Pediatrics and Cell Biology and Human Anatomy, and Biochemistry and Molecular Medicine, School of Medicine
Prin. NPRC Core Sci.		Pediatrics and Cell Biology and Human Anatomy, School of Medicine
Other Core and Affil.		

PROJECT DESCRIPTION:

The objective of these studies is to capitalize on innovative capabilities for in vivo delivery of somatic cell gene editing tools to demonstrate the feasibility of a new approach for translational models of human congenital disorders.

PROGRESS REPORT:

Studies are currently in progress.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

NIH, NINDS

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: HEMOSTATIC METHODS FOR HYSTEROTOMY

SPID#: 57014

UNIT/DIVISION: Reproductive Sciences and Regenerative Medicine

TYPE: Research

START DATE: 2/10/2019

END DATE: 4/30/2020

GENERAL CATEGORY: Reproductive

SUB-CATEGORY: Development

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER:

SUPPORTING ORGANIZATION: U Michigan

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	<div style="border: 1px solid black; padding: 5px;"> Redacted by agreement </div>	Surgery, University of Michigan
Prin. NPRC Core Sci.		Pediatrics and Cell Biology and Human Anatomy, School of Medicine
Other Core and Affil.		

PROJECT DESCRIPTION:

The goal of this study is to evaluate a new method for performing procedures related to human fetal surgery.

PROGRESS REPORT:

The study has recently been initiated.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

Private donor

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: DEVELOPMENTAL ORIGIN AND TRAFFICKING OF MICROGLIAL CELLS

SPID#: 57015

UNIT/DIVISION: Reproductive Sciences and Regenerative Medicine

TYPE: Research

START DATE: 9/30/2018

END DATE: 6/30/2023

GENERAL CATEGORY: Neural

SUB-CATEGORY: Development

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01NS109379

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Psychiatry and Behavioral Sciences, and Pediatrics, School of Medicine
Prin. NPRC Core Sci.		Pediatrics and Cell Biology and Human Anatomy, School of Medicine
Other Core and Affil.		

PROJECT DESCRIPTION:

Microglial cells are resident innate immune cells in the brain and exhibit dynamic changes in morphology and distribution during gestation. They can regulate diverse programs that are essential for normal brain development and function, and recent studies have shown that in the developing brain microglia regulate key processes including synapse development, axonal path finding, and cortical layer formation. The studies proposed are designed to address significant gaps in our knowledge on the trafficking and seeding of microglial cell populations during critical windows of primate brain development.

PROGRESS REPORT:

These studies have recently been initiated and are in progress.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

NIH, NINDS

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: MATERNAL ANTIBODIES AND FETAL BRAIN DEVELOPMENT

SPID#: 57016

UNIT/DIVISION: Reproductive Sciences and Regenerative Medicine

TYPE: Research

START DATE: 11/15/2018

END DATE: 10/31/2020

GENERAL CATEGORY: Neural

SUB-CATEGORY: Development

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R21MH118574

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	<div style="border: 1px solid black; padding: 5px;"> Redacted by agreement </div>	Psychiatry, Pediatrics, and Internal Medicine, School of Medicine
Prin. NPRC Core Sci.		Pediatrics and Cell Biology and Human Anatomy, School of Medicine
Other Core and Affil.		Psychiatry and Behavioral Sciences, School of Medicine

PROJECT DESCRIPTION:

Autism spectrum disorder (ASD) affects over 1% of the children in the United States, yet there remains relatively little understanding of the underlying cause(s) and few options for therapeutic interventions. The studies proposed will evaluate a prenatal risk factor that has been implicated in ASD - maternal antibodies that can transfer across the placenta into the developing brain - and by using new in vivo imaging methods.

PROGRESS REPORT:

Studies have recently been initiated.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

NIH, NIMH

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: PRODUCTION OF CHIMERIC NHPS

SPID#: 57017

UNIT/DIVISION:

TYPE: Pilot

START DATE: 1/1/2019

END DATE: 5/30/2019

GENERAL CATEGORY: Reproductive

SUB-CATEGORY: Genetic

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER: Private Source

SUPPORTING ORGANIZATION:

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	OB/GYN and CNPRC
Prin. NPRC Core Sci.		OB/GYN and CNPRC
Other Core and Affil.		

PROJECT DESCRIPTION:

Induced pluripotent stem cells (iPSC) are expected to be a powerful tool for curing human disease and for organ generation. Although several research groups recently reported methods for deriving human ground-state (naïve) pluripotent stem cells(1-4), their totipotency has not been demonstrated in vivo through the generation of chimeric animals and thus their suitability for therapeutic use and organ generation is not known. In rodents, rat iPSCs have been injected into PdX1 knock-out mouse embryos, leading to the formation of rat pancreas in mice (5). However, this is not possible in humans. Presently there is a moratorium on the direct generation of human-animal chimeras, because of potentially controversial effects of human cells in animal embryos. Progress in this research was slowed by the issue of an NIH moratorium on injection of human naïve pluripotent stem cells into pre-gastrulation nonhuman vertebrate embryos (NOT-OD-15-158). To resolve the serious ethical issues surrounding this method, it is imperative that additional information be acquired about the fate of naïve pluripotent stem cells injected into larger vertebrate, non-rodent and specifically NHP embryos.

We propose to ethically test interspecific chimera formation in nonhuman primates (NHP), using rhesus macaque (*Macaca mulatta*) pre-gastrulation embryos as recipients, and either pig-tailed macaque (*Macaca nemestrina*) or chimpanzee (*Pan troglodytes*) naïve pluripotent stem cells derived from their iPSC, because these species are closely related (approximately 93% and 98% genome sequence identity) to humans. In order to conduct this project we propose a unique inter-institutional research collaboration involving world-renown experts at Stanford School of Medicine, Johns Hopkins School of Medicine, and the California National Primate Research Center (CNPRC).

We believe this work will form a landmark study that will provide important information regarding the ability to make chimeric animals in primates and investigate the level and sites of incorporation of the donor cells into recipient primate embryos. This study will provide important information to resolve the serious ethical issues surrounding the injection of human naïve pluripotent stem cells into nonhuman animal vertebrates pre-gastrulation embryos.

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PROGRESS REPORT:

This pilot funding has just been received. We have collected oocytes, but have not yet injected the specialized induced pluripotent stem cells into embryos.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: MECHANISMS OF ADULT LUNG ALVEOGENESIS

SPID#: 57018

UNIT/DIVISION: Respiratory

TYPE: Research

START DATE: 5/1/2017

END DATE: 2/28/2019

GENERAL CATEGORY: Respiratory

SUB-CATEGORY: Regenerative Medicine

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: U01HL134766

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Anatomy, Physiology, & Cell Biology, UCD School of Veterinary Medicine
Prin. NPRC Core Sci.		Anatomy, Physiology, & Cell Biology, UCD School of Veterinary Medicine
Other Core and Affil.		UCSF School of Medicine
		Boston University

PROJECT DESCRIPTION:

The overall objective of this application is to develop human lung epithelial stem/progenitor cells, either endogenous or derived from iPS cells, as an adjunctive therapy to promote recovery from severe lung injury, i.e. diffuse alveolar damage. The application involves a multi-disciplinary investigative team and uses influenza infection in both mice and macaques as pre-clinical models to assess efficacy of cell-based therapy in lung repair.

PROGRESS REPORT:

Studies are ongoing.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

NIH

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: ROLE OF MICROBIOME IN NEONATAL LUNG MATURATION AND IMMUNE SUSCEPTIBILITY

SPID#: 57019

UNIT/DIVISION: Respiratory

TYPE: Research

START DATE: 5/1/2017

END DATE: 2/28/2019

GENERAL CATEGORY: Respiratory

SUB-CATEGORY: Influenza

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R01AI138553

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Anatomy, Physiology & Cell Biology, UCD School of Veterinary Medicine
Prin. NPRC Core Sci.		Anatomy, Physiology & Cell Biology, UCD School of Veterinary Medicine
		Anatomy, Physiology & Cell Biology, UCD School of Veterinary Medicine
		Medical Microbiology, UCD School of Medicine
Other Core and Affil.		Cincinnati Children's Hospital

PROJECT DESCRIPTION:

The major goal of this study is to investigate the developing microbiome of the airways using the nonhuman human primate model.

PROGRESS REPORT:

Studies are ongoing.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

NIH

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**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: SUSCEPTIBILITY OF ADOLESCENT AIRWAYS TO E-CIGARETTE EXPOSURE

SPID#: 57020

UNIT/DIVISION: Respiratory

TYPE: Research

START DATE: 5/1/2017

END DATE: 2/28/2019

GENERAL CATEGORY: Respiratory

SUB-CATEGORY: Pediatric

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: R21HL142485

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Anatomy, Physiology, & Cell Biology, UCD School of Veterinary Medicine
Prin. NPRC Core Sci.		Anatomy, Physiology, & Cell Biology, UCD School of Veterinary Medicine
Other Core and Affil.		California National Primate Research Center

PROJECT DESCRIPTION:

The major goal of this study is to investigate the influence of e-cigarette exposure on growth of lower airways in a mouse and cell culture model.

PROGRESS REPORT:

Studies are currently ongoing.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

NIH

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: AGE-DEPENDENT EFFECTS OF ECIGARETTE VAPING ON HOST PATHOGEN DEFENSE

SPID#: 57021

UNIT/DIVISION: Respiratory Diseases Unit

TYPE: Research

START DATE: 5/1/2017

END DATE: 2/28/2019

GENERAL CATEGORY: Respiratory

SUB-CATEGORY: Respiratory

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: K01OD024782

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Respiratory Diseases Unit
Prin. NPRC Core Sci.		
Other Core and Affil.		Respiratory Diseases Unit

PROJECT DESCRIPTION:

Electronic cigarettes have rapidly gained popularity especially in adolescence presenting a major concern for the potential to cause long lasting lung disease from an early age. Our goal is to determine the age-related disease potential for electronic cigarettes in comparison to traditional cigarettes. Specifically, we seek to understand the exposure effects at the frontline barrier to the environment and determine the efficacy of a novel therapeutic functioning at this interface with the environment.

PROGRESS REPORT:

Early research efforts have been focused accumulating a bank of nonhuman primate primary airway epithelial cells and standardizing the cell culture and exposure methods necessary to achieve Specific Aims 1 and 2. A protocol for isolating and storing epithelial cells from major airways, approximately 4th generation and proximal including trachea, of nonhuman primate pulmonary specimens has been developed and successfully utilized to generate primary tracheobronchial epithelial cell cultures. A total of 8 specimens across infant to adolescent and adult age ranges have been collected to date which is approximately half of the necessary specimens that will be utilized for experiments in these two age groups. Archived specimens may be utilized from the laboratory of Dr.

Redacted by agreement

if new specimens do not become available prior to the start of experiments in the next reporting period. With the help of Redacted by agreement existing cell culture protocols, cultures involving cell lines (16HBE, human bronchial epithelial cell line) were established in order for Redacted by agreement to develop his laboratory's preliminary cell culture protocols. Subsequently cell culture protocols for primary airway epithelial cells were developed. These cell line cultures were also used in basic toxicity testing for the vaping exposure system outlined below, which indicated exposures are not acutely toxic to HBE cells as illustrated by the maintenance of metabolic reduction of alamar blue reagent. Adolescent primary airway epithelial cultures have been established to yield a fully differentiated ciliated epithelium, which occurs over approximately 1.5 months. With these cultures

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a time course of samples of apically secreted proteins from the beginning of air-liquid interface culture to terminal differentiation has been obtained. Assessment of innate defense protein secretion during epithelial cell differentiation is underway by western blot to identify the culture period for maturation of the secretory system producing the current proteins of interest, SPLUNC1, LPLUNC1, cathelicidin, beta-defensin, and lysozyme. These data will inform optimal timing of exposures in the examination of the vaping effects on this innate defense system.

In the current review period, methods for vaping exposure and dosimetry have been established. Funding from the UC Davis Environmental Health Sciences NIEHS P30 Center was awarded to [Redacted by agreement] to construct a vaping exposure system and develop a gas chromatographic method for analysis of the three major components of e-liquids. Much of the current literature on in vitro effects of vaping has limited translational impact due to limitations in comparing the doses used to that commonly received in the average e-cigarette user. Here we have developed direct dosimetry of the vapor constituents to be able to compare to current models of exposure in e-cigarette users. Dosimetry for the vaping exposures was established through the development of a gas chromatographic analytical technique that allows the simultaneous quantification of the two vehicle components of the vapor, propylene glycol and glycerin, and nicotine (figure 2). With this technique an exposure regimen has been established to mimic a single acute exposure similar to an average vaping session measured in e-cigarette users. This exposure regimen can then be repeated as needed to simulate a given number of vaping sessions depending on the experiment. To date, this exposure regimen has been successfully used in the exposure of cell lines (figure 1) and terminally differentiated primary airway epithelial cells and will continue to be used in the upcoming experiments requiring vaping exposure.

Review of scientific progress and an outline of goals was conducted at an initial meeting, November 9th 2017, with an advisory committee of faculty at UC Davis that provides oversight for the California National Primate Research Center Inhalation Exposure Core, which I manage. The committee consists of Respiratory Disease Unit Core Scientists and mentors [Redacted by agreement] as well as [Redacted by agreement] and [Redacted by agreement]

[Redacted by agreement] Director of the Air Quality Research Center. Committee members contribute expertise in respiratory physiology, inhalation toxicology, and modeling of air pollutant exposures. With the development of the methods and protocols listed above, experiments to achieve Specific Aim 1 are underway following the complete analysis of the maturation time course of the secretory innate defense protein system in primary airway epithelia.

PUBLICATIONS:

PMID	Title
29216343	Nonhuman Primate Models of Respiratory Disease: Past, Present, and Future.

FUNDING SOURCES:

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: INVESTIGATING THE ROLE OF T CELLS IN AGE-RELATED
NEURODEGENERATION IN HIV INFECTION

SPID#: 57022

UNIT/DIVISION: Neuroscience and Beh. and Infectious Disease

TYPE: Research

START DATE: 8/1/2018

END DATE: 7/31/2019

GENERAL CATEGORY: AIDS

SUB-CATEGORY: Aging

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: P51OD011107

**SUPPORTING
ORGANIZATION:** NIH

**SPECIFIC
INFORMATION:**

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	<div style="border: 1px solid black; padding: 5px;"> Redacted by agreement </div>	Primate Center/CCM
Prin. NPRC Core Sci.		Primate Center/CCM
Other Core and Affil.		

PROJECT DESCRIPTION:

This is a Supplement to the Base grant provided by NIA and OAR to model HIV-Associated Neurocognitive Disorders (HAND) in the rhesus monkey. Monkeys will be infected with SIV and given antiretroviral drugs, followed by behavioral and immunologic assessments, with cellular and synaptic analyses performed after sacrifice.

PROGRESS REPORT:

All oif the animals have been identified and the infectious agents and drugs have been secured. We have also been developing new microscopic and biochemical methods to characterize the expected neuro-inflammation that will be a major target for serum and CSF biomarkers as well as microscopy.

PUBLICATIONS:

PMID	Title
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FUNDING SOURCES:

NIH

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: ADENO-ASSOCIATED VIRAL VECTOR SERVICE AGREEMENT

SPID#: 57023

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE: 4/13/2018

END DATE: 12/31/2019

GENERAL CATEGORY: Neural

SUB-CATEGORY: Brain Structure/Function

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER: Private Source

SUPPORTING ORGANIZATION:

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	Neurology, Primate Center
Prin. NPRC Core Sci.		Neurology, Primate Center
Other Core and Affil.		Coda Biotherapeutics

PROJECT DESCRIPTION:

Private Source is using a viral vector approach to develop a gene-therapy solution to chronic pain. This is being modeled in the rhesus monkey.

PROGRESS REPORT:

The surgical approach has been validated and expression of the viral vector has been achieved.

PUBLICATIONS:

PMID	Title

FUNDING SOURCES:

Private Source

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: SPECIALIZED HOUSING/TESTING FACILITIES TO ENHANCE SOCIAL INTERACTIONS

SPID#: 57024

UNIT/DIVISION: Neuroscience and Behavior

TYPE: Research

START DATE: 8/6/2018

END DATE: 4/30/2019

GENERAL CATEGORY: Infrastructure

SUB-CATEGORY: Neural

NIH GRANT: ☒ Yes ☐ No

GRANT NUMBER: P51OD011107

SUPPORTING ORGANIZATION: NIH

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	<div style="border: 1px solid black; padding: 5px;"> Redacted by agreement </div>	Vice Chancellor for Research
Prin. NPRC Core Sci.		Primate Center, Neurology
		Primate Center
Other Core and Affil.		

PROJECT DESCRIPTION:

This is a supplement to the base grant designed to build new caging and testing facilities for neuroscience that are more naturalistic in design and will allow for group housing and within cage testing for various behavioral targets.

PROGRESS REPORT:

The equipment has been identified and will be purchased soon. The rooms have been identified and readied for occupation of the new caging and then animals.

PUBLICATIONS:

PMID	Title

FUNDING SOURCES:

NIH

**California National Primate Research Center
2017 Annual Progress Report SPID Form**

TITLE: NEUROMODULATION OF LOWER URINARY TRACT FUNCTION AFTER A PARTIAL CAUDA EQUINA/CONUS MEDULLARIS FORM OF SPINAL CORD INJURY IN RHESUS MACAQUES

SPID#: 57025

UNIT/DIVISION: Primate Medicine

TYPE: Research

START DATE: 12/14/2016

END DATE: 12/14/2019

GENERAL CATEGORY: Neural

SUB-CATEGORY: Model

NIH GRANT: ☐ Yes ☒ No

GRANT NUMBER:

Private Source

SUPPORTING ORGANIZATION:

SPECIFIC INFORMATION:

INVESTIGATORS:

	<u>Name</u>	<u>Dept</u>
Principal Investigator	Redacted by agreement	SVM, Department of Medicine and Epidemiology
Prin. NPRC Core Sci.		
Other Core and Affil.		Department of Neurology, UCLA

PROJECT DESCRIPTION:

The proposed studies will investigate the effects of aging on lower urinary tract and pelvic floor function in rhesus macaques. For this purpose, we will perform urodynamic studies and electromyography (EMG) of pelvic floor muscles, including the external urethral and anal sphincters in both adult and geriatric subjects. The studies will examine both male and female rhesus macaques, as micturition reflexes and pelvic floor function are sexually dimorphic in mammals. In addition, we will investigate the feasibility and efficacy of transcutaneous electrical stimulation to initiate and augment voiding in rhesus macaques across adult and geriatric ages. All studies will be performed as survival procedures using animals from the CNPRC animal colony, and all subjects will return to the colony after the completion of the physiological testing.

PROGRESS REPORT:

All animals have been evaluated and we are now analyzing our results and preparing manuscripts.

PUBLICATIONS:

PMID	Title
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30089020	EMG characteristics of the external anal sphincter guarding reflex and effects of a unilateral ventral
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Obtained by Rise for Animals.

Uploaded to Animal Research Laboratory Overview (ARLO) on 07/22/2021

root avulsion injury in rhesus macaques (*Macaca mulatta*).

29361664 Noninvasive neurophysiological mapping of the lower urinary tract in adult and aging rhesus macaques.

FUNDING SOURCES:

Private Source

Comments: Reporting Period 5/1/17 - 4/30/19

10. Outreach. Provide a brief statement describing outreach activities including how the research community is informed about the capabilities of the NPRC, as well as other items related to outreach (e.g., community relations).

Description: During this reporting period, the Public Information Officer left the University and the two student interns graduated. These positions have remained vacant due to financial constraints, however, the websites (both internet and intranet) have been maintained through contract services. The CNPRC has engaged marketing resources on the UCD Campus to continue to revamp the website and marketing materials.

The CNPRC will be hiring a new PIO in the next base grant year to continue to support the Center. In the next reporting period, the CNPRC will rehire a new PIO and that person will resume the student intern training program. The two student interns received two years of training in both graphic design and web development and graduated with their degrees. Once a new PIO is hired this training program will be resumed. In addition, the CNPRC is well underway in revamping its marketing program utilizing UCD Campus resources. New marketing materials, improvements to the internet site as well as other materials will be accomplished in the next base grant year.

Comments: Reporting period 5/1/17 - 4/30/19

11. Comments. Provide information showing (in dollars) how the Resource was supported during the reporting period, broken down by: 1) Direct Costs of the ORIP grant, 2) Program Income, 3) Other Sources of support, including cost sharing by the grantee Institution and contribution of F&A costs from the ORIP grant or other grants. If program income is reported, the amount in this table must be the same as the amount reported in Section G.11, "Program Income" of the RPPR. Do not include support (e.g., individual R01 grants) for the PIs or other investigators that does not contribute directly to the NPRC. Describe any limitations of this information.

Direct Costs of the ORIP Grant	Program Income	Other Sources of Support	Total Support for the Resource
\$9,407,932	\$23,024,677	\$5,118,963	\$37,551,572
Does not include supplements & carryforward funding		See description below.	

Description: The funding identified in the Other Sources column is entirely from Campus resources to complete some of our large infrastructure projects:

1. TB132 AIDS Research Project Suites and TB142 AIDS Nursery Renovation will be completed this summer,
2. TB184 AIDS Wing Renovation will be completed this spring, and
3. Lifespan Health Center is projected to be completed and will come online in summer 2020.

Comments: Reporting period 5/1/17 - 4/30/19

12. Feedback from Users. Provide a brief statement discussing how feedback is solicited and the topics that are covered (e.g. quality of: the web site, the ordering process, service delivered, etc.). If feedback has been solicited, include a brief summary of the most significant results, lessons learned and changes made in response to feedback.

See Next Page

Publications Reported for this Reporting Period

NIH Public Access Compliance	Citation
Complete	Bales KL. <u>Parenting in Animals</u> . Curr Opin Psychol. 2017 Jun;15:93-98. doi: 10.1016/j.copsyc.2017.02.026. PubMed PMID: 28428975; PubMed Central PMCID: PMC5393448.
Complete	Careaga M, Murai T, Bauman MD. <u>Maternal Immune Activation and Autism Spectrum Disorder: From Rodents to Nonhuman and Human Primates</u> . Biol Psychiatry. 2017 Mar 1;81(5):391-401. doi: 10.1016/j.biopsych.2016.10.020. Epub 2016 Oct 25. Review. PubMed PMID: 28137374; PubMed Central PMCID: PMC5513502.
Complete	Miller LA. <u>The best defense is a good (Protease) offense: How Pseudomonas aeruginosa evades mucosal immunity in the lung</u> . Virulence. 2017 Aug 18;8(6):625-627. doi: 10.1080/21505594.2016.1278335. Epub 2017 Jan 19. PubMed PMID: 28102763; PubMed Central PMCID: PMC5626340.
Complete	Black C, Gerriets JE, Fontaine JH, Harper RW, Kenyon NJ, Tablin F, Schelegle ES, Miller LA. <u>Early Life Wildfire Smoke Exposure Is Associated with Immune Dysregulation and Lung Function Decrements in Adolescence</u> . Am J Respir Cell Mol Biol. 2017 May;56(5):657-666. doi: 10.1165/rcmb.2016-0380OC. PubMed PMID: 28208028; PubMed Central PMCID: PMC5449494.
Complete	Kanthaswamy S, Ng J, Oldt RF, Phillippi-Falkenstein K, Kubisch HM. <u>SNP-based genetic characterization of the Tulane National Primate Research Center's conventional and specific pathogen-free rhesus macaque (Macaca mulatta) populations</u> . J Med Primatol. 2018 Feb;47(1):29-34. doi: 10.1111/jmp.12284. Epub 2017 Jun 21. PubMed PMID: 28639374; PubMed Central PMCID: PMC5740026.
Complete	Yee JL, Grant R, Van Rompay KK, Kuller L, Carpenter A, Watanabe R, Huebner R, Agricola B, Smedley J, Roberts JA. <u>Emerging diagnostic challenges and characteristics of simian betaretrovirus infections in captive macaque colonies</u> . J Med Primatol. 2017 Aug;46(4):149-153. doi: 10.1111/jmp.12295. PubMed PMID: 28748661; PubMed Central PMCID: PMC5559289.
Complete	Larke RH, Toubiana A, Lindsay KA, Mendoza SP, Bales KL. <u>Infant titi monkey behavior in the open field test and the effect of early adversity</u> . Am J Primatol. 2017 Sep;79(9). doi: 10.1002/ajp.22678. Epub 2017 Jun 12. PubMed PMID: 28605039; PubMed Central PMCID: PMC5587143.

Complete	Méndez-Lagares G, Lu D, Chen C, Terrault N, Segal MR, Khalili M, Monto A, Shen H, Manos MM, Lanier LL, Ryan JC, McCune JM, Hartigan-O'Connor DJ. <u>Memory T Cell Proliferation before Hepatitis C Virus Therapy Predicts Antiviral Immune Responses and Treatment Success</u> . J Immunol. 2018 Feb 1;200(3):1124-1132. doi: 10.4049/jimmunol.1701364. Epub 2017 Dec 20. PubMed PMID: 29263212; PubMed Central PMCID: PMC5780234.
Complete	Bauman MD, Schumann CM. <u>Advances in nonhuman primate models of autism: Integrating neuroscience and behavior</u> . Exp Neurol. 2018 Jan;299(Pt A):252-265. doi: 10.1016/j.expneurol.2017.07.021. Epub 2017 Aug 1. Review. PubMed PMID: 28774750; PubMed Central PMCID: PMC5810939.
Complete	Miller LA, Royer CM, Pinkerton KE, Schelegle ES. <u>Nonhuman Primate Models of Respiratory Disease: Past, Present, and Future</u> . ILAR J. 2017 Dec 1;58(2):269-280. doi: 10.1093/ilar/ilx030. Review. PubMed PMID: 29216343; PubMed Central PMCID: PMC5886323.
Complete	Kanthaswamy S, Bales KL. <u>Evaluating the genetic status of a closed colony of titi monkeys (Callicebus cupreus) using multigenerational pedigrees</u> . J Med Primatol. 2018 Apr;47(2):139-141. doi: 10.1111/jmp.12331. Epub 2018 Feb 1. PubMed PMID: 29388214; PubMed Central PMCID: PMC5843535.
Complete	Maninger N, Mendoza SP, Williams DR, Mason WA, Cherry SR, Rowland DJ, Schaefer T, Bales KL. <u>Imaging, Behavior and Endocrine Analysis of "Jealousy" in a Monogamous Primate</u> . Front Ecol Evol. 2017 Oct;5. pii: 119. doi: 10.3389/fevo.2017.00119. Epub 2017 Oct 19. PubMed PMID: 29682503; PubMed Central PMCID: PMC5909987.
Complete	Midic U, Goheen B, Vincent KA, VandeVoort CA, Latham KE. <u>Changes in gene expression following long-term in vitro exposure of Macaca mulatta trophoblast stem cells to biologically relevant levels of endocrine disruptors</u> . Reprod Toxicol. 2018 Apr;77:154-165. doi: 10.1016/j.reprotox.2018.02.012. Epub 2018 Mar 2. PubMed PMID: 29505797; PubMed Central PMCID: PMC5898618.
Complete	Bliss-Moreau E, Moadab G, Capitanio JP. <u>Maternal rearing environment impacts autonomic nervous system activity</u> . Dev Psychobiol. 2017 May;59(4):551-556. doi: 10.1002/dev.21513. Epub 2017 Apr 3. PubMed PMID: 28369889; PubMed Central PMCID: PMC5423540.
Complete	Chang WL, Gonzalez DF, Kieu HT, Castillo LD, Messaoudi I, Shen X, Tomaras GD, Shacklett BL, Barry PA, Sparger EE. <u>Changes in Circulating B Cell Subsets Associated with Aging and Acute SIV Infection in Rhesus Macaques</u> . PLoS One. 2017 Jan 17;12(1):e0170154. doi: 10.1371/journal.pone.0170154. eCollection 2017. PubMed PMID: 28095513; PubMed Central PMCID: PMC5240950.

Complete	Coffey LL, Pesavento PA, Keesler RI, Singapuri A, Watanabe J, Watanabe R, Yee J, Bliss-Moreau E, Cruzen C, Christe KL, Reader JR, von Morgenland W, Gibbons AM, Allen AM, Linnen J, Gao K, Delwart E, Simmons G, Stone M, Lanteri M, Bakkour S, Busch M, Morrison J, Van Rompay KK. <u>Zika Virus Tissue and Blood Compartmentalization in Acute Infection of Rhesus Macaques</u> . PLoS One. 2017 Jan 31;12(1):e0171148. doi: 10.1371/journal.pone.0171148. eCollection 2017. PubMed PMID: 28141843; PubMed Central PMCID: PMC5283740.
Complete	Colagross-Schouten A, Lemoy MJ, Keesler RI, Lissner E, VandeVoort CA. <u>The contraceptive efficacy of intravas injection of VasalgeTM for adult male rhesus monkeys</u> . Basic Clin Androl. 2017 Feb 7;27:4. doi: 10.1186/s12610-017-0048-9. eCollection 2017. PubMed PMID: 28191316; PubMed Central PMCID: PMC5294830.
Complete	Pereira AC, Gray JD, Kogan JF, Davidson RL, Rubin TG, Okamoto M, Morrison JH, McEwen BS. <u>Age and Alzheimer's disease gene expression profiles reversed by the glutamate modulator riluzole</u> . Mol Psychiatry. 2017 Feb;22(2):296-305. doi: 10.1038/mp.2016.33. Epub 2016 Mar 29. PubMed PMID: 27021815; PubMed Central PMCID: PMC5042881.
Complete	Robinson LM, Coleman K, Capitanio JP, Gottlieb DH, Handel IG, Adams MJ, Leach MC, Waran NK, Weiss A. <u>Rhesus macaque personality, dominance, behavior, and health</u> . Am J Primatol. 2018 Feb;80(2). doi: 10.1002/ajp.22739. Epub 2018 Feb 19. PubMed PMID: 29457637; PubMed Central PMCID: PMC5969515.
Complete	Almodovar S, Swanson J, Giavedoni LD, Kanthaswamy S, Long CS, Voelkel NF, Edwards MG, Folkvord JM, Connick E, Westmoreland SV, Luciw PA, Flores SC. <u>Lung Vascular Remodeling, Cardiac Hypertrophy, and Inflammatory Cytokines in SHIVnef-Infected Macaques</u> . Viral Immunol. 2018 Apr;31(3):206-222. doi: 10.1089/vim.2017.0051. Epub 2017 Dec 19. PubMed PMID: 29256819; PubMed Central PMCID: PMC5909115.
Complete	Amedee AM, Phillips B, Jensen K, Robichaux S, Lacour N, Burke M, Piatak M Jr, Lifson JD, Kozlowski PA, Van Rompay KKA, De Paris K. <u>Early Sites of Virus Replication After Oral SIV_{mac251} Infection of Infant Macaques: Implications for Pathogenesis</u> . AIDS Res Hum Retroviruses. 2018 Mar;34(3):286-299. doi: 10.1089/AID.2017.0169. Epub 2018 Jan 17. PubMed PMID: 29237287; PubMed Central PMCID: PMC5863100.
Complete	Black C, Tesfaigzi Y, Bassein JA, Miller LA. <u>Wildfire smoke exposure and human health: Significant gaps in research for a growing public health issue</u> . Environ Toxicol Pharmacol. 2017 Oct;55:186-195. doi: 10.1016/j.etap.2017.08.022. Epub 2017 Aug 30. Review. PubMed PMID: 28892756; PubMed Central PMCID: PMC5628149.

Complete	Bliss-Moreau E, Moadab G, Machado CJ. <u>Monkeys preferentially process body information while viewing affective displays.</u> Emotion. 2017 Aug;17(5):765-771. doi: 10.1037/emo0000292. Epub 2017 Mar 23. PubMed PMID: 28333483; PubMed Central PMCID: PMC5519437.
Complete	Bliss-Moreau E, Moadab G, Santistevan A, Amaral DG. <u>The effects of neonatal amygdala or hippocampus lesions on adult social behavior.</u> Behav Brain Res. 2017 Mar 30;322(Pt A):123-137. doi: 10.1016/j.bbr.2016.11.052. Epub 2016 Dec 22. PubMed PMID: 28017854; PubMed Central PMCID: PMC5423538.
Complete	Bugaytsova JA, Björnham O, Chernov YA, Gideonsson P, Henriksson S, Mendez M, Sjöström R, Mahdavi J, Shevtsova A, Ilver D, Moonens K, Quintana-Hayashi MP, Moskalenko R, Aisenbrey C, Bylund G, Schmidt A, Åberg A, Brännström K, Königer V, Vikström S, Rakhimova L, Hofer A, Ögren J, Liu H, Goldman MD, Whitmire JM, Ådén J, Younson J, Kelly CG, Gilman RH, Chowdhury A, Mukhopadhyay AK, Nair GB, Papadakos KS, Martinez-Gonzalez B, Sgouras DN, Engstrand L, Unemo M, Danielsson D, Suerbaum S, Oscarson S, Morozova-Roche LA, Olofsson A, Gröbner G, Holgersson J, Esberg A, Strömberg N, Landström M, Eldridge AM, Chromy BA, Hansen LM, Solnick JV, Lindén SK, Haas R, Dubois A, Merrell DS, Schedin S, Remaut H, Arnqvist A, Berg DE, Borén T. <u>Helicobacter pylori Adapts to Chronic Infection and Gastric Disease via pH-Responsive BabA-Mediated Adherence.</u> Cell Host Microbe. 2017 Mar 8;21(3):376-389. doi: 10.1016/j.chom.2017.02.013. PubMed PMID: 28279347; PubMed Central PMCID: PMC5392239.
Complete	Capitanio JP. <u>Naturally Occurring Nonhuman Primate Models of Psychosocial Processes.</u> ILAR J. 2017 Dec 1;58(2):226-234. doi: 10.1093/ilar/ilx012. Review. PubMed PMID: 28472500; PubMed Central PMCID: PMC6279173.
Complete	Carroll T, Lo M, Lanteri M, Dutra J, Zarbock K, Silveira P, Rourke T, Ma ZM, Fritts L, O'Connor S, Busch M, Miller CJ. <u>Zika virus preferentially replicates in the female reproductive tract after vaginal inoculation of rhesus macaques.</u> PLoS Pathog. 2017 Jul 26;13(7):e1006537. doi: 10.1371/journal.ppat.1006537. eCollection 2017 Jul. PubMed PMID: 28746373; PubMed Central PMCID: PMC5546709.
Complete	Chareyron LJ, Banta Lavenex P, Amaral DG, Lavenex P. <u>Functional organization of the medial temporal lobe memory system following neonatal hippocampal lesion in rhesus monkeys.</u> Brain Struct Funct. 2017 Dec;222(9):3899-3914. doi: 10.1007/s00429-017-1441-z. Epub 2017 May 9. PubMed PMID: 28488186; PubMed Central PMCID: PMC6018021.
Complete	Cherry SR, Jones T, Karp JS, Qi J, Moses WW, Badawi RD. <u>Total-Body PET: Maximizing Sensitivity to Create New Opportunities for Clinical Research and Patient Care.</u> J Nucl Med. 2018 Jan;59(1):3-12. doi: 10.2967/jnumed.116.184028. Epub 2017 Sep 21. PubMed PMID: 28935835; PubMed Central PMCID: PMC5750522.

Complete	Cherry SR, Badawi RD, Karp JS, Moses WW, Price P, Jones T. <u>Total-body imaging: Transforming the role of positron emission tomography</u> . Sci Transl Med. 2017 Mar 15;9(381). pii: eaaf6169. doi: 10.1126/scitranslmed.aaf6169. Review. PubMed PMID: 28298419; PubMed Central PMCID: PMC5629037.
Complete	Crowley CM, Fontaine JH, Gerriets JE, Schelegle ES, Hyde DM, Miller LA. <u>Early life allergen and air pollutant exposures alter longitudinal blood immune profiles in infant rhesus monkeys</u> . Toxicol Appl Pharmacol. 2017 Aug 1;328:60-69. doi: 10.1016/j.taap.2017.05.006. Epub 2017 May 18. PubMed PMID: 28529118; PubMed Central PMCID: PMC5535809.
Complete	Dela Pena-Ponce MG, Jimenez MT, Hansen LM, Solnick JV, Miller LA. <u>The Helicobacter pylori type IV secretion system promotes IL-8 synthesis in a model of pediatric airway epithelium via p38 MAP kinase</u> . PLoS One. 2017 Aug 15;12(8):e0183324. doi: 10.1371/journal.pone.0183324. eCollection 2017. PubMed PMID: 28813514; PubMed Central PMCID: PMC5557493.
Complete	Estes JD, Kityo C, Ssali F, Swainson L, Makamdop KN, Del Prete GQ, Deeks SG, Luciw PA, Chipman JG, Beilman GJ, Hoskuldsson T, Khoruts A, Anderson J, Deleage C, Jasurda J, Schmidt TE, Hafertepe M, Callisto SP, Pearson H, Reimann T, Schuster J, Schoepfoerster J, Southern P, Perkey K, Shang L, Wietgreffe SW, Fletcher CV, Lifson JD, Douek DC, McCune JM, Haase AT, Schacker TW. <u>Defining total-body AIDS-virus burden with implications for curative strategies</u> . Nat Med. 2017 Nov;23(11):1271-1276. doi: 10.1038/nm.4411. Epub 2017 Oct 2. PubMed PMID: 28967921; PubMed Central PMCID: PMC5831193.
Complete	Eudailey JA, Dennis ML, Parker ME, Phillips BL, Huffman TN, Bay CP, Hudgens MG, Wiseman RW, Pollara JJ, Fouda GG, Ferrari G, Pickup DJ, Kozlowski PA, Van Rompay KKA, De Paris K, Permar SR. <u>Maternal HIV-1 Env Vaccination for Systemic and Breast Milk Immunity To Prevent Oral SHIV Acquisition in Infant Macaques</u> . mSphere. 2018 Jan 10;3(1). pii: e00505-17. doi: 10.1128/mSphere.00505-17. eCollection 2018 Jan-Feb. PubMed PMID: 29359183; PubMed Central PMCID: PMC5760748.
Complete	Flahou B, Rossi M, Bakker J, Langermans JA, Heuvelman E, Solnick JV, Martin ME, O'Rourke J, Ngoan LD, Hoa NX, Nakamura M, Øverby A, Matsui H, Ota H, Matsumoto T, Foss DL, Kopta LA, Omotosho O, Franciosini MP, Casagrande Proietti P, Guo A, Liu H, Borilova G, Bracarense AP, Lindén SK, De Bruyckere S, Zhang G, De Witte C, Smet A, Pasmans F, Ducatelle R, Corander J, Haesebrouck F. <u>Evidence for a primate origin of zoonotic Helicobacter suis colonizing domesticated pigs</u> . ISME J. 2018 Jan;12(1):77-86. doi: 10.1038/ismej.2017.145. Epub 2017 Sep 8. PubMed PMID: 28885626; PubMed Central PMCID: PMC5739005.

Complete	Fan Q, Nelson CS, Bialas KM, Chiuppesi F, Amos J, Gurley TC, Marshall DJ, Eudailey J, Heimsath H, Himes J, Deshpande A, Walter MR, Wussow F, Diamond DJ, Barry PA, Moody MA, Kaur A, Permar SR. <u>Plasmablast Response to Primary Rhesus Cytomegalovirus (CMV) Infection in a Monkey Model of Congenital CMV Transmission</u> . Clin Vaccine Immunol. 2017 May 5;24(5). pii: e00510-16. doi: 10.1128/CVI.00510-16. Print 2017 May. PubMed PMID: 28298291; PubMed Central PMCID: PMC5424243.
Complete	Golub MS, Hackett EP, Hogrefe CE, Leraneth C, Elsworth JD, Roth RH. <u>Cognitive performance of juvenile monkeys after chronic fluoxetine treatment</u> . Dev Cogn Neurosci. 2017 Aug;26:52-61. doi: 10.1016/j.dcn.2017.04.008. Epub 2017 May 1. PubMed PMID: 28521247; PubMed Central PMCID: PMC5557667.
Complete	Grayson DS, Bliss-Moreau E, Bennett J, Lavenex P, Amaral DG. <u>Neural Reorganization Due to Neonatal Amygdala Lesions in the Rhesus Monkey: Changes in Morphology and Network Structure</u> . Cereb Cortex. 2017 Jun 1;27(6):3240-3253. doi: 10.1093/cercor/bhx080. PubMed PMID: 28383709; PubMed Central PMCID: PMC6059167.
Complete	Guoynes CD, Simmons TC, Downing GM, Jacob S, Solomon M, Bales KL. <u>Chronic Intranasal Oxytocin has Dose-dependent Effects on Central Oxytocin and Vasopressin Systems in Prairie Voles (Microtus ochrogaster)</u> . Neuroscience. 2018 Jan 15;369:292-302. doi: 10.1016/j.neuroscience.2017.11.037. Epub 2017 Nov 26. PubMed PMID: 29183825; PubMed Central PMCID: PMC5766367.
Complete	Han P, Nielsen M, Song M, Yin J, Permenter MR, Vogt JA, Engle JR, Dugger BN, Beach TG, Barnes CA, Shi J. <u>The Impact of Aging on Brain Pituitary Adenylate Cyclase Activating Polypeptide Pathology and Cognition in Mice and Rhesus Macaques</u> . Front Aging Neurosci. 2017 Jun 12;9:180. doi: 10.3389/fnagi.2017.00180. eCollection 2017. PubMed PMID: 28659785; PubMed Central PMCID: PMC5467357.
Complete	Han Q, Williams WB, Saunders KO, Seaton KE, Wiehe KJ, Vandergrift N, Von Holle TA, Trama AM, Parks RJ, Luo K, Gurley TC, Kepler TB, Marshall DJ, Montefiori DC, Sutherland LL, Alam MS, Whitesides JF, Bowman CM, Permar SR, Graham BS, Mascola JR, Seed PC, Van Rompay KKA, Tomaras GD, Moody MA, Haynes BF. <u>HIV DNA-Adenovirus Multiclude Envelope Vaccine Induces gp41 Antibody Immunodominance in Rhesus Macaques</u> . J Virol. 2017 Oct 13;91(21). pii: e00923-17. doi: 10.1128/JVI.00923-17. Print 2017 Nov 1. PubMed PMID: 28794027; PubMed Central PMCID: PMC5640856.
Complete	Hansen LM, Gideonsson P, Canfield DR, Borén T, Solnick JV. <u>Dynamic Expression of the BabA Adhesin and Its BabB Paralog during Helicobacter pylori Infection in Rhesus Macaques</u> . Infect Immun. 2017 May 23;85(6). pii: e00094-17. doi: 10.1128/IAI.00094-17. Print 2017 Jun. PubMed PMID: 28396320; PubMed Central PMCID: PMC5442622.

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Not applicable	Lapate R, Fox A. The nature of emotion : fundamental questions. Second ed. Fox A, Lapate R, Shackman A, Davidson R, editors. New York: Oxford University Press; 2018. Afterword: What is the role of conscious awareness in emotion?
Not applicable	Lapate R, Fox A. The nature of emotion : fundamental questions. Second ed. Fox A, Lapate R, Shackman A, Davidson R, editors. New York: Oxford University Press; 2018. Afterword: How and why are emotions communicated?
Not applicable	Okon-Singer H, Stout D, Stockbridge M, Gamer M, Fox A, Shackman A. The nature of emotion : fundamental questions. Second ed. Fox A, Lapate R, Shackman A, Davidson R, editors. New York: Oxford University Press; 2018. The interplay of emotion and cognition
Not applicable	Shackman A, Fox A. The nature of emotion : fundamental questions. Second ed. Fox A, Lapate R, Shackman A, Davidson R, editors. New York: Oxford University Press; 2018. Afterword: How are emotions organized in the brain?

Not applicable	Shackman A, Fox A. The nature of emotion : fundamental questions. Second ed. Fox A, Lapate R, Shackman A, Davidson R, editors. New York: Oxford University Press; 2018. Afterword: What are the dimensions and bases for lasting individual differences in emotion?
Not applicable	Shackman A, Lapate R, Fox A. The nature of emotion : fundamental questions. Second ed. Fox A, Lapate R, Shackman A, Davidson R, editors. New York: Oxford University Press; 2018. Afterword: How are emotions, mood, and temperament related?
Not applicable	Shackman A, Stockbridge M, LeMay E, Fox A. The nature of emotion : fundamental questions. Second ed. Fox A, Lapate R, Shackman A, Davidson R, editors. New York: Oxford University Press; 2018. The psychological and neurobiological bases of dispositional negativity

Publications Reported for this Reporting Period

NIH Public Access Compliance	Citation
Non-compliant	Bales KL, Witczak LR, Simmons TC, Savidge LE, Rothwell ES, Rogers FD, Manning RA, Heise MJ, Englund M, Arias Del Razo R. <u>Social touch during development: Long-term effects on brain and behavior</u> . <i>Neurosci Biobehav Rev</i> . 2018 Dec;95:202-219. doi: 10.1016/j.neubiorev.2018.09.019. Epub 2018 Sep 29. Review. PubMed PMID: 30278194.
Non-compliant	Bauman MD, Murai T, Hogrefe CE, Platt ML. <u>Opportunities and challenges for intranasal oxytocin treatment studies in nonhuman primates</u> . <i>Am J Primatol</i> . 2018 Oct;80(10):e22913. doi: 10.1002/ajp.22913. Epub 2018 Oct 3. PubMed PMID: 30281820.
Non-compliant	Unpublished
Non-compliant	
Non-compliant	Careaga M, Taylor SL, Chang C, Chiang A, Ku KM, Berman RF, Van de Water JA, Bauman MD. <u>Variability in PolyIC induced immune response: Implications for preclinical maternal immune activation models</u> . <i>J Neuroimmunol</i> . 2018 Oct 15;323:87-93. doi: 10.1016/j.jneuroim.2018.06.014. Epub 2018 Jun 28. PubMed PMID: 30196839.
Non-compliant	Freeman SM, Bales KL. <u>Oxytocin, vasopressin, and primate behavior: Diversity and insight</u> . <i>Am J Primatol</i> . 2018 Oct;80(10):e22919. doi: 10.1002/ajp.22919. Epub 2018 Oct 3. PubMed PMID: 30281814.
Non-compliant	Gottlieb DH, Del Rosso L, Sheikhi F, Gottlieb A, McCowan B, Capitanio JP. <u>Personality, environmental stressors, and diarrhea in Rhesus macaques: An interactionist perspective</u> . <i>Am J Primatol</i> . 2018 Dec;80(12):e22908. doi: 10.1002/ajp.22908. Epub 2018 Aug 28. PubMed PMID: 30152539.
Non-compliant	Hannibal DL, Cassidy LC, Vandeleest J, Semple S, Barnard A, Chun K, Winkler S, McCowan B. <u>Intermittent pair-housing, pair relationship qualities, and HPA activity in adult female rhesus macaques</u> . <i>Am J Primatol</i> . 2018 May;80(5):e22762. doi: 10.1002/ajp.22762. Epub 2018 Mar 14. PubMed PMID: 29722048.
Non-compliant	Hara Y, Crimins JL, Puri R, Wang ACJ, Motley SE, Yuk F, Ramos TM, Janssen WGM, Rapp PR, Morrison JH. <u>Estrogen Alters the Synaptic Distribution of Phospho-GluN2B in the Dorsolateral Prefrontal Cortex While Promoting Working Memory in Aged Rhesus Monkeys</u> . <i>Neuroscience</i> . 2018 Dec 1;394:303-315. doi: 10.1016/j.neuroscience.2018.09.021. PubMed PMID: 30482274.

Non-compliant	Unpublished
Non-compliant	Kaburu SSK, Marty PR, Beisner B, Balasubramaniam KN, Bliss-Moreau E, Kaur K, Mohan L, McCowan B. <u>Rates of human-macaque interactions affect grooming behavior among urban-dwelling rhesus macaques (Macaca mulatta)</u> . Am J Phys Anthropol. 2019 Jan;168(1):92-103. doi: 10.1002/ajpa.23722. Epub 2018 Oct 3. PubMed PMID: 30368773.
Non-compliant	Kinnally EL, Cenicerio L, Martinez SJ. <u>Genetic and environmental factors in the intergenerational transmission of maternal care in rhesus macaques: Preliminary findings</u> . Am J Primatol. 2018 Dec;80(12):e22939. doi: 10.1002/ajp.22939. Epub 2018 Dec 4. PubMed PMID: 30512216.
Non-compliant	Kinnally EL, Gonzalez MN, Capitanio JP. <u>Paternal line effects of early experiences persist across three generations in rhesus macaques</u> . Dev Psychobiol. 2018 Dec;60(8):879-888. doi: 10.1002/dev.21771. Epub 2018 Aug 13. PubMed PMID: 30103289.
Non-compliant	Laing ST, Merriam D, Shock BC, Mills S, Spinner A, Reader R, Hartigan-O'Connor DJ. <u>Idiopathic Colitis in Rhesus Macaques Is Associated With Dysbiosis, Abundant Enterochromaffin Cells and Altered T-Cell Cytokine Expression</u> . Vet Pathol. 2018 Sep;55(5):741-752. doi: 10.1177/0300985818780449. Epub 2018 Jun 21. PubMed PMID: 29929446.
Non-compliant	Unpublished
Non-compliant	Linden JB, Capitanio JP, McCowan B, Isbell LA. <u>Coping style and cortisol levels in infancy predict hair cortisol following new group formation in captive rhesus macaques (Macaca mulatta)</u> . Am J Primatol. 2018 Dec;80(12):e22938. doi: 10.1002/ajp.22938. Epub 2018 Nov 27. PubMed PMID: 30480316.
Non-compliant	Linden JB, McCowan B, Capitanio JP, Isbell LA. <u>Male-inflicted wounds have opposite effects on hair cortisol for captive male and female rhesus macaques (Macaca mulatta) following new group formation</u> . Primates. 2019 Jan;60(1):51-62. doi: 10.1007/s10329-018-0703-6. Epub 2018 Nov 30. PubMed PMID: 30506293.
Non-compliant	Unpublished
Non-compliant	Olstad K, Kasantikul T, Kiupel M, Reader J. Mixed Malignant Pancreatic Tumour in a Rhesus Macaque (Macaca mullata). Journal of comparative pathology. 2019 January 22.

Non-compliant	Parker KJ, Garner JP, Oztan O, Tarara ER, Li J, Sclafani V, Del Rosso LA, Chun K, Berquist SW, Chez MG, Partap S, Hardan AY, Sherr EH, Capitanio JP. <u>Arginine vasopressin in cerebrospinal fluid is a marker of sociality in nonhuman primates</u> . Sci Transl Med. 2018 May 2;10(439). pii: eaam9100. doi: 10.1126/scitranslmed.aam9100. PubMed PMID: 29720452.
Non-compliant	Piguet O, Chareyron LJ, Banta Lavenex P, Amaral DG, Lavenex P. <u>Stereological analysis of the rhesus monkey entorhinal cortex</u> . J Comp Neurol. 2018 Sep 1;526(13):2115-2132. doi: 10.1002/cne.24496. Epub 2018 Aug 8. PubMed PMID: 30004581.
Non-compliant	Ryan AM, Berman RF, Bauman MD. <u>Bridging the species gap in translational research for neurodevelopmental disorders</u> . Neurobiol Learn Mem. 2018 Oct 19. pii: S1074-7427(18)30240-5. doi: 10.1016/j.nlm.2018.10.006. [Epub ahead of print] PubMed PMID: 30347236. [Epub ahead of print]
Non-compliant	Tromp DPM, Williams LE, Fox AS, Oler JA, Roseboom PH, Rogers GM, Benson BE, Alexander AL, Pine DS, Kalin NH. <u>Altered Uncinate Fasciculus Microstructure in Childhood Anxiety Disorders in Boys But Not Girls</u> . Am J Psychiatry. 2019 Jan 18;appiajp201818040425. doi: 10.1176/appi.ajp.2018.18040425. [Epub ahead of print] PubMed PMID: 30654645. [Epub ahead of print]
Non-compliant	Wang KY, Christie KL, Yee J, Roberts JA, Ardeshtir A. <u>Rotavirus is associated with decompensated diarrhea among young rhesus macaques (Macaca mulatta)</u> . Am J Primatol. 2019 Jan;81(1):e22948. doi: 10.1002/ajp.22948. Epub 2019 Jan 8. PubMed PMID: 30620103.
Non-compliant	Waters EM, Mazid S, Dodos M, Puri R, Janssen WG, Morrison JH, McEwen BS, Milner TA. <u>Effects of estrogen and aging on synaptic morphology and distribution of phosphorylated Tyr1472 NR2B in the female rat hippocampus</u> . Neurobiol Aging. 2019 Jan;73:200-210. doi: 10.1016/j.neurobiolaging.2018.09.025. Epub 2018 Sep 25. PubMed PMID: 30384123.
Non-compliant	Witczak LR, Ferrer E, Bales KL. <u>Effects of aggressive temperament on endogenous oxytocin levels in adult titi monkeys</u> . Am J Primatol. 2018 Oct;80(10):e22907. doi: 10.1002/ajp.22907. Epub 2018 Aug 14. PubMed PMID: 30106168.

Comments: Reporting Period of 4/1/17 - 5/30/19.

Publications.pdf includes

1. YR56 Compliant
2. YR56 Non-Compliant
3. YR57 Compliant
4. YR57 Non-Compliant

13. Infrastructure Improvements. Provide a list of major infrastructure improvements and capital equipment (as defined by the Institution) purchased during the reporting period. For NIH sources of support, report the Institute or Center from which support was derived.

Type of Improvement	Source of support
Automatic email generated from system, including link.	9. Individual projects
Allow larger file size documents to be uploaded	8. Organizational chart

Comments: Please call me for further clarification. Redacted by agreement CNPRC 916.616.2063

Composite Application Budget Summary

Categories	Budget Period
Salary, Wages and Fringe Benefits	3,555,078
Equipment	582,399
Travel	78,376
Participant/Trainee Support Costs	0
Other Direct Costs (excluding Consortium)	4,876,884
Consortium Costs	315,195
Direct Costs	9,407,932
Indirect Costs	1,999,432
Total Direct and Indirect Costs	11,407,363

Component Budget Summary

Components	Categories	Budget Period
6647-001 (Admin Core)	Salary, Wages and Fringe Benefits	474,096
	Equipment	0
	Travel	40,740
	Participant/Trainee Support Costs	0
	Other Direct Costs (excluding Consortium)	28,130
	Consortium Costs	0
	Direct Costs	542,966
	Indirect Costs	123,253
TOTALS	Total Direct and Indirect Costs	666,219
6648-002 (Admin Core)	Salary, Wages and Fringe Benefits	590,973
	Equipment	0
	Travel	0
	Participant/Trainee Support Costs	0
	Other Direct Costs (excluding Consortium)	12,610
	Consortium Costs	0
	Direct Costs	603,583
	Indirect Costs	137,013
TOTALS	Total Direct and Indirect Costs	740,596
6646-003 (Admin Core)	Salary, Wages and Fringe Benefits	0
	Equipment	0
	Travel	0

	Participant/Trainee Support Costs	0
	Other Direct Costs (excluding Consortium)	0
	Consortium Costs	0
	Direct Costs	0
	Indirect Costs	0
TOTALS	Total Direct and Indirect Costs	0
6650-004 (Admin Core)	Salary, Wages and Fringe Benefits	0
	Equipment	582,399
	Travel	0
	Participant/Trainee Support Costs	0
	Other Direct Costs (excluding Consortium)	0
	Consortium Costs	0
	Direct Costs	582,399
	Indirect Costs	0
TOTALS	Total Direct and Indirect Costs	582,399
6649-005 (Admin Core)	Salary, Wages and Fringe Benefits	328,593
	Equipment	0
	Travel	0
	Participant/Trainee Support Costs	0
	Other Direct Costs (excluding Consortium)	144,597
	Consortium Costs	0
	Direct Costs	473,190
	Indirect Costs	107,414
TOTALS	Total Direct and Indirect Costs	580,604

6676-001 (Core)	Salary, Wages and Fringe Benefits	113,924
	Equipment	0
	Travel	0
	Participant/Trainee Support Costs	0
	Other Direct Costs (excluding Consortium)	8,730
	Consortium Costs	0
	Direct Costs	122,654
	Indirect Costs	27,842
TOTALS	Total Direct and Indirect Costs	150,496
6678-002 (Core)	Salary, Wages and Fringe Benefits	133,325
	Equipment	0
	Travel	0
	Participant/Trainee Support Costs	0
	Other Direct Costs (excluding Consortium)	8,730
	Consortium Costs	0
	Direct Costs	142,055
	Indirect Costs	32,246
TOTALS	Total Direct and Indirect Costs	174,301
6664-003 (Core)	Salary, Wages and Fringe Benefits	90,574
	Equipment	0
	Travel	0
	Participant/Trainee Support Costs	0
	Other Direct Costs (excluding Consortium)	27,160
	Consortium Costs	0

	Direct Costs	117,734
	Indirect Costs	26,726
TOTALS	Total Direct and Indirect Costs	144,459
6665-004 (Core)	Salary, Wages and Fringe Benefits	104,524
	Equipment	0
	Travel	0
	Participant/Trainee Support Costs	0
	Other Direct Costs (excluding Consortium)	11,155
	Consortium Costs	0
	Direct Costs	115,678
	Indirect Costs	26,259
TOTALS	Total Direct and Indirect Costs	141,938
6662-005 (Core)	Salary, Wages and Fringe Benefits	322,483
	Equipment	0
	Travel	15,520
	Participant/Trainee Support Costs	0
	Other Direct Costs (excluding Consortium)	23,280
	Consortium Costs	0
	Direct Costs	361,283
	Indirect Costs	82,011
TOTALS	Total Direct and Indirect Costs	443,294
6663-006 (Core)	Salary, Wages and Fringe Benefits	274,813
	Equipment	0
	Travel	7,760

	Participant/Trainee Support Costs	0
	Other Direct Costs (excluding Consortium)	30,555
	Consortium Costs	0
	Direct Costs	313,128
	Indirect Costs	71,080
TOTALS	Total Direct and Indirect Costs	384,208
6661-007 (Core)	Salary, Wages and Fringe Benefits	7,855
	Equipment	0
	Travel	0
	Participant/Trainee Support Costs	0
	Other Direct Costs (excluding Consortium)	101,582
	Consortium Costs	0
	Direct Costs	109,437
	Indirect Costs	24,842
TOTALS	Total Direct and Indirect Costs	134,279
6670-008 (Core)	Salary, Wages and Fringe Benefits	129,723
	Equipment	0
	Travel	0
	Participant/Trainee Support Costs	0
	Other Direct Costs (excluding Consortium)	10,185
	Consortium Costs	0
	Direct Costs	139,908
	Indirect Costs	31,759
TOTALS	Total Direct and Indirect Costs	171,667

6671-009 (Core)	Salary, Wages and Fringe Benefits	206,021
	Equipment	0
	Travel	3,880
	Participant/Trainee Support Costs	0
	Other Direct Costs (excluding Consortium)	7,760
	Consortium Costs	0
	Direct Costs	217,661
	Indirect Costs	49,409
TOTALS	Total Direct and Indirect Costs	267,070
6668-010 (Core)	Salary, Wages and Fringe Benefits	205,242
	Equipment	0
	Travel	0
	Participant/Trainee Support Costs	0
	Other Direct Costs (excluding Consortium)	16,004
	Consortium Costs	0
	Direct Costs	221,246
	Indirect Costs	50,223
TOTALS	Total Direct and Indirect Costs	271,468
6669-011 (Core)	Salary, Wages and Fringe Benefits	57,815
	Equipment	0
	Travel	0
	Participant/Trainee Support Costs	0
	Other Direct Costs (excluding Consortium)	3,395
	Consortium Costs	0

	Direct Costs	61,210
	Indirect Costs	13,895
TOTALS	Total Direct and Indirect Costs	75,105
6667-012 (Core)	Salary, Wages and Fringe Benefits	99,375
	Equipment	0
	Travel	0
	Participant/Trainee Support Costs	0
	Other Direct Costs (excluding Consortium)	17,945
	Consortium Costs	0
	Direct Costs	117,320
	Indirect Costs	26,632
TOTALS	Total Direct and Indirect Costs	143,951
6651-013 (Core)	Salary, Wages and Fringe Benefits	238,417
	Equipment	0
	Travel	0
	Participant/Trainee Support Costs	0
	Other Direct Costs (excluding Consortium)	3,922,556
	Consortium Costs	0
	Direct Costs	4,160,973
	Indirect Costs	940,577
TOTALS	Total Direct and Indirect Costs	5,101,550
6666-014 (Core)	Salary, Wages and Fringe Benefits	156,226
	Equipment	0
	Travel	0

	Participant/Trainee Support Costs	0
	Other Direct Costs (excluding Consortium)	39,770
	Consortium Costs	0
	Direct Costs	195,996
	Indirect Costs	44,491
TOTALS	Total Direct and Indirect Costs	240,487
6686-001 (Other)	Salary, Wages and Fringe Benefits	21,100
	Equipment	0
	Travel	0
	Participant/Trainee Support Costs	0
	Other Direct Costs (excluding Consortium)	11,155
	Consortium Costs	0
	Direct Costs	32,255
	Indirect Costs	7,322
TOTALS	Total Direct and Indirect Costs	39,577
6681-002 (Other)	Salary, Wages and Fringe Benefits	0
	Equipment	0
	Travel	10,476
	Participant/Trainee Support Costs	0
	Other Direct Costs (excluding Consortium)	451,585
	Consortium Costs	15,195
	Direct Costs	477,256
	Indirect Costs	108,337
TOTALS	Total Direct and Indirect Costs	585,593

6688-001 (Project)	Salary, Wages and Fringe Benefits	0
	Equipment	0
	Travel	0
	Participant/Trainee Support Costs	0
	Other Direct Costs (excluding Consortium)	0
	Consortium Costs	300,000
	Direct Costs	300,000
	Indirect Costs	68,100
TOTALS	Total Direct and Indirect Costs	368,100
TOTALS		11,407,363

Categories Budget Summary

Categories	Components	Budget Period
R&R Budget - Senior/Key Person Funds Requested	6647-001 (Admin Core)	384,072
	6648-002 (Admin Core)	65,459
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	0
	6649-005 (Admin Core)	5,237
	6676-001 (Core)	91,763
	6678-002 (Core)	116,315
	6664-003 (Core)	5,237
	6665-004 (Core)	51,644
	6662-005 (Core)	123,367
	6663-006 (Core)	159,858
	6661-007 (Core)	7,855
	6670-008 (Core)	115,278
	6671-009 (Core)	173,810
	6668-010 (Core)	35,749
	6669-011 (Core)	24,819
	6667-012 (Core)	33,643
	6651-013 (Core)	5,237
	6666-014 (Core)	25,831
	6686-001 (Other)	5,237
	6681-002 (Other)	0

	6688-001 (Project)	0
TOTALS		1,430,410
R&R Budget - Other Personnel Funds Requested	6647-001 (Admin Core)	90,024
	6648-002 (Admin Core)	525,514
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	0
	6649-005 (Admin Core)	323,356
	6676-001 (Core)	22,161
	6678-002 (Core)	17,010
	6664-003 (Core)	85,337
	6665-004 (Core)	52,879
	6662-005 (Core)	199,115
	6663-006 (Core)	114,955
	6661-007 (Core)	0
	6670-008 (Core)	14,445
	6671-009 (Core)	32,211
	6668-010 (Core)	169,493
	6669-011 (Core)	32,997
	6667-012 (Core)	65,732
	6651-013 (Core)	233,181
	6666-014 (Core)	130,395
	6686-001 (Other)	15,864
	6681-002 (Other)	0
	6688-001 (Project)	0

TOTALS		2,124,668
R&R Budget - Section A & B. Total Salary, Wages and Fringe Benefits (A+B)	6647-001 (Admin Core)	474,096
	6648-002 (Admin Core)	590,973
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	0
	6649-005 (Admin Core)	328,593
	6676-001 (Core)	113,924
	6678-002 (Core)	133,325
	6664-003 (Core)	90,574
	6665-004 (Core)	104,524
	6662-005 (Core)	322,483
	6663-006 (Core)	274,813
	6661-007 (Core)	7,855
	6670-008 (Core)	129,723
	6671-009 (Core)	206,021
	6668-010 (Core)	205,242
	6669-011 (Core)	57,815
	6667-012 (Core)	99,375
	6651-013 (Core)	238,417
	6666-014 (Core)	156,226
	6686-001 (Other)	21,100
	6681-002 (Other)	0
	6688-001 (Project)	0
TOTALS		3,555,078

R&R Budget - Section C. Total Equipment	6647-001 (Admin Core)	0
	6648-002 (Admin Core)	0
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	582,399
	6649-005 (Admin Core)	0
	6676-001 (Core)	0
	6678-002 (Core)	0
	6664-003 (Core)	0
	6665-004 (Core)	0
	6662-005 (Core)	0
	6663-006 (Core)	0
	6661-007 (Core)	0
	6670-008 (Core)	0
	6671-009 (Core)	0
	6668-010 (Core)	0
	6669-011 (Core)	0
	6667-012 (Core)	0
	6651-013 (Core)	0
	6666-014 (Core)	0
	6686-001 (Other)	0
	6681-002 (Other)	0
	6688-001 (Project)	0
TOTALS		582,399
R&R Budget - Domestic Travel	6647-001 (Admin Core)	40,740

	6648-002 (Admin Core)	0
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	0
	6649-005 (Admin Core)	0
	6676-001 (Core)	0
	6678-002 (Core)	0
	6664-003 (Core)	0
	6665-004 (Core)	0
	6662-005 (Core)	15,520
	6663-006 (Core)	7,760
	6661-007 (Core)	0
	6670-008 (Core)	0
	6671-009 (Core)	3,880
	6668-010 (Core)	0
	6669-011 (Core)	0
	6667-012 (Core)	0
	6651-013 (Core)	0
	6666-014 (Core)	0
	6686-001 (Other)	0
	6681-002 (Other)	10,476
	6688-001 (Project)	0
TOTALS		78,376
R&R Budget - Foreign Travel	6647-001 (Admin Core)	0
	6648-002 (Admin Core)	0

	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	0
	6649-005 (Admin Core)	0
	6676-001 (Core)	0
	6678-002 (Core)	0
	6664-003 (Core)	0
	6665-004 (Core)	0
	6662-005 (Core)	0
	6663-006 (Core)	0
	6661-007 (Core)	0
	6670-008 (Core)	0
	6671-009 (Core)	0
	6668-010 (Core)	0
	6669-011 (Core)	0
	6667-012 (Core)	0
	6651-013 (Core)	0
	6666-014 (Core)	0
	6686-001 (Other)	0
	6681-002 (Other)	0
	6688-001 (Project)	0
TOTALS		0
R&R Budget - Section D. Total Travel	6647-001 (Admin Core)	40,740
	6648-002 (Admin Core)	0
	6646-003 (Admin Core)	0

	6650-004 (Admin Core)	0
	6649-005 (Admin Core)	0
	6676-001 (Core)	0
	6678-002 (Core)	0
	6664-003 (Core)	0
	6665-004 (Core)	0
	6662-005 (Core)	15,520
	6663-006 (Core)	7,760
	6661-007 (Core)	0
	6670-008 (Core)	0
	6671-009 (Core)	3,880
	6668-010 (Core)	0
	6669-011 (Core)	0
	6667-012 (Core)	0
	6651-013 (Core)	0
	6666-014 (Core)	0
	6686-001 (Other)	0
	6681-002 (Other)	10,476
	6688-001 (Project)	0
TOTALS		78,376
R&R Budget - Tuition/Fees/Health Insurance	6647-001 (Admin Core)	0
	6648-002 (Admin Core)	0
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	0

	6649-005 (Admin Core)	0
	6676-001 (Core)	0
	6678-002 (Core)	0
	6664-003 (Core)	0
	6665-004 (Core)	0
	6662-005 (Core)	0
	6663-006 (Core)	0
	6661-007 (Core)	0
	6670-008 (Core)	0
	6671-009 (Core)	0
	6668-010 (Core)	0
	6669-011 (Core)	0
	6667-012 (Core)	0
	6651-013 (Core)	0
	6666-014 (Core)	0
	6686-001 (Other)	0
	6681-002 (Other)	0
	6688-001 (Project)	0
TOTALS		0
R&R Budget - Stipends	6647-001 (Admin Core)	0
	6648-002 (Admin Core)	0
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	0
	6649-005 (Admin Core)	0

	6676-001 (Core)	0
	6678-002 (Core)	0
	6664-003 (Core)	0
	6665-004 (Core)	0
	6662-005 (Core)	0
	6663-006 (Core)	0
	6661-007 (Core)	0
	6670-008 (Core)	0
	6671-009 (Core)	0
	6668-010 (Core)	0
	6669-011 (Core)	0
	6667-012 (Core)	0
	6651-013 (Core)	0
	6666-014 (Core)	0
	6686-001 (Other)	0
	6681-002 (Other)	0
	6688-001 (Project)	0
TOTALS		0
R&R Budget - Trainee Travel	6647-001 (Admin Core)	0
	6648-002 (Admin Core)	0
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	0
	6649-005 (Admin Core)	0
	6676-001 (Core)	0

	6678-002 (Core)	0
	6664-003 (Core)	0
	6665-004 (Core)	0
	6662-005 (Core)	0
	6663-006 (Core)	0
	6661-007 (Core)	0
	6670-008 (Core)	0
	6671-009 (Core)	0
	6668-010 (Core)	0
	6669-011 (Core)	0
	6667-012 (Core)	0
	6651-013 (Core)	0
	6666-014 (Core)	0
	6686-001 (Other)	0
	6681-002 (Other)	0
	6688-001 (Project)	0
TOTALS		0
R&R Budget - Subsistence	6647-001 (Admin Core)	0
	6648-002 (Admin Core)	0
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	0
	6649-005 (Admin Core)	0
	6676-001 (Core)	0
	6678-002 (Core)	0

	6664-003 (Core)	0
	6665-004 (Core)	0
	6662-005 (Core)	0
	6663-006 (Core)	0
	6661-007 (Core)	0
	6670-008 (Core)	0
	6671-009 (Core)	0
	6668-010 (Core)	0
	6669-011 (Core)	0
	6667-012 (Core)	0
	6651-013 (Core)	0
	6666-014 (Core)	0
	6686-001 (Other)	0
	6681-002 (Other)	0
	6688-001 (Project)	0
TOTALS		0
R&R Budget - Other Participants/Trainee Support Costs	6647-001 (Admin Core)	0
	6648-002 (Admin Core)	0
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	0
	6649-005 (Admin Core)	0
	6676-001 (Core)	0
	6678-002 (Core)	0
	6664-003 (Core)	0

	6665-004 (Core)	0
	6662-005 (Core)	0
	6663-006 (Core)	0
	6661-007 (Core)	0
	6670-008 (Core)	0
	6671-009 (Core)	0
	6668-010 (Core)	0
	6669-011 (Core)	0
	6667-012 (Core)	0
	6651-013 (Core)	0
	6666-014 (Core)	0
	6686-001 (Other)	0
	6681-002 (Other)	0
	6688-001 (Project)	0
TOTALS		0
R&R Budget - Section E. Total Participants/Trainee Support Costs	6647-001 (Admin Core)	0
	6648-002 (Admin Core)	0
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	0
	6649-005 (Admin Core)	0
	6676-001 (Core)	0
	6678-002 (Core)	0
	6664-003 (Core)	0
	6665-004 (Core)	0

	6662-005 (Core)	0
	6663-006 (Core)	0
	6661-007 (Core)	0
	6670-008 (Core)	0
	6671-009 (Core)	0
	6668-010 (Core)	0
	6669-011 (Core)	0
	6667-012 (Core)	0
	6651-013 (Core)	0
	6666-014 (Core)	0
	6686-001 (Other)	0
	6681-002 (Other)	0
	6688-001 (Project)	0
TOTALS		0
R&R Budget - Materials and Supplies	6647-001 (Admin Core)	9,700
	6648-002 (Admin Core)	9,700
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	0
	6649-005 (Admin Core)	142,492
	6676-001 (Core)	2,910
	6678-002 (Core)	2,910
	6664-003 (Core)	27,160
	6665-004 (Core)	9,700
	6662-005 (Core)	22,310

	6663-006 (Core)	9,700
	6661-007 (Core)	101,582
	6670-008 (Core)	3,395
	6671-009 (Core)	3,880
	6668-010 (Core)	12,610
	6669-011 (Core)	3,395
	6667-012 (Core)	16,975
	6651-013 (Core)	3,690,026
	6666-014 (Core)	34,920
	6686-001 (Other)	2,425
	6681-002 (Other)	0
	6688-001 (Project)	0
TOTALS		4,105,790
R&R Budget - Publication Costs	6647-001 (Admin Core)	0
	6648-002 (Admin Core)	0
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	0
	6649-005 (Admin Core)	0
	6676-001 (Core)	5,820
	6678-002 (Core)	5,820
	6664-003 (Core)	0
	6665-004 (Core)	970
	6662-005 (Core)	970
	6663-006 (Core)	970

	6661-007 (Core)	0
	6670-008 (Core)	6,790
	6671-009 (Core)	3,880
	6668-010 (Core)	970
	6669-011 (Core)	0
	6667-012 (Core)	970
	6651-013 (Core)	0
	6666-014 (Core)	1,940
	6686-001 (Other)	0
	6681-002 (Other)	0
	6688-001 (Project)	0
TOTALS		29,100
R&R Budget - Consultant Services	6647-001 (Admin Core)	9,700
	6648-002 (Admin Core)	0
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	0
	6649-005 (Admin Core)	0
	6676-001 (Core)	0
	6678-002 (Core)	0
	6664-003 (Core)	0
	6665-004 (Core)	0
	6662-005 (Core)	0
	6663-006 (Core)	0
	6661-007 (Core)	0

	6670-008 (Core)	0
	6671-009 (Core)	0
	6668-010 (Core)	0
	6669-011 (Core)	0
	6667-012 (Core)	0
	6651-013 (Core)	0
	6666-014 (Core)	0
	6686-001 (Other)	0
	6681-002 (Other)	451,585
	6688-001 (Project)	0
TOTALS		461,285
R&R Budget - ADP/Computer Services	6647-001 (Admin Core)	0
	6648-002 (Admin Core)	0
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	0
	6649-005 (Admin Core)	0
	6676-001 (Core)	0
	6678-002 (Core)	0
	6664-003 (Core)	0
	6665-004 (Core)	0
	6662-005 (Core)	0
	6663-006 (Core)	19,400
	6661-007 (Core)	0
	6670-008 (Core)	0

	6671-009 (Core)	0
	6668-010 (Core)	2,424
	6669-011 (Core)	0
	6667-012 (Core)	0
	6651-013 (Core)	0
	6666-014 (Core)	0
	6686-001 (Other)	0
	6681-002 (Other)	0
	6688-001 (Project)	0
TOTALS		21,824
R&R Budget - Subawards/Consortium/Contractual Costs	6647-001 (Admin Core)	0
	6648-002 (Admin Core)	0
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	0
	6649-005 (Admin Core)	0
	6676-001 (Core)	0
	6678-002 (Core)	0
	6664-003 (Core)	0
	6665-004 (Core)	0
	6662-005 (Core)	0
	6663-006 (Core)	0
	6661-007 (Core)	0
	6670-008 (Core)	0
	6671-009 (Core)	0

	6668-010 (Core)	0
	6669-011 (Core)	0
	6667-012 (Core)	0
	6651-013 (Core)	0
	6666-014 (Core)	0
	6686-001 (Other)	0
	6681-002 (Other)	15,195
	6688-001 (Project)	300,000
TOTALS		315,195
R&R Budget - Equipment or Facility Rental User Fees	6647-001 (Admin Core)	0
	6648-002 (Admin Core)	0
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	0
	6649-005 (Admin Core)	0
	6676-001 (Core)	0
	6678-002 (Core)	0
	6664-003 (Core)	0
	6665-004 (Core)	0
	6662-005 (Core)	0
	6663-006 (Core)	0
	6661-007 (Core)	0
	6670-008 (Core)	0
	6671-009 (Core)	0
	6668-010 (Core)	0

	6669-011 (Core)	0
	6667-012 (Core)	0
	6651-013 (Core)	0
	6666-014 (Core)	0
	6686-001 (Other)	0
	6681-002 (Other)	0
	6688-001 (Project)	0
TOTALS		0
R&R Budget - Alterations and Renovations	6647-001 (Admin Core)	0
	6648-002 (Admin Core)	0
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	0
	6649-005 (Admin Core)	0
	6676-001 (Core)	0
	6678-002 (Core)	0
	6664-003 (Core)	0
	6665-004 (Core)	0
	6662-005 (Core)	0
	6663-006 (Core)	0
	6661-007 (Core)	0
	6670-008 (Core)	0
	6671-009 (Core)	0
	6668-010 (Core)	0
	6669-011 (Core)	0

	6667-012 (Core)	0
	6651-013 (Core)	0
	6666-014 (Core)	0
	6686-001 (Other)	0
	6681-002 (Other)	0
	6688-001 (Project)	0
TOTALS		0
R&R Budget - Other Direct Cost 1	6647-001 (Admin Core)	4,850
	6648-002 (Admin Core)	2,910
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	0
	6649-005 (Admin Core)	2,105
	6676-001 (Core)	0
	6678-002 (Core)	0
	6664-003 (Core)	0
	6665-004 (Core)	485
	6662-005 (Core)	0
	6663-006 (Core)	485
	6661-007 (Core)	0
	6670-008 (Core)	0
	6671-009 (Core)	0
	6668-010 (Core)	0
	6669-011 (Core)	0
	6667-012 (Core)	0

	6651-013 (Core)	232,530
	6666-014 (Core)	2,910
	6686-001 (Other)	8,730
	6681-002 (Other)	0
	6688-001 (Project)	0
TOTALS		255,005
R&R Budget - Other Direct Cost 2	6647-001 (Admin Core)	3,880
	6648-002 (Admin Core)	0
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	0
	6649-005 (Admin Core)	0
	6676-001 (Core)	0
	6678-002 (Core)	0
	6664-003 (Core)	0
	6665-004 (Core)	0
	6662-005 (Core)	0
	6663-006 (Core)	0
	6661-007 (Core)	0
	6670-008 (Core)	0
	6671-009 (Core)	0
	6668-010 (Core)	0
	6669-011 (Core)	0
	6667-012 (Core)	0
	6651-013 (Core)	0

	6666-014 (Core)	0
	6686-001 (Other)	0
	6681-002 (Other)	0
	6688-001 (Project)	0
TOTALS		3,880
R&R Budget - Other Direct Cost 3	6647-001 (Admin Core)	0
	6648-002 (Admin Core)	0
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	0
	6649-005 (Admin Core)	0
	6676-001 (Core)	0
	6678-002 (Core)	0
	6664-003 (Core)	0
	6665-004 (Core)	0
	6662-005 (Core)	0
	6663-006 (Core)	0
	6661-007 (Core)	0
	6670-008 (Core)	0
	6671-009 (Core)	0
	6668-010 (Core)	0
	6669-011 (Core)	0
	6667-012 (Core)	0
	6651-013 (Core)	0
	6666-014 (Core)	0

	6686-001 (Other)	0
	6681-002 (Other)	0
	6688-001 (Project)	0
TOTALS		0
R&R Budget - Section F. Total Other Direct Cost	6647-001 (Admin Core)	28,130
	6648-002 (Admin Core)	12,610
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	0
	6649-005 (Admin Core)	144,597
	6676-001 (Core)	8,730
	6678-002 (Core)	8,730
	6664-003 (Core)	27,160
	6665-004 (Core)	11,155
	6662-005 (Core)	23,280
	6663-006 (Core)	30,555
	6661-007 (Core)	101,582
	6670-008 (Core)	10,185
	6671-009 (Core)	7,760
	6668-010 (Core)	16,004
	6669-011 (Core)	3,395
	6667-012 (Core)	17,945
	6651-013 (Core)	3,922,556
	6666-014 (Core)	39,770
	6686-001 (Other)	11,155

	6681-002 (Other)	466,780
	6688-001 (Project)	300,000
TOTALS		5,192,079
R&R Budget - Section G. Total Direct Cost (A thru F)	6647-001 (Admin Core)	542,966
	6648-002 (Admin Core)	603,583
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	582,399
	6649-005 (Admin Core)	473,190
	6676-001 (Core)	122,654
	6678-002 (Core)	142,055
	6664-003 (Core)	117,734
	6665-004 (Core)	115,678
	6662-005 (Core)	361,283
	6663-006 (Core)	313,128
	6661-007 (Core)	109,437
	6670-008 (Core)	139,908
	6671-009 (Core)	217,661
	6668-010 (Core)	221,246
	6669-011 (Core)	61,210
	6667-012 (Core)	117,320
	6651-013 (Core)	4,160,973
	6666-014 (Core)	195,996
	6686-001 (Other)	32,255
	6681-002 (Other)	477,256

	6688-001 (Project)	300,000
TOTALS		9,407,932
R&R Budget - Section H. Indirect Costs	6647-001 (Admin Core)	123,253
	6648-002 (Admin Core)	137,013
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	0
	6649-005 (Admin Core)	107,414
	6676-001 (Core)	27,842
	6678-002 (Core)	32,246
	6664-003 (Core)	26,726
	6665-004 (Core)	26,259
	6662-005 (Core)	82,011
	6663-006 (Core)	71,080
	6661-007 (Core)	24,842
	6670-008 (Core)	31,759
	6671-009 (Core)	49,409
	6668-010 (Core)	50,223
	6669-011 (Core)	13,895
	6667-012 (Core)	26,632
	6651-013 (Core)	940,577
	6666-014 (Core)	44,491
	6686-001 (Other)	7,322
	6681-002 (Other)	108,337
	6688-001 (Project)	68,100

TOTALS		1,999,432
R&R Budget - Section I. Total Direct and Indirect Costs (G +H)	6647-001 (Admin Core)	666,219
	6648-002 (Admin Core)	740,596
	6646-003 (Admin Core)	0
	6650-004 (Admin Core)	582,399
	6649-005 (Admin Core)	580,604
	6676-001 (Core)	150,496
	6678-002 (Core)	174,301
	6664-003 (Core)	144,459
	6665-004 (Core)	141,938
	6662-005 (Core)	443,294
	6663-006 (Core)	384,208
	6661-007 (Core)	134,279
	6670-008 (Core)	171,667
	6671-009 (Core)	267,070
	6668-010 (Core)	271,468
	6669-011 (Core)	75,105
	6667-012 (Core)	143,951
	6651-013 (Core)	5,101,550
	6666-014 (Core)	240,487
	6686-001 (Other)	39,577
	6681-002 (Other)	585,593
	6688-001 (Project)	368,100
TOTALS		11,407,363

A. COMPONENT COVER PAGE

Project Title: ADMINISTRATION OVERVIEW (GOVERNANCE UNIT)

Component Project Lead Information:

Redacted by agreement

B. COMPONENT ACCOMPLISHMENTS**B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?**

The Administration Overview (Governance Unit) component of the California National Primate Research Center (CNPRC) provides services across the entire program through the Director's Office, Administration and Operations Services, Information Technology Services, and Alternations and Renovations – Facilities Improvement and Outreach/ Public Information Office. The Specific Aims for the CNPRC administration are directly aligned with the components that comprise the central administration for the CNPRC as follows:

Specific Aim 1. Provide an overall structure for executive management and decision-making of the CNPRC. Plan. This will be accomplished in the Director's Office through coordination with the Executive Leadership at the UC Davis Campus and the Office of Research. The collaboration and coordination by these leaders will provide direction and leadership for research excellence, ensuring the successful operation of the CNPRC through consensus management and highly trained staff, mentoring and training the next generation of investigators with NHP expertise, and ensuring the highest standards of responsible conduct of research and animal care.

Specific Aim 2. Ensure administrative and operational responsibility for the CNPRC. Plan. This will be accomplished through CNPRC Administration and Operations Services that will provide business office services, human resources support, oversight of purchasing and stores, operations of facilities and occupational health and safety. CNPRC will align with our Campus counterparts to ensure that we onboard faculty and staff in a timely and effective manner.

Specific Aim 3. Support CNPRC technological and data management needs. Plan. This will be accomplished by the CNPRC Information Technology Services aligning with Campus Information Technology resources to ensure the efficient and cost-effective operations of Core and Affiliate Scientists research, colony management, and business operations as it pertains to information technology. In addition, CNPRC will strengthen existing relationships with entities such as the UC Davis Genome Center to provide "big data" computational resources, storage and archival to our scientists.

Specific Aim 4. Improve and maintain the infrastructure of CNPRC facilities. Plan. This will be accomplished by directing Alternations and Renovations – Facilities Improvement funds work with our campus counterparts to improve the overall infrastructure that supports the research enterprise by upgrading the facilities and replacing obsolete equipment to ensure the sustainability and overall mission of the CNPRC.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File uploaded: B.2. What was accomplished under these goals.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

Not Applicable

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

File uploaded: B.4. What opportunities for training and professional development has the project provided.pdf

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

The Director and Executive Leadership provide a Town Hall annually for all faculty and staff. In addition, the Executive Leadership also bring this information to the Research Advisory Committee (RAC) and Core Scientist meeting on a monthly basis.

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

The Director and Executive Management Team will continue to advance our relationships with the leadership at Central Campus and other partner departments.

B.2. What was accomplished under these goals?

The CNPRC continues its cooperative relationships with key units on the UCD Campus. The CNPRC leadership team meets monthly with the Vice Chancellor of Research and his staff to provide an overview of administrative and financial issues. In addition, [Redacted by agreement] collaborates and strategizes on future outreach within the UC organization for research initiatives and support. In addition, the CNPRC leadership meets quarterly with the Chancellor's office and Vice Provost to review various administrative, financial and operational initiatives and issues. The Director and Associate Director's and Assistant Director participate in various campus committees to make decisions in all areas of interest such as finance, facilities planning, animal care and regulation and research.

B.4. What opportunities for training and professional development has the project provided?

Members of the Executive Leadership team are always engaged in continuous learning in areas of research program marketing, operational leadership and other areas of interest.

C. COMPONENT PRODUCTS

C.1 PUBLICATIONS

Not Applicable

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Not Applicable

C.3 TECHNOLOGIES OR TECHNIQUES

NOTHING TO REPORT

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Not Applicable

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Category	Explanation
Educational aids or curricula	https://cnprc.ucdavis.edu/training-and-outreach/training/ A variety of educational and training opportunities are available for individuals at all skill levels.
Other	https://www.facebook.com/CaliforniaNationalPrimateResearchCenter/ Facebook is like a compilation of the other networks. It allows Private Messaging, Public Messaging, Groups, Friends, Photo-sharing, Video-sharing, and Public Pages, many of which isn't offered by the other networks.
Other	https://cnprc.ucdavis.edu/ The California National Primate Research Center is a federally funded biomedical research facility, dedicated to improving human and animal health, and located on the University of California, Davis, campus. Main website.
Other	https://twitter.com/cnprcresearch?lang=en Networking. One of the primary purposes for creating a Twitter account is to network online. Twitter's system of shortened links and hashtags make it easy to find people or businesses posting tweets in the same areas that you are.
Other	https://cnprc.ucdavis.edu/our-science/zika-virus-projects-and-teams/ Zika Research

D. COMPONENT PARTICIPANTS

Not Applicable

E. COMPONENT IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

Not Applicable

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

NOTHING TO REPORT

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

Not Applicable

F. COMPONENT CHANGES

F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

NOTHING TO REPORT

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subjects**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. COMPONENT SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS Not Applicable
G.2 RESPONSIBLE CONDUCT OF RESEARCH Not Applicable
G.3 MENTOR'S REPORT OR SPONSOR COMMENTS Not Applicable
G.4 HUMAN SUBJECTS G.4.a Does the project involve human subjects? No
G.4.b Inclusion Enrollment Data Not Applicable
G.4.c ClinicalTrials.gov Not Applicable
G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT Not Applicable
G.6 HUMAN EMBRYONIC STEM CELLS (HESCS) Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)? No
G.7 VERTEBRATE ANIMALS Not Applicable
G.8 PROJECT/PERFORMANCE SITES Not Applicable
G.9 FOREIGN COMPONENT Not Applicable
G.10 ESTIMATED UNOBLIGATED BALANCE Not Applicable
G.11 PROGRAM INCOME Not Applicable
G.12 F&A COSTS Not Applicable

RPPR - Admin Core-6646

RESEARCH & RELATED BUDGET - SECTION A & B FINAL

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

A. Senior/Key Person												
Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*
1.	Mohapatra		Prasant		PI	Institutional Base Salary	EFFORT			0.00	0.00	0.00
Total Funds Requested for all Senior Key Persons in the attached file												
Additional Senior Key Persons: File Name:											Total Senior/Key Person	0.00

B. Other Personnel							
Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
	Secretarial/Clerical						
0	Total Number Other Personnel					Total Other Personnel	0.00
						Total Salary, Wages and Fringe Benefits (A+B)	0.00

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

C. Equipment Description

List items and dollar amount for each item exceeding \$5,000

Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	0.00
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel

Funds Requested (\$)*

1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	0.00
2. Foreign Travel Costs	0.00
Total Travel Cost	0.00

E. Participant/Trainee Support Costs

Funds Requested (\$)*

1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

F. Other Direct Costs		Funds Requested (\$)*
1. Materials and Supplies		0.00
2. Publication Costs		0.00
3. Consultant Services		0.00
4. ADP/Computer Services		0.00
5. Subawards/Consortium/Contractual Costs		0.00
6. Equipment or Facility Rental/User Fees		0.00
7. Alterations and Renovations		0.00
Total Other Direct Costs		0.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	0.00

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
Total Indirect Costs			
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	0.00

J. Fee	Funds Requested (\$)*
	0.00

K. Budget Justification*	File Name:
	(Only attach one file.)

RESEARCH & RELATED Budget {F-K} (Funds Requested)

A. COMPONENT COVER PAGE

Project Title: DIRECTOR'S OFFICE	
Component Project Lead Information:	
Redacted by agreement	

B. COMPONENT ACCOMPLISHMENTS**B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?**

The Director's Office is responsible to the Principal Investigator (PI), for the P51 base grant and to the University of California and the NIH for the overall administration of the California National Primate Research Center (CNPRC). This includes fiscal management, quality control of performance in all areas, and the development and implementation of short and long range plans. The Specific Aims for the Director's Office are as follows:

Specific Aim 1. Provide direction and leadership for research excellence. The Director is committed to the optimal use of the nonhuman primate (NHP) model for translational impact and to the provision of outstanding animal care, facilities operations, and scientific expertise to ensure that the goals of local investigators and collaborators nationwide can be achieved. We have a responsibility to promote the CNPRC resource and effectively facilitate outstanding NHP research programs, and the spectrum of opportunities for individual and institutional research partnerships. The Director meets regularly with the Office of Research and UC Davis Organized Research Unit and Center Directors regarding policies and research goals for the campus. The Director oversees all CNPRC recruitment efforts in collaboration with multiple UC Davis partners. The Director interacts with other academic institutions, the private sector, and NIH to promote the CNPRC and highlight the depth and breadth of the Center's activities. The Director also works with the other National Primate Research Center (NPRC) Directors and the NIH to increase the recognition of the overall NPRC Program. The overall objective is to promote the excellence of the CNPRC program through enhancing facilities and ongoing research programs, recruiting the highest quality faculty, forming new partnerships, and launching new programmatic initiatives that adhere to strategic goals and priorities that advance translational research with the NHP model.

Specific Aim 2. Ensure the successful operation of the CNPRC. The Director ensures that research goals are facilitated through an efficient process for proposal review for study conduct and grant/contract submissions, and by providing specialized facilities, expertise, and related nonhuman primate resources. The Director provides administrative oversight by consensus management that relies on faculty and staff participation in key advisory committees. The Director also ensures ready access to Core Scientists and Service Cores by potential collaborators to foster research opportunities that advance the research mission.

Specific Aim 3. Mentor and train the next generation of investigators with nonhuman primate expertise. The Director promotes mentoring and training of investigators in the performance of high quality research with NHPs, and the conduct of multidisciplinary team-based investigations through Core and Affiliate Scientists, Veterinarians, and staff. Core Scientists participate in campus undergraduate and graduate education and training programs which provide essential mechanisms to develop emerging investigators dedicated to primatology and high quality NHP research. While the Core Scientists will continue to participate vigorously in Training Grants centered primarily on campus, we will also pursue training grants that are linked to the essential elements of NHP research that will provide an important campus-wide training opportunity centered at the CNPRC.

Specific Aim 4. Ensure the highest standards of responsible conduct of research and animal care. Our colony is one of the most important resources at the CNPRC and it must be maintained and expanded in a manner that assures the health and well-being of the animals. The rhesus monkey production colony offers research subjects that span the entire life history ranging from newborns, infants, and juveniles to adults and geriatric stages. The colony addresses an important national need, and all of these age groups are utilized in current research programs and projects. The advantage of a large, well-managed and characterized colony is an unparalleled economy of scale, i.e., to cost effectively provide sufficient numbers of healthy animals for lifespan research with well documented life histories and demographic profiles. A comparable approach is anticipated for the next funding period; should there be a major increase in demand that exceeds supply, priority will be given to NIH-funded studies. The CNPRC will ensure investigators are provided healthy, well characterized animals to support lifespan health research objectives, and new tools, technologies, and methodologies to advance this research.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File uploaded: B2 Accomplishments.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

Not Applicable

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

File uploaded: B.4. What opportunities for training and professional development has the project provided.pdf

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

The Director and Executive Leadership provide a Town Hall annually for all faculty and staff. In addition, the Executive Leadership also bring this information to the Research Advisory Committee (RAC) and Core Scientist meeting on a monthly basis.

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

The Director and Executive Management Team will continue to advance the critical relationships with campus partners and industry partners to provide effective direction and leadership to the CNPRC. In addition, these relationships are also critical to advancing the research mission as well.

B.2. What was accomplished under these goals?

In the last pilot project announcement the CNPRC targeted investigators from other UC schools. Several of the applicants were successful and this approach has been successful in raising the profile of the CNPRC and the value of its animal models to other researchers throughout the UC research community. CNPRC has also onboarded three research scientists. Two of these scientists joined the team of scientists in the Infectious Disease Research Unit, with [Redacted by agreement] assuming the role of Unit Leader of Infectious Disease Unit. The previous Unit Leader [Redacted by agreement] retired and has remained active at the CNPRC as an emeritus faculty member.

B.4. What opportunities for training and professional development has the project provided?

Redacted by agreement

is working collaboratively to build the Vision Science program as well as the Aging program with our Core Scientists and Affiliate Scientists in the UCD School of Medicine and UCD School of Veterinary Medicine as well as Industry partners.

C. COMPONENT PRODUCTS**C.1 PUBLICATIONS**

Not Applicable

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Not Applicable

C.3 TECHNOLOGIES OR TECHNIQUES

NOTHING TO REPORT

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Not Applicable

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Nothing to report

D. COMPONENT PARTICIPANTS

Not Applicable

E. COMPONENT IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

Not Applicable

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

NOTHING TO REPORT

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

Not Applicable

F. COMPONENT CHANGES

F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

NOTHING TO REPORT

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subjects**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. COMPONENT SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS

Not Applicable

G.2 RESPONSIBLE CONDUCT OF RESEARCH

Not Applicable

G.3 MENTOR'S REPORT OR SPONSOR COMMENTS

Not Applicable

G.4 HUMAN SUBJECTS**G.4.a Does the project involve human subjects?**

No

G.4.b Inclusion Enrollment Data

Not Applicable

G.4.c ClinicalTrials.gov

Not Applicable

G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT

Not Applicable

G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)

Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?

No

G.7 VERTEBRATE ANIMALS

Not Applicable

G.8 PROJECT/PERFORMANCE SITES

Not Applicable

G.9 FOREIGN COMPONENT

Not Applicable

G.10 ESTIMATED UNOBLIGATED BALANCE

Not Applicable

G.11 PROGRAM INCOME

Not Applicable

G.12 F&A COSTS

Not Applicable

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

A. Senior/Key Person

Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*			
1.	Prasant		Mohapatra		PI	Institutional Base Salary	EFFORT			0.00	0.00	0.00			
2.	Redacted by agreement				Director					110,536.80	21,554.68	132,091.48			
3.					Associate Director Operations					68,256.00	26,005.54	94,261.54			
4.					Associate Director Research					49,742.56	18,951.92	68,694.48			
5.					Associate Director Primate Svcs					64,464.00	24,560.78	89,024.78			
Total Funds Requested for all Senior Key Persons in the attached file															
Additional Senior Key Persons:					File Name:	Total Senior/Key Person						384,072.28			

B. Other Personnel

Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
1	Secretarial/Clerical	10.2			59,500.00	30,523.50	90,023.50
1	Total Number Other Personnel					Total Other Personnel	90,023.50
Total Salary, Wages and Fringe Benefits (A+B)							474,095.78

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

C. Equipment Description	
List items and dollar amount for each item exceeding \$5,000	
Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	0.00
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel	Funds Requested (\$)*
1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	40,740.00
2. Foreign Travel Costs	0.00
Total Travel Cost	40,740.00

E. Participant/Trainee Support Costs	Funds Requested (\$)*
1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

F. Other Direct Costs		Funds Requested (\$)*
1. Materials and Supplies		9,700.00
2. Publication Costs		0.00
3. Consultant Services		9,700.00
4. ADP/Computer Services		0.00
5. Subawards/Consortium/Contractual Costs		0.00
6. Equipment or Facility Rental/User Fees		0.00
7. Alterations and Renovations		0.00
8. Annual Gene Symposium		4,850.00
9. Copy/Printing		3,880.00
Total Other Direct Costs		28,130.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	542,965.78

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. MTDC	22.7	542,965.78	123,253.23
Total Indirect Costs			123,253.23
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	666,219.01

J. Fee	Funds Requested (\$)*
	0.00

K. Budget Justification*	File Name:
	(Only attach one file.)

RESEARCH & RELATED Budget {F-K} (Funds Requested)

A. COMPONENT COVER PAGE

Project Title: ADMINISTRATION AND OPERATIONS SERVICES

Component Project Lead Information:

Redacted by agreement

B. COMPONENT ACCOMPLISHMENTS**B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?**

The California National Primate Research Center (CNPRC) Administration and Operations Services functions in coordination with the UC Davis campus administration and maintains administrative and operational responsibility for the CNPRC in the areas of business office services, human resources, purchasing and stores, facilities operations, occupational health and emergency response, and support for the Director's Office. The Specific Aims for Administration and Operations Services include:

Specific Aim 1. Ensure effective and efficient operation of the CNPRC infrastructure to optimize the conduct of nonhuman primate research. During the proposed funding period, Administration and Operations staff will focus on excellence in their respective support areas to provide services to enhance and support the Center's mission of convergence. The Unit will also work to increase the ability of the CNPRC Core and Affiliate Scientists to compete for contracts and awards. This effort will involve strategic improvements in the following areas:

- Improve the efficiency of the OHSS risk assessment system and Occupational Health oversight by including annual CNPRC medical clearances within the OHSS system by aligning OHSS risk assessment renewal with annual Medical Clearance. This will require centralizing the Medical Clearance process with the CNPRC Safety and Effectiveness Operations Manager and a period of adjustment that might require staff to have a second Medical Clearance to align dates with the generation of the risk assessment. The consolidation will also benefit UC Davis Occupational Health by automating and eliminating an accounting process used to bill departments.

Specific Aim 2. Work with Core Scientists, the UC Davis campus, and the NIH to evaluate infrastructure needs and facilitate research.

- One of our key goals for the coming year is the implementation of Labkey for our month end billing process. Our current process relies on a "home grown" system has been in place for decades. Although, the system still works, it lacks the efficiencies and connectivity Labkey would provide. With Labkey we intend to have a more streamlined process and better access to information that can be tied together across the center. The implementation of the new Labkey system will support the investigators and the mission and goal of convergence for the Center.

- Since our team is now fully staffed, one of our goals will be to make it a high performing cross-functional team. This will entail cross training our analysts on different duties across different functions within the office. By doing this, each analyst will be a stronger asset to the department and the center.

- We have developed an office that is efficient while maintaining our fiduciary responsibility to our sponsors and the University. This is evidenced by regular audits by the University that confirm our efficient and effective processes. With new staff and new systems in our department, we will review our processes to continuously improve our service and to ensure efficiency and effectiveness.

- Leverage the new web vitals software to automate monthly safety inspections. Current methods require paper logs be created and transferred to the CNPRC Occupational Health and Safety Manager for review before potentially hazardous situations are identified and addressed. By bar coding the equipment and leveraging the web based system it would be possible to scan each unit at the time of inspection and have automated real time alerts sent directly to the CNPRC Occupational Health and Safety Manager for review.

Specific Aim 3. Share best practices across the NPRC Consortium. Administrative and Operational staff works closely with the Director to ensure the financial success of the CNPRC. The direct award and budgeting practices support the entire organization and regulate program income and its allocation. The external relationships that are fostered through this component provide for stability, external evaluation, and create conditions optimizing the continued financial success of the CNPRC, creating a stable foundation for the CNPRC scientific enterprise and for the innovative work performed by CNPRC Core Scientists. Some examples of potential positive outcomes of shared practices across the NPRC Consortium include:

- Adoption of common methods and best practices established by the NPRC Consortium Working Groups to increase capabilities across the NPRCs.
- Consortium Working Group initiatives resulting in cost savings through collaborative development of common shared methods and materials.
- Assist in expanding capabilities for NPRC Core and Affiliate Scientists to create dynamic social networking tools that will enhance collaboration and promotion of research activities.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File uploaded: B2 Accomplishments.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

Not Applicable

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

File uploaded: B.4. What opportunities for training and professional development has the project provided.pdf

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

The Associate Director of Administration and Operations as well as the Division Directors participate in various opportunities to communicate with faculty and staff at the Center. They participate in the Town Hall, Research Advisory Committee and Core Scientist

meetings. In addition, the Unit utilizes the email system to send out notifications and post on the intranet site as well as utilize the various information kiosks throughout the Center.

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

The Associate Director for Administration and Operations as well as the Division Managers will:

- Continue to work with Center Core Scientists and Administrators in in conducting process improvements reviews and implementation plans of center operations and service delivery.
- Implement training to supervisors on performance management, educating staff on the Center's strategic plan, and facilitate training on workplace issues.
- Continue to work with UC Davis Campus Police Department to integrate the Center's security and card access in support of a centralized program.

B.2. What was accomplished under these goals?

Occupational Health and Safety:

The CNPRC streamlined the OHSS risk assessment system and Occupational Health oversight by adopting 100% use of the OHSS risk assessment system for all staff regardless of classification.

Business Office/Grants Management:

Staff were trained and facilitated implementation of the the new Adaptive Insights budget software developed by the Office of Research. This new application will provide easier monthly report and trend analysis for the financial oversight of the Center.

Human Resources:

In January 2017, the CNPRC HR Services was able to create a new HR Academic and Staff Analyst which 50% of the position supports academic recruitment and leave administration and the other 50% supports staff personnel administration. The incumbent's works with UC Davis academic departments in the coordination of the recruitment and selection process for new faculty. The HR Services Unit worked closely with Director in the coordination of 3 academic hires of new Core Scientists (academic departments: Center for Comparative Medicine, School of Veterinary Medicine, and Colleges of letters and Science). A new recruitment in the School of Medicine, Department of Neurology is being planned for the Fall of 2019. This position also handles academic recruitments of Federation titles for Researchers and Project Scientists in addition to merits and promotions. Beginning in January 2018, the CNPRC began conducting organizational reviews that included assessing operational performance in both Primate Services and Administration and Operations. The HRM was very successful in conducting organizational analyses and implementing organizational changes in Population Behavioral Health Services to improve employee morale and streamlining workflow efficiencies such as reducing duplication of work performed by others in the unit. In Primate Medicine, an organizational review that resulted in a reorganization of veterinary management structure to expand areas of responsibilities in the day-to-day management of animal care among the Staff Veterinarians in Primate Medicine. The Center deployed a new ID badge system which required a lot of data clean up and migration over to the new system. The UC Davis Campus is no looking to centralized card access for the entire Campus which the CNPRC will be participating in the new campus-wide centralized card access program. In May 2018, the CNPRC began the process of surveying the Center's Core and Affiliate Scientists to better understand their level of satisfaction regarding CNPRC's centralized services ranging from Administration to Primate Services. The short survey yielded feedback on both operational processes and suggestions for improvement, which the Director initiated an operational review steering committee that began in Aug 2018. The first several months the steering committee focused on the organizational and operational overviews of the Center's areas (Administration and Primate Services). In preparation for UC Path coming to UC Davis in March 2019, (UC newly implemented 10 campus-wide centralized HRIS system), the CNPRC transitioned over the Center's payroll processing, new hire and onboarding, fund changes transactional workflow to UC Davis Shared Services Organization (SSO). SSO is a single, service-oriented unit that provide a range of finance, human resources, and payroll services to UC Davis campus. The Center will no longer have direct accessed to campus personnel and payroll system to hire, separate, process payroll, leave administration, and enter our own actions and those actions of other units on our funding accounts. These transactions are now completed by the Campus Shared Services Organization.

B.4. What opportunities for training and professional development has the project provided?

The implementation of the Adaptive Insights budget management system provided the opportunity for the Business office staff to learn the new application and review the Center's account structure to determine how best to integrate this into the new software application.

The new UC Path system will "go live" in April 2019. This will have a profound change in how human resources is handled across UC Davis. The HR and Business Office team, through the integration with the Shared Services Unit, is learning the new role of supporting payroll processing without being directly responsible for payroll processing. The new UC Path application will centralize many human resources services leaving recruiting and onboarding with the Center HR team. The Center HR team will also be responsible for assisting faculty and staff in management issues and personnel actions at all levels.

C. COMPONENT PRODUCTS**C.1 PUBLICATIONS**

Not Applicable

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Not Applicable

C.3 TECHNOLOGIES OR TECHNIQUES

NOTHING TO REPORT

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Not Applicable

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Nothing to report

D. COMPONENT PARTICIPANTS

Not Applicable

E. COMPONENT IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

Not Applicable

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

NOTHING TO REPORT

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

Not Applicable

F. COMPONENT CHANGES

F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

NOTHING TO REPORT

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subjects**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. COMPONENT SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS

Not Applicable

G.2 RESPONSIBLE CONDUCT OF RESEARCH

Not Applicable

G.3 MENTOR'S REPORT OR SPONSOR COMMENTS

Not Applicable

G.4 HUMAN SUBJECTS**G.4.a Does the project involve human subjects?**

No

G.4.b Inclusion Enrollment Data

Not Applicable

G.4.c ClinicalTrials.gov

Not Applicable

G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT

Not Applicable

G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)

Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?

No

G.7 VERTEBRATE ANIMALS

Not Applicable

G.8 PROJECT/PERFORMANCE SITES

Not Applicable

G.9 FOREIGN COMPONENT

Not Applicable

G.10 ESTIMATED UNOBLIGATED BALANCE

Not Applicable

G.11 PROGRAM INCOME

Not Applicable

G.12 F&A COSTS

Not Applicable

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

A. Senior/Key Person

Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*
1.	Redacted by agreement				Associate Director Operations	Institutional Base Salary	EFFORT			47,400.00	18,059.40	65,459.40
Total Funds Requested for all Senior Key Persons in the attached file												
Additional Senior Key Persons:			File Name:								Total Senior/Key Person	65,459.40

B. Other Personnel

Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
	Secretarial/Clerical						
14	Safety, Facilities, Finance, Grants, Purchasing, HR	52.8			345,888.42	179,625.30	525,513.72
14	Total Number Other Personnel					Total Other Personnel	525,513.72
Total Salary, Wages and Fringe Benefits (A+B)							590,973.12

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

C. Equipment Description	
List items and dollar amount for each item exceeding \$5,000	
Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	0.00
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel	Funds Requested (\$)*
1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	0.00
2. Foreign Travel Costs	0.00
Total Travel Cost	0.00

E. Participant/Trainee Support Costs	Funds Requested (\$)*
1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

F. Other Direct Costs		Funds Requested (\$)*
1. Materials and Supplies		9,700.00
2. Publication Costs		0.00
3. Consultant Services		0.00
4. ADP/Computer Services		0.00
5. Subawards/Consortium/Contractual Costs		0.00
6. Equipment or Facility Rental/User Fees		0.00
7. Alterations and Renovations		0.00
8. Copy/Printing		2,910.00
Total Other Direct Costs		12,610.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	603,583.12

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. MTDC	22.7	603,583.12	137,013.36
Total Indirect Costs			137,013.36
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	740,596.48

J. Fee	Funds Requested (\$)*
	0.00

K. Budget Justification*	File Name:
	(Only attach one file.)

RESEARCH & RELATED Budget (F-K) (Funds Requested)

A. COMPONENT COVER PAGE

Project Title: INFORMATION TECHNOLOGY SERVICES

Component Project Lead Information:

Redacted by agreement

B. COMPONENT ACCOMPLISHMENTS**B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?**

The primary mission of Information Technology (IT) Services is to support all programs within the California National Primate Research Center (CNPRC), including research, colony management, and business services to ensure efficient and cost effective operations.

Specific Aim 1. Provide effective data management, streamlined data access on a secure and reliable data infrastructure and to provide support for the CNPRC research mission. Plan. The goal is to continue to build and strengthen the data center located and managed at the CNPRC. The LabKey project will provide a comprehensive data solution for the entire Center whether it is colony management, investigators or the business office. The new LabKey application will also have a portal which will allow investigators to post their data and allow other collaborators access as needed in a secure and private environment.

Specific Aim 2. Ensure investigators have access to efficient IT systems and tools. Plan. Implement a robust network of computers and servers that allows investigators to work seamlessly with their collaborators and research staff. Implement the LabKey application which will provide a comprehensive solution for all research procedures and data collection throughout the facility. This solution will also include an enhancement to the CNPRC website to provide dynamic data and online services, assist the CNPRC Public Information Officer with the external website for easy access of CNPRC information, and automate business practices such as work order processing and billing in order to increase efficiencies, facilitate communications, and reduce paper use.

Specific Aim 3. Aid in the training of the next generation of investigators with nonhuman primate expertise. Plan. Assist Core and Affiliate Scientists in the training of new investigators in the use of modern IT and assist Core and Affiliate Scientists with data analysis through strategic linking with UC Davis campus programs and resources such as the data center in the UC Davis Genome Center.

Specific Aim 4. Support nonhuman primate colony management and animal care. Plan. Through the LabKey application, improve the animal records system to include electronic health records, colony information, genetic characterization, breeding records, and pathology findings; integrate with other animal related data, such as behavior and clinical pathology results; develop portal applications to allow Core Scientists, Veterinarians, and Colony Management and Research Services staff easy access to data related to individual animals through a single web entrance; develop mobile applications and assist users to select mobile devices to ensure that data can be entered at the point-of-service, and that real-time data can be accessed at the cage-side; and automate processes to facilitate communications among animal care groups and with Core and Affiliate Scientists. By achieving the above Specific Aims, the IT Services staff will be able to ensure strong support for the ongoing state-of-the-art research at the CNPRC, high quality animal care, and streamlined business operations by providing point-of-service data entry, cage-side data access, real-time information exchange and communications, automated processes, integrated presentation of related data, and computing support for research projects. These efforts will ultimately improve CNPRC operations in virtually all areas, and serve as a foundation to increase efficiency and economy of scale.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File uploaded: B2 Accomplishments.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

Not Applicable

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

File uploaded: B.4. What opportunities for training and professional development has the project provided.pdf

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

NOTHING TO REPORT

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

CNPRC anticipates the following areas of emphasis for the IT Services area:

Research and Business Technologies implementation

- Objective #1: Deploy modern / upgraded Operating Systems and software to the desktops and laptop computers, including Windows 10, Office 2016, etc.

- Objective #2: Update, and/or, upgrade Research Systems currently maintained in the CNPRC Data Center.

- Objective #3: Implementation of a yearly printer refresh cycle, ensuring printers are up to date and meet the needs for research computing.

Information Security

- Objective #1: Implement a newer generation of Firewall with additional features and functionalities, providing enhanced cyber security at the point of internet access.
- Objective #2: Implement a non-routable private IP space within the CNPRC, providing an added level of security in preventing data breaches.

IT Infrastructure Organizational Development

- Objective #1: Establish and implement IT process improvements so that the CNPRC can easily bring onboard other Faculty and Staff.
- Objective #2: Establish a "DevOps" culture in order to shorten systems development cycles, yet continuing to deliver business objectives.

IT Infrastructure Technologies Implementation

- Objective #1: Implement an Information Technology Asset Management System to catalog and govern all Information Technology Assets within the CNPRC.
- Objective #2: Enhance the CNPRC's current network to allow for the transfer of large datasets and research studies during worldwide collaboration efforts.

B.2. What was accomplished under these goals?

- Implemented redundant backup servers within UCD Campus' Data Center.
- Implemented SecureVPN allowing faculty, and staff, the ability to work securely offsite.
- Completed two cycles of the PC Refresh Program
- Implemented Amazon Web Services (AWS) as an archival solution.
- Transferred multiple Research websites to Amazon allowing for better speeds and access.
- Implemented tertiary, redundant, CNPRC authorization system within UCD Campus' Data Center.
- Implemented Systems Center Configurations Manager, allowing for the central management of all Windows based systems.
- Completed the migration of the CNPRC IT Infrastructure to a cloud-hybrid model
- Implemented JAMF, allowing for the central management of all Apple base systems.
- Implemented a server which collects, and analyses logs from all IT systems.
- Enrolled CNPRC into Apple's Device Enrollment Program and Apple's Volume Purchasing Program, allowing IT to centrally manage all Apple software.
- Enrolled CNPRC into Adobe's Value Incentive Plan (VIP), allowing IT to centrally manage all Adobe products.
- Implemented Pager Duty to replace Sympa list for Animal Alarm notification
- Upgraded aging Security Badging system.
- Implemented advanced Anti-Virus system on all servers and workstations.
- Implemented Voice Over IP phone system, within select areas of the CNPRC, replacing older generation of analog phones.
- Implemented a separate network for the combined project with industry partner.
- Implemented a Microscopy Image Analysis System for a research lab.
- Authored, and implemented, multiple IT Policies which align CNPRC to the governing IT Policies at UCDavis.
- Implemented WiFi Video recording, at select areas, for Behavioral studies.
- Implemented Amazon Web Services for individual Laboratories.
- Planned, managed and coordinated Information Technology workshops with campus and California State agencies.
- Implemented a Learning Management System for Primate Services.
- Implemented a Mobile Management System, allowing CNPRC IT to centrally manage mobile devices.
- Upgraded all of CNPRC's IT domain authorization systems.
- Implemented VMWares Software Academic Plan.

B.4. What opportunities for training and professional development has the project provided?

CNPRC has provided technical training to the IT Services Unit staff, including:

- Technical collaboration web conferences with IT professionals within UC Davis and other NPRC facilities.
- Technical collaboration workshops with other IT professionals within UC Davis and local State Government agencies.
- Advanced Operating Systems implementation training for the Systems Administration Team.
- DevOps training for the Development Team.
- Open Source Operating Systems and Architecture training for the Systems Administration Team.
- Open Source Programming Language for the Development Team.
- Open Source Applications training for the Systems Administration and Desktop Administration Teams.

C. COMPONENT PRODUCTS**C.1 PUBLICATIONS**

Not Applicable

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Not Applicable

C.3 TECHNOLOGIES OR TECHNIQUES

NOTHING TO REPORT

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Not Applicable

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Nothing to report

D. COMPONENT PARTICIPANTS

Not Applicable

E. COMPONENT IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

Not Applicable

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

NOTHING TO REPORT

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

Not Applicable

F. COMPONENT CHANGES

F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

NOTHING TO REPORT

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subjects**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. COMPONENT SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS

Not Applicable

G.2 RESPONSIBLE CONDUCT OF RESEARCH

Not Applicable

G.3 MENTOR'S REPORT OR SPONSOR COMMENTS

Not Applicable

G.4 HUMAN SUBJECTS**G.4.a Does the project involve human subjects?**

No

G.4.b Inclusion Enrollment Data

Not Applicable

G.4.c ClinicalTrials.gov

Not Applicable

G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT

Not Applicable

G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)

Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?

No

G.7 VERTEBRATE ANIMALS

Not Applicable

G.8 PROJECT/PERFORMANCE SITES

Not Applicable

G.9 FOREIGN COMPONENT

Not Applicable

G.10 ESTIMATED UNOBLIGATED BALANCE

Not Applicable

G.11 PROGRAM INCOME

Not Applicable

G.12 F&A COSTS

Not Applicable

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

A. Senior/Key Person

Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*
1.	Redacted by agreement				Associate Director Operations	Institutional Base Salary	EFFORT			3,792.00	1,444.75	5,236.75
Total Funds Requested for all Senior Key Persons in the attached file												
Additional Senior Key Persons:		File Name:									Total Senior/Key Person	5,236.75

B. Other Personnel

Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
1	Undergraduate Students	3.0			15,660.00	203.58	15,863.58
	Secretarial/Clerical						
6	Technical Support	27.6			208,830.05	98,662.55	307,492.60
7	Total Number Other Personnel					Total Other Personnel	323,356.18
Total Salary, Wages and Fringe Benefits (A+B)							328,592.93

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

C. Equipment Description

List items and dollar amount for each item exceeding \$5,000

Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	0.00
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel

Funds Requested (\$)*

1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	0.00
2. Foreign Travel Costs	0.00
Total Travel Cost	0.00

E. Participant/Trainee Support Costs

Funds Requested (\$)*

1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

F. Other Direct Costs		Funds Requested (\$)*
1. Materials and Supplies		142,492.00
2. Publication Costs		0.00
3. Consultant Services		0.00
4. ADP/Computer Services		0.00
5. Subawards/Consortium/Contractual Costs		0.00
6. Equipment or Facility Rental/User Fees		0.00
7. Alterations and Renovations		0.00
8. Other: Copy/Printing/Subscriptions		2,105.00
Total Other Direct Costs		144,597.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	473,189.93

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. MTDC	22.7	473,189.93	107,414.11
Total Indirect Costs			107,414.11
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	580,604.04

J. Fee	Funds Requested (\$)*
	0.00

K. Budget Justification*	File Name:
	(Only attach one file.)

RESEARCH & RELATED Budget (F-K) (Funds Requested)

A. COMPONENT COVER PAGE

Project Title: ALTERATIONS AND RENOVATIONS – FACILITIES IMPROVEMENT

Component Project Lead Information:

Redacted by agreement

B. COMPONENT ACCOMPLISHMENTS**B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?**

Alterations and Renovations – Facilities Improvement funds are essential to ensure that the California National Primate Research Center (CNPRC) is able to provide optimal animal care and research support. Alterations and Renovations: Facilities Improvement funds are permitted up to a maximum of \$600,000 annually per the funding opportunity announcement (FOA PAR-17-144). The proposed use of these funds includes addressing facility and equipment needs integral to colony management (e.g., replacement of corn cribs, cage repairs, replacement of tarps for the field corrals), to replace outdated or nonfunctional equipment necessary to provide uninterrupted services to NIH-funded investigators (e.g., anesthesia machines, cryostat, centrifuges), and to improve Information Technology systems such as those critical to maintain the colony database. In addition, the facilities manager works with the CNPRC Executive Management, Research Advisory Committee (RAC) and Core Scientists to determine the primary space and facilities needs for both the colony and the CNPRC research community and to submit additional grant proposals to obtain funding to fulfill those needs. In this last Base Grant period, the CNPRC also received several supplemental awards which were used to improve and expand the colony and research capabilities.

Specific Aim 1. Identify and prioritize requests for the improvement and modernization of the CNPRC. Plan. The Research Advisory Committee continuously evaluates and assesses needs to ensure optimal operation of the CNPRC. The Committee regularly identifies the most pressing needs, develops a foundation for proposed improvements, and provides a proactive approach and optimized efficiency for use of these funds. In addition, a committee of faculty and lab staff from all areas of the CNPRC (Colony Management, Research Labs and Cores) was tasked with providing a list of items that represent the most beneficial use of these limited resources. The result of both of these outreach efforts is represented in this base grant submission.

Specific Aim 2. Design and develop with consideration to adaptability and efficiency. Plan. The CNPRC interacts with UC Davis campus administration, mainly through the Physical Asset Committee (PAC) meetings, to ensure the timely resolution of infrastructure and equipment needs based on best practices, through standing meetings with key UC Davis administrative personnel and officials, and by expeditious integration of campus facilities staff with on-site CNPRC staff. This collaborative approach will facilitate an efficient and synergistic partnership that benefits the CNPRC.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File uploaded: B2 Accomplishments.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

Not Applicable

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

NOTHING TO REPORT

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

NOTHING TO REPORT

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

Redacted by agreement - this project will be completed in the next reporting period. This will be a modular building with Redacted by square feet of space divided in to two distinctive infectious disease research suites. Each suite is comprised of an ante room, an animal room and a procedure room. The design was made to decrease unnecessary animal transport for potentially infectious studies.

Redacted by agreement - this project will be completed in the next reporting period. This will be a modular building with approximately Redacted square feet of space divided into two animal rooms with an adjoining ante room and procedure rooms. The wing will also have lab space, a shower in/out locker room, supply room, separate procedure room and a cage staging area.

B.2. What was accomplished under these goals?

During this reporting period the unit has accomplished the following:

Primate Center Administration Remodel project was completed. This provided greater flexibility and utility of the existing space to accommodate three offices and nine cubicles.

Redacted by agreement - will be completed by April 2019. This project was funded by a P51 supplement and was designed to reconfigure approximately Redacted by square feet of space into a self-contained infectious research wing. The renovated half of the building will have two animal rooms with adjoining ante room and procedures rooms. The wing will have lab space, a shower in/out locker room, a supply room, separate procedure room and a cage staging area.

C. COMPONENT PRODUCTS**C.1 PUBLICATIONS**

Not Applicable

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Not Applicable

C.3 TECHNOLOGIES OR TECHNIQUES

NOTHING TO REPORT

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Not Applicable

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Nothing to report

D. COMPONENT PARTICIPANTS

Not Applicable

E. COMPONENT IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

Not Applicable

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

NOTHING TO REPORT

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

Not Applicable

F. COMPONENT CHANGES

F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

NOTHING TO REPORT

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subjects**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. COMPONENT SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS

Not Applicable

G.2 RESPONSIBLE CONDUCT OF RESEARCH

Not Applicable

G.3 MENTOR'S REPORT OR SPONSOR COMMENTS

Not Applicable

G.4 HUMAN SUBJECTS**G.4.a Does the project involve human subjects?**

No

G.4.b Inclusion Enrollment Data

Not Applicable

G.4.c ClinicalTrials.gov

Not Applicable

G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT

Not Applicable

G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)

Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?

No

G.7 VERTEBRATE ANIMALS

Not Applicable

G.8 PROJECT/PERFORMANCE SITES

Not Applicable

G.9 FOREIGN COMPONENT

Not Applicable

G.10 ESTIMATED UNOBLIGATED BALANCE

Not Applicable

G.11 PROGRAM INCOME

Not Applicable

G.12 F&A COSTS

Not Applicable

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

A. Senior/Key Person

Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*
1.	Redacted by agreement					Associate Director Operations	Institutional Base Salary	EFFORT		0.00	0.00	0.00
Total Funds Requested for all Senior Key Persons in the attached file												
Additional Senior Key Persons:			File Name:							Total Senior/Key Person		0.00

B. Other Personnel

Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
	Secretarial/Clerical						
0	Total Number Other Personnel					Total Other Personnel	0.00
Total Salary, Wages and Fringe Benefits (A+B)							0.00

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

C. Equipment Description

List items and dollar amount for each item exceeding \$5,000

Equipment Item	Funds Requested (\$)*
1. Seminar Hall A/V Equipment - Phase 2	48,006.00
2. Mac Server Virtualization Development	13,200.00
3. Microscope and Camera System	24,994.00
4. Mule Vehicle Replacement	14,165.00
5. Tunnels for Indoor Caging	30,000.00
6. Socialization Caging	62,617.00
7. Replacement Caging	75,000.00
8. Steam Cleaners	6,000.00
9. Sub80 Freezers 5 units at \$11,499	39,950.00
10. Epimotion System	98,924.00
11. Oscillometry System	29,920.00
12. NM3 Capnography System	5,523.00
13. FACS Software Upgrades	10,000.00
14. Electrical Room for Main Lab Building	89,600.00
15. Cassette Microwriter System	34,500.00
Total funds requested for all equipment listed in the attached file	0.00
Total Equipment	582,399.00

Additional Equipment: File Name:

D. Travel

Funds Requested (\$)*

1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	0.00
2. Foreign Travel Costs	0.00
Total Travel Cost	0.00

E. Participant/Trainee Support Costs

Funds Requested (\$)*

1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

F. Other Direct Costs		Funds Requested (\$)*
1. Materials and Supplies		0.00
2. Publication Costs		0.00
3. Consultant Services		0.00
4. ADP/Computer Services		0.00
5. Subawards/Consortium/Contractual Costs		0.00
6. Equipment or Facility Rental/User Fees		0.00
7. Alterations and Renovations		0.00
Total Other Direct Costs		0.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	582,399.00

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. MTDC	22.7	0.00	0.00
Total Indirect Costs			0.00
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	582,399.00

J. Fee	Funds Requested (\$)*
	0.00

K. Budget Justification*	File Name:
	(Only attach one file.)

RESEARCH & RELATED Budget (F-K) (Funds Requested)

A. COMPONENT COVER PAGE

Project Title: COLONY MANAGEMENT AND RESEARCH SERVICES

Component Project Lead Information:

Redacted by agreement

B. COMPONENT ACCOMPLISHMENTS**B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?**

The Colony Management and Research Services team provides support for all indoor and outdoor-housed monkeys with a census of 4200 animals. The rhesus macaque (*Macaca mulatta*) is the primary species housed at the California National Primate Research Center (CNPRC), with subsets of animals defined by age and viral status. There are also two small colonies of long-tailed macaques (*Macaca fascicularis*) and titi monkeys (*Callicebus cupreus*) that are used for specialized research projects. The experienced Colony Management and Research Services team manages this large and complex colony providing continuous care, 24 hours a day, 7 days a week, as well as a range of research support capabilities to meet investigator needs.

Specific Aim 1. Provide outstanding colony management and infrastructure support to maintain and utilize a national resource of nonhuman primates (NHPs) for translational research. Plan. The overriding goal is to provide a well-managed colony and well-trained workforce to support all operations of Colony Management and Research Services. The efficient management of the animal colonies is essential to ensure a readily available source of healthy animals and associated resources to maximize research opportunities for investigators. This service function closely integrates with all Primate Services components as well as the National Primate Research Center (NPRC) Consortium where best practices are shared for continued improvements and refinements. Staff respond to the dynamic research environment, and provide a central hub for the flow of information to all Primate Services entities to ensure that overall goals in colony management and research support are achieved.

Specific Aim 2. Provide excellent research support to all CNPRC investigators. Plan. Colony Management and Research Services provides outstanding research support through its highly trained staff of animal care personnel and staff research associates. The goal is to ensure that the NHP model is equally accessible to all investigators working at the CNPRC.

Specific Aim 3. Ensure high quality training in all areas of animal care and colony management. Plan. An essential effort is focused on the training of staff in daily husbandry, care, and management to meet regulatory requirements and ensure expectations are achieved. Working knowledge of daily husbandry and animal needs, appropriate animal handling techniques, the importance of infectious disease control, safe practices training, and refined technical procedures that are targeted to the species is critical to the CNPRC mission. One-on-one training, group training, and on-the-job training provided by dedicated training specialists ensure that the knowledge and skillset required are achieved and sustained. The training program is focused on all aspects of job performance, with an emphasis on consistency, safe practices, and compliance. Training is also provided for all levels of the American Association for Laboratory Animal Science Technician Certification Program, and staff members are encouraged to participate in and meet the qualifications for certified animal care technicians.

Specific Aim 4. Promote and support responsible conduct of research and animal care. Plan. A central focus is to ensure the highest quality standards of animal care and research conduct for the wellbeing of the animals, and to meet the CNPRC scientific mission. The goal is to continue to evaluate and review established guidelines, standard operating procedures, and practices to ensure that standards of excellence are consistently maintained.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File uploaded: B2 Accomplishments.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

Not Applicable

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

NOTHING TO REPORT

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

NOTHING TO REPORT

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

Colony Management and Research Services Staff will 1) Continue to focus on providing a well-managed colony, and a well trained workforce to support this national resource 2) Ensure a high quality of staff in all areas of daily animal husbandry and research support 3) Continue to evaluate and review procedures, guidelines and standard operating procedures and practices to ensure standards of excellence.

B.2. What was accomplished under these goals?

The colony has continued to produce and provide healthy and well characterized nonhuman primates for assignment to current research programs, the breeding colony and for external animal sales. The emphasis for future colony planning continues to move toward focus on a higher percentage of the colony being SPF and Full Indian origin breeding in the corrals. The colony has been able to provide the required number of animals for current and planned funded projects, while keeping a low inventory of surplus animals assigned to the base grant.

Training goals have been accomplished with an increase in the number of Animal Care Technicians that have completed the AAALAC technician series resulting in certification. Research Services SRA staff have continued to provide technical support to new research areas such as Zika programs, Vision services and upcoming Pilot projects.

Colony Management Accomplishments:

- Completion and occupancy of newly constructed clean cage storage building.
- Replacement of aged storage containers for produce, cold storage and chow.
- Technical support to complex research programs in indoor, outdoor, infectious and nursery projects.
- *Occupancy of the BSL3 facility to accommodate Chikungunya research.
- *Construction of social cages for ZIKA research in social groups.
- * Fabrication of "Condo cages, for socialization of weanlings."

Research Services Accomplishments:

- Provide extensive nursing care and project support to infectious disease projects.
- Project support for new grants in Vision Science.
- Project support for CNPRC pilot program, Colony Management projects, as well as new faculty and collaborators.
- Establishment and growth of a North Colony Management committee to enhance the scheduling and planning for users of the North Colony field corrals.

C. COMPONENT PRODUCTS**C.1 PUBLICATIONS**

Not Applicable

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Not Applicable

C.3 TECHNOLOGIES OR TECHNIQUES

NOTHING TO REPORT

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Not Applicable

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Nothing to report

D. COMPONENT PARTICIPANTS

Not Applicable

E. COMPONENT IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

Not Applicable

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

NOTHING TO REPORT

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

Not Applicable

F. COMPONENT CHANGES

F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

NOTHING TO REPORT

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subjects**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. COMPONENT SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS
Not Applicable
G.2 RESPONSIBLE CONDUCT OF RESEARCH
Not Applicable
G.3 MENTOR'S REPORT OR SPONSOR COMMENTS
Not Applicable
G.4 HUMAN SUBJECTS
G.4.a Does the project involve human subjects?
No
G.4.b Inclusion Enrollment Data
Not Applicable
G.4.c ClinicalTrials.gov
Not Applicable
G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT
Not Applicable
G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)
Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?
No
G.7 VERTEBRATE ANIMALS
Not Applicable
G.8 PROJECT/PERFORMANCE SITES
Not Applicable
G.9 FOREIGN COMPONENT
Not Applicable
G.10 ESTIMATED UNOBLIGATED BALANCE
Not Applicable
G.11 PROGRAM INCOME
Not Applicable
G.12 F&A COSTS
Not Applicable

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

A. Senior/Key Person

Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*
1.	Redacted by agreement				Associate Director Primate Svcs	Institutional Base Salary	EFFORT			3,792.00	1,444.75	5,236.75
Total Funds Requested for all Senior Key Persons in the attached file												
Additional Senior Key Persons:		File Name:								Total Senior/Key Person		5,236.75

B. Other Personnel

Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
1	Secretarial/Clerical	3.0			13,827.78	7,093.65	20,921.43
4	Technical Services	14.4			140,290.34	71,968.95	212,259.29
5	Total Number Other Personnel					Total Other Personnel	233,180.72
Total Salary, Wages and Fringe Benefits (A+B)							238,417.47

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

C. Equipment Description	
List items and dollar amount for each item exceeding \$5,000	
Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	0.00
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel	Funds Requested (\$)*
1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	0.00
2. Foreign Travel Costs	0.00
Total Travel Cost	0.00

E. Participant/Trainee Support Costs	Funds Requested (\$)*
1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

F. Other Direct Costs		Funds Requested (\$)*
1. Materials and Supplies		3,690,026.00
2. Publication Costs		0.00
3. Consultant Services		0.00
4. ADP/Computer Services		0.00
5. Subawards/Consortium/Contractual Costs		0.00
6. Equipment or Facility Rental/User Fees		0.00
7. Alterations and Renovations		0.00
8. Other Costs: Immunology & Path Detection Resources, Vet Genetics Lab, Shipping, AALAS Test Fees		232,530.00
Total Other Direct Costs		3,922,556.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	4,160,973.47

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. MTDC	22.7	0.00	940,576.68
Total Indirect Costs			940,576.68
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	5,101,550.15

J. Fee	Funds Requested (\$)*
	0.00

K. Budget Justification*	File Name:
	(Only attach one file.)

RESEARCH & RELATED Budget (F-K) (Funds Requested)

A. COMPONENT COVER PAGE

Project Title: NATIONAL INSTITUTE ON AGING COLONY

Component Project Lead Information:

Redacted by agreement

B. COMPONENT ACCOMPLISHMENTS**B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?**

The National Institute on Aging (NIA) supports research on aged rhesus monkeys at National Primate Research Centers including the California National Primate Research Center (CNPRC). The CNPRC NIA Colony of geriatric rhesus macaques (≥ 19 years) has a current census of 28 animals, and is managed and supported for use by investigators in aging research, an area of increasing prominence and importance. All aged monkeys at the CNPRC, including the NIA Colony, participate in semi-annual assessments by the veterinary staff (e.g., physical examination, clinical pathology) to ensure overall health and to monitor for potential age-related complications. The Colony Management and Research Services staff also tracks eligible animals at 19 years of age in the field corrals for potential use in the NIA Colony. The CNPRC breeding corrals represent an important resource for the recruitment of aged surgery-naïve animals. The history of individual animals (e.g., health history, vaccination records, virology status, housing history, body weights, behavior profile, and pedigree) is maintained in a complete colony database that includes every animal in the colony, supported by the CNPRC Information Technology Services staff. The transition to LabKey electronic health records in the next base grant period will advance both the veterinary care and research use of the aged rhesus macaque colony. The overriding objective of the NIA Colony is to provide rhesus macaques for aging research.

Specific Aim 1. Support and maintain NIA rhesus monkeys for investigators nationwide that are conducting aging-related research. Plan. The goal is to proactively manage the NIA Colony in order to maximize the number of healthy, surgery naïve geriatric rhesus monkeys for aging research. The Primate Services team work closely together with investigators to support translational rhesus macaque models of human aging. Research interest in the aged rhesus macaque model has emerged from all four of the CNPRC research units and represents an excellent example of convergence on areas such as cognition, endocrine function, immune response, metabolism and ocular conditions associated with aging.

Specific Aim 2. Provide high quality expertise and services to investigators at the local, regional, and national levels. Plan. Through established protocols, guidelines, and expertise, the goal is to ensure investigators are provided sufficient healthy, well-characterized aged animals and correlative services and infrastructure to support aging and lifespan health research objectives.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File uploaded: B2 Accomplishments.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

Not Applicable

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

NOTHING TO REPORT

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

NOTHING TO REPORT

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

During the next reporting period we plan to increase the overall aged rhesus colony census by setting aside animals in the recruitment ages 15-18+, to optimize the recruitment pool available for the aging colony.

B.2. What was accomplished under these goals?

The interest in the aging colony has continued to increase over the last year and effort has been focused to expand the characterization of the aged animals. The entire Primate Services team works closely together with investigators to support translational rhesus monkey models of human aging.

The focus in this area is to proactively manage the NIA colony in order to preserve and manage the number of healthy geriatric rhesus monkeys for aging research. This specialized group of aged animals receive semiannual physical exam workups in order to monitor and manage age related health complications. This includes a physical exam and may include clinical pathology diagnostic samples, imaging, and/or expanded workups as deemed important by the veterinary staff. All the animals have had complete health exams including ophthalmology and cardiac exams.

C. COMPONENT PRODUCTS**C.1 PUBLICATIONS**

Not Applicable

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Not Applicable

C.3 TECHNOLOGIES OR TECHNIQUES

NOTHING TO REPORT

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Not Applicable

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Nothing to report

D. COMPONENT PARTICIPANTS

Not Applicable

E. COMPONENT IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

Not Applicable

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

NOTHING TO REPORT

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

Not Applicable

F. COMPONENT CHANGES

F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

NOTHING TO REPORT

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subjects**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. COMPONENT SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS
Not Applicable
G.2 RESPONSIBLE CONDUCT OF RESEARCH
Not Applicable
G.3 MENTOR'S REPORT OR SPONSOR COMMENTS
Not Applicable
G.4 HUMAN SUBJECTS
G.4.a Does the project involve human subjects?
No
G.4.b Inclusion Enrollment Data
Not Applicable
G.4.c ClinicalTrials.gov
Not Applicable
G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT
Not Applicable
G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)
Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?
No
G.7 VERTEBRATE ANIMALS
Not Applicable
G.8 PROJECT/PERFORMANCE SITES
Not Applicable
G.9 FOREIGN COMPONENT
Not Applicable
G.10 ESTIMATED UNOBLIGATED BALANCE
Not Applicable
G.11 PROGRAM INCOME
Not Applicable
G.12 F&A COSTS
Not Applicable

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

A. Senior/Key Person

Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*
1.	Redacted by agreement				Associate Director Primate Services	Institutional Base Salary	EFFORT			5,688.00	2,167.13	7,855.13
Total Funds Requested for all Senior Key Persons in the attached file												
Additional Senior Key Persons:			File Name:								Total Senior/Key Person	7,855.13

B. Other Personnel

Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
	Secretarial/Clerical						
0	Total Number Other Personnel					Total Other Personnel	0.00
Total Salary, Wages and Fringe Benefits (A+B)							7,855.13

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

C. Equipment Description

List items and dollar amount for each item exceeding \$5,000

Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	0.00
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel

Funds Requested (\$)*

1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	0.00
2. Foreign Travel Costs	0.00
Total Travel Cost	0.00

E. Participant/Trainee Support Costs

Funds Requested (\$)*

1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

F. Other Direct Costs		Funds Requested (\$)*
1. Materials and Supplies		101,582.00
2. Publication Costs		0.00
3. Consultant Services		0.00
4. ADP/Computer Services		0.00
5. Subawards/Consortium/Contractual Costs		0.00
6. Equipment or Facility Rental/User Fees		0.00
7. Alterations and Renovations		0.00
Total Other Direct Costs		101,582.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	109,437.13

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. MTDC	22.7	109,437.13	24,842.23
Total Indirect Costs			24,842.23
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	134,279.36

J. Fee	Funds Requested (\$)*
	0.00

K. Budget Justification*	File Name:
	(Only attach one file.)

RESEARCH & RELATED Budget (F-K) (Funds Requested)

A. COMPONENT COVER PAGE

Project Title: PRIMATE MEDICINE SERVICES

Component Project Lead Information:

Redacted by agreement

B. COMPONENT ACCOMPLISHMENTS**B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?**

Primate Medicine is the component within Primate Services tasked with the responsibility for ensuring the physical health and well-being of all members of our nonhuman primate (NHP) colony, offering medical expertise for protocol and procedure development, providing clinical, surgical, and anesthetic support for investigators, and balancing animal welfare with scientific needs. Members of Primate Medicine are represented on the IACUC, Infection Control Committee, Population and Behavioral Health Service committee, Colony Management committees, and several other internal and campus committees. Many of our staff veterinarians are also represented at both the state and national level in a variety of professional organizations and collaborate routinely with veterinarians at other primate centers and other institutions through formal consortium activities. Our extensive involvement both locally and nationally ensures that our facility's practices are comparable to those of other facilities and allows us to continuously refine our practices and help to set high standards for facilities around the world. Primate Medicine provides high quality centralized clinical care, advanced imaging support, skilled anesthesia services, exceptional surgical support, and expertise in protocol development to both onsite and offsite investigators.

Specific Aim 1. Provide high quality care for nonhuman primate at the CNPRC. Our veterinary team (6 ACLAM-boarded veterinarians, 2 veterinary residents, and 14 Animal Health Technicians), aims to provide exceptional clinical care to all animals in the colony. We work collaboratively with one another as well as clinicians from the UCD Veterinary Medicine Teaching Hospital and the UCD Sacramento Medical Center. Medical care starts in utero with routine pregnancy evaluations and continues through geriatric ages with thorough screening to prevent, identify, and treat naturally-occurring diseases throughout the life span. Primate Medicine provides all investigators working at the CNPRC with state of the art veterinary care and research support. During the next funding period this service will expand with the transition to LabKey providing both the veterinary staff and investigators with a powerful tool to advance both veterinary care and research.

Specific Aim 2. Support research through the application of clinical and surgical expertise while balancing the need for regulatory compliance and animal welfare. The veterinary team will continue to converge with investigators to develop and refine NHP-based research models. Our role in scientific support begins with initial protocol development and continues through project end point. We provide intellectual contribution and work collaboratively with investigative staff across disciplines to refine projects as they proceed to optimize results, minimize animal distress, and ensure compliance.

Specific Aim 3. Mentor and train the next generation of nonhuman primate veterinarians. Primate Medicine staff is devoted to ensuring the continuation of our field through the provision of education and opportunities to veterinary students and residents on an ongoing basis. All of our veterinary staff participate in the educational effort and work to support our ACLAM residency program, externships for veterinary students and residents, and a veterinary student employment program offering paid support positions to select veterinary students.

Specific Aim 4. Provide oversight to ensure the highest standards of responsible conduct of research, regulatory compliance, and animal welfare. The centralized program of veterinary services allows Primate Medicine staff to ensure proper conduct of research at all levels. Our direct oversight of procedures ensures that animal welfare is a top priority at all times. We also have direct interaction with animal care staff, behavior staff, and research support staff on a daily basis to provide feedback from everything from basic feeding practices to cooperative training for specific procedures. Our veterinary team reviews all protocols, reviews and edits Standard Operating Procedures (SOPS), develops internal guidelines and policies, and works closely with all staff to ensure compliance and training of staff.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File uploaded: B2 Accomplishments.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

Not Applicable

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

File uploaded: B.4. What opportunities for training and professional development has the project provided.pdf.pdf

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

The Primate Medicine Service shares its expertise by variety of means.

1. We routinely attend and present at national and international meetings such as SVAALAS, APV, AALAS, EPV, BCMC, and ACLAM.
2. Our staff participate as Board and committee members for the Association of Primate Veterinarians and play important roles in the development of national policy and position statements.
3. Primate Medicine routinely participates in the NPPRC Consortium and attends face to face meetings or webinars. This includes the Breeding Colony Management Consortium, Virtual Grand Rounds Training and Clinical and Surgical Techniques.
4. The Primate Medicine veterinary staff serve as instructors in three different courses in the UC Davis School of Veterinary Medicine.

5. Primate Medicine employs veterinary students as assistants in our clinical care program.
6. Primate Medicine clinicians are often invited speakers for various community groups, clubs and school groups.
7. Primate Medicine also contributes to the published literature.
8. Primate Medicine also routinely attends management meetings and meetings with the Core Scientists.

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

Primate Medicine staff will continue to:

- Provide high quality care for nonhuman primates at the CNPRC
- Provide expert research support to local and national investigators conducting research at the CNPRC
- Mentor and train the next generation of veterinarians in medical primatology and laboratory animal medicine
- Ensure the highest standards of responsible conduct of animal care and research

B.2. What was accomplished under these goals?

1. Evaluation and implementation of changes in wound closure technique: the results are less bandaging, less sedations, less tech time, and shorter hospital stay
2. Creation of stand for oral rehydration therapy bottles, so that animals can drink what they choose when on the restraint board
3. New diarrhea algorithm and use of probiotic sandwiches: decreased hospital stay, decreased cost, decreased number of animals sent to necropsy, increased time between hospitalizations
4. Discontinuation of stool sample collection for diarrhea cases in the hospitals
5. Collaboration with Oregon National Primate Research Center in *Campylobacter* vaccine study: if successful will decrease hospital diarrhea admissions
6. Acquisition of compounded metronidazole from compounding pharmacy for animal treatment
7. Acquisition and study of Simbadol for improved animal analgesia: 1/6 the number of treatments required, which can be given at the time of sedation
8. Implementation of use of the antibiotic CCFA for epistaxis cases: reduces number of treatments required
9. Conducting an azotemia study, ongoing: already increased IV bolus and SQ fluid volume; giving larger bolus (30ml/kg) over 30 minutes also saves time and supplies, while keeping animals from being restrained for 3 hours
10. Administration of potassium via oral gastric tube in addition to SQ reduces the need to administer 3hr of IV fluids
11. Change in technique of ultrasound procedures so that only one individual is needed for sample collection (amniotic fluid, liver biopsies) – obtaining the new ultrasound also made a difference in ease of collection!
12. Change in vasectomy procedure: no longer requires full anesthesia and has significantly decreased complications in patients
13. Creation of new algorithms (as well as continually updating algorithms) to increase technician (and outdoor tech) independence: corneal ulcers, epistaxis, wound repair
14. Creation of relocation group with animal care and behavior management: biweekly meetings cut down on time spent emailing all interested parties, and makes documenting outcomes in records easier, more efficient, and more visible in the records
15. Discontinuation of rectal cultures for animals moving indoors (particularly when transition rooms are available)
16. Decreased number of days per week full SOAPs are required for hospitalized animal records
17. Creation of fluid guidelines: allows for supplies to be kept longer, less waste
18. Discontinuation of cultures for suspect *Shigella* gingivitis cases
19. Change in supplements offered: switch from boost bars to fig bar/peanuts – less cost and much less time
20. Increased awareness of when ORT is offered to animals (discontinuing after 3d normal stool): less supply cost and much less labor
21. Use of cameras to monitor animals receiving IV fluids – allows for more efficient use of time when animals are located in separate rooms
22. Acquisition of a Primate Medicine transport vehicle
23. Discontinuation of automatically giving antibiotic for digit/tail amputations
24. New NOVA. No explanation needed. ☐
25. Discontinuation of routine geriatric ophthalmic exams
26. Dermoscent treatment for dermatitis: once a week topical treatment instead of daily fatty acid and vitamin treatment

B.4. What opportunities for training and professional development has the project provided?

During the past year the Primate Medicine staff has trained 20 senior veterinary students (a total of 28 weeks with an average 2 weeks/rotation). The Primate Medicine Service has also trained seven residents: We continuously mentor and train our Laboratory Animal Residents with a focus in nonhuman primates.

C. COMPONENT PRODUCTS

C.1 PUBLICATIONS

Not Applicable

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Not Applicable

C.3 TECHNOLOGIES OR TECHNIQUES

NOTHING TO REPORT

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Not Applicable

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Category	Explanation
Other	https://cnprc.ucdavis.edu/primate-medicine/ Primate Medicine provides high quality centralized clinical care, research support, training, and veterinary oversight to ensure compliance with optimized standards of research conduct and animal care.

D. COMPONENT PARTICIPANTS

Not Applicable

E. COMPONENT IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

Not Applicable

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

NOTHING TO REPORT

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

Not Applicable

F. COMPONENT CHANGES

F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

NOTHING TO REPORT

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subjects**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. COMPONENT SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS

Not Applicable

G.2 RESPONSIBLE CONDUCT OF RESEARCH

Not Applicable

G.3 MENTOR'S REPORT OR SPONSOR COMMENTS

Not Applicable

G.4 HUMAN SUBJECTS**G.4.a Does the project involve human subjects?**

No

G.4.b Inclusion Enrollment Data

Not Applicable

G.4.c ClinicalTrials.gov

Not Applicable

G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT

Not Applicable

G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)

Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?

No

G.7 VERTEBRATE ANIMALS

Not Applicable

G.8 PROJECT/PERFORMANCE SITES

Not Applicable

G.9 FOREIGN COMPONENT

Not Applicable

G.10 ESTIMATED UNOBLIGATED BALANCE

Not Applicable

G.11 PROGRAM INCOME

Not Applicable

G.12 F&A COSTS

Not Applicable

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

A. Senior/Key Person

Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*
1.	Redacted by agreement				Associate Director Primate Services	Institutional Base Salary	EFFORT			3,792.00	1,444.75	5,236.75
2.					Assistant Director Primate Services					11,376.00	4,334.26	15,710.26
3.					Senior Veterinarian					33,604.40	12,803.28	46,407.68
4.					Senior Veterinarian					12,303.00	4,687.44	16,990.44
5.					Senior Veterinarian					12,458.20	4,746.57	17,204.77
6.					Senior Veterinarian					11,513.40	4,386.61	15,900.01
7.	(TBN)		(TBN)		Senior Veterinarian		0.36			4,284.78	1,632.50	5,917.28
Total Funds Requested for all Senior Key Persons in the attached file												
Additional Senior Key Persons:			File Name:						Total Senior/Key Person			123,367.19

B. Other Personnel

Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
3	Post Doctoral Associates	24.12			90,116.34	34,334.33	124,450.67
	Graduate Students						
	Undergraduate Students						
	Secretarial/Clerical						
2	Technical Support/Assoc Veterinarian	4.2			54,065.70	20,599.03	74,664.73
5	Total Number Other Personnel					Total Other Personnel	199,115.40
Total Salary, Wages and Fringe Benefits (A+B)							322,482.59

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

C. Equipment Description

List items and dollar amount for each item exceeding \$5,000

Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	0.00
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel

Funds Requested (\$)*

1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	15,520.00
2. Foreign Travel Costs	0.00
Total Travel Cost	15,520.00

E. Participant/Trainee Support Costs

Funds Requested (\$)*

1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

F. Other Direct Costs		Funds Requested (\$)*
1. Materials and Supplies		22,310.00
2. Publication Costs		970.00
3. Consultant Services		0.00
4. ADP/Computer Services		0.00
5. Subawards/Consortium/Contractual Costs		0.00
6. Equipment or Facility Rental/User Fees		0.00
7. Alterations and Renovations		0.00
Total Other Direct Costs		23,280.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	361,282.59

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. MTDC	22.7	361,282.59	82,011.15
Total Indirect Costs			82,011.15
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	443,293.74

J. Fee	Funds Requested (\$)*
	0.00

K. Budget Justification*	File Name:
	(Only attach one file.)

RESEARCH & RELATED Budget (F-K) (Funds Requested)

A. COMPONENT COVER PAGE

Project Title: ANATOMIC AND CLINICAL PATHOLOGY SERVICES

Component Project Lead Information:

Redacted by agreement

B. COMPONENT ACCOMPLISHMENTS**B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?**

Anatomic and Clinical Pathology Services is dedicated to supporting convergent multidisciplinary research that optimizes the development and use of nonhuman primate (NHP) models of human health and disease. Our staff provides extensive expertise in clinical, gross, and microscopic diagnostic pathology to promote colony health and disease surveillance to ensure that high quality animals are available for biomedical research, and to provide research support for projects requiring pathology expertise. Pathology is closely aligned with the overall CNPRC goals for the next funding period, which are reflected in the following Specific Aims.

Specific Aim 1. Provide pathology expertise for state-of-art research and scientifically contribute to the understanding and treatment of human disease with NHP models. Plan. Pathology Services support convergent research by providing anatomic and clinical pathology expertise to all investigators utilizing the CNPRC. Pathologists with strong comparative pathology backgrounds and PhD training are ideally positioned to work effectively at the interface of animal models and their translation to human disease and assist with integration and interpretation of data across disciplines which is critical to promote convergent research. Currently within these services, there is additional expertise in gastrointestinal disease, ocular pathology, dermatopathology, respiratory pathology, stereology, and naturally occurring infectious disease.

Specific Aim 2. Provide exceptional nonhuman primate resources and pathology services to investigators at the regional and national levels to advance NIH-supported research excellence. Plan. The primary goal is to facilitate research and ensure a supportive environment for investigators by providing pathology expertise in study design and evaluation of animals on experimental protocols. High quality technical support can facilitate extensive or specialized tissue collection and handling techniques including specific organ perfusion for fixation, or immediate antemortem collection of tissues needed for in vitro studies. The Clinical Pathology Laboratory provides a wide range of clinical laboratory assays to both intramural and extramural investigators. Additionally, the Biological Specimen Request Program distributes tissues collected at necropsy from colony animals to local and national investigators requesting specific biological samples, and the Service maintains repositories of fixed NHP tissues and a serum bank. These resources will become increasingly important for population and genetic studies.

Specific Aim 3. Mentor and train the next generation of NHP pathologists and translational investigators. Plan. A central mission is to mentor and train pathologists early in their careers to become strong comparative pathologists with an emphasis in nonhuman primate pathology.

Specific Aim 4. Maintain the production of high quality, healthy animals for research. Plan. The CNPRC will continue to deliver high quality pathology services by performing post-mortem examinations and clinical pathology testing. As a result, the Pathology Service, in close cooperation with Primate Medicine, provides surveillance for infectious diseases and other conditions having a deleterious effect on colony health, epidemiological data on the incidence and prevalence of disease, and most importantly, early recognition of potential spontaneous animal models of human diseases.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File uploaded: B2 Accomplishments.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

Not Applicable

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

File uploaded: B.4. What opportunities for training and professional development has the project provided.pdf.pdf

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

Through regular rounds at the CNPRC with clinical veterinary staff and on a national level through monthly interaction with the National Primate Centers Pathology Consortium Group.

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

We will continue to provide outstanding pathology services to support experimental pathology and colony health and continue to train the next generation of laboratory animal pathologists.

B.2. What was accomplished under these goals?

Provide pathology expertise for state-of-art research and scientifically contribute to the understanding and treatment of human disease with nonhuman primate models,

We have performed 302 experimental necropsies this past year and have provided pathology expertise for a wide range of projects. The following list highlights the major areas of research where we have provided the most extensive pathology services this past year. 1) Infectious disease (Zika virus, Chikungunya virus and SIV infections) 2) Neurobiology projects spanning the ageing brain to spinal cord regenerative medicine 3) Pregnancy, preterm abortion and neonatal medicine. 4) Metabolic disease. Additionally, the pathology technical team has provided specialized technical support for projects involving brain perfusions and specialized brain sectioning as well as projects involving detailed processing of fetal and placental tissues.

Provide exceptional nonhuman primate resources and pathology services to investigators at the regional and national levels to advance NIH-supported research excellence,

We have distributed 2223 biospecimens to 35 investigators, the majority of whom were from the CNPRC or UC system although there were 6 other outside investigators. Furthermore, a number of the projects we support are run by offsite investigators (e.g. Redacted by agreement Cincinnati Children's Hospital). Closely coordinating with our research services unit, we provide pathology expertise for such projects.

Maintain the production of high quality, healthy animals for research.

We have performed 366 necropsies to support colony health as well as provide biopsy (approx. 50) and cytology (approx. 70) services to aid in clinical diagnosis and treatment of animals requiring medical attention. By performing necropsies on all animals that die or are culled from the colony we are continually monitoring the colony for disease outbreaks or emerging health problems.

B.4. What opportunities for training and professional development has the project provided?

We have trained 1 laboratory animal resident [Redacted by agreement] and 2 laboratory animal medicine residents [Redacted by agreement] and [Redacted by agreement] and have also contributed to training of other pathology residents in laboratory animal pathology through participation in biopsy rounds, gross primate pathology seminars and laboratory animal rounds at the UC Davis School of Veterinary Medicine.

C. COMPONENT PRODUCTS

C.1 PUBLICATIONS

Not Applicable

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Not Applicable

C.3 TECHNOLOGIES OR TECHNIQUES

NOTHING TO REPORT

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Not Applicable

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Category	Explanation
Other	https://cnprc.ucdavis.edu/pathology/ Anatomic and Clinical Pathology Services home and history, including publications.

D. COMPONENT PARTICIPANTS

Not Applicable

E. COMPONENT IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

Not Applicable

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

NOTHING TO REPORT

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

Not Applicable

F. COMPONENT CHANGES

F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

NOTHING TO REPORT

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subjects**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. COMPONENT SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS
Not Applicable
G.2 RESPONSIBLE CONDUCT OF RESEARCH
Not Applicable
G.3 MENTOR'S REPORT OR SPONSOR COMMENTS
Not Applicable
G.4 HUMAN SUBJECTS
G.4.a Does the project involve human subjects?
No
G.4.b Inclusion Enrollment Data
Not Applicable
G.4.c ClinicalTrials.gov
Not Applicable
G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT
Not Applicable
G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)
Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?
No
G.7 VERTEBRATE ANIMALS
Not Applicable
G.8 PROJECT/PERFORMANCE SITES
Not Applicable
G.9 FOREIGN COMPONENT
Not Applicable
G.10 ESTIMATED UNOBLIGATED BALANCE
Not Applicable
G.11 PROGRAM INCOME
Not Applicable
G.12 F&A COSTS
Not Applicable

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

A. Senior/Key Person

Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*
1.	Redacted by agreement				Associate Director Primate Services	Institutional Base Salary	EFFORT			3,792.00	1,444.75	5,236.75
2.					Pathology Senior Manager					63,742.80	24,286.01	88,028.81
3.					Senior Veterinary Pathology					17,979.00	6,850.00	24,829.00
4.					Veterinary Pathology					14,167.95	5,397.99	19,565.94
5.	(TBN)		(TBN)		Senior Veterinary Pathology		1.8			16,073.48	6,123.99	22,197.47
Total Funds Requested for all Senior Key Persons in the attached file												
Additional Senior Key Persons: File Name:											Total Senior/Key Person	159,857.97

B. Other Personnel

Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
3	Post Doctoral Associates	12.24			48,563.22	18,502.59	67,065.81
	Graduate Students						
	Undergraduate Students						
	Secretarial/Clerical						
4	Technical Support	4.8			31,651.99	16,237.47	47,889.46
7	Total Number Other Personnel					Total Other Personnel	114,955.27
Total Salary, Wages and Fringe Benefits (A+B)							274,813.24

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

C. Equipment Description

List items and dollar amount for each item exceeding \$5,000

Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	0.00
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel

Funds Requested (\$)*

1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	7,760.00
2. Foreign Travel Costs	0.00
Total Travel Cost	7,760.00

E. Participant/Trainee Support Costs

Funds Requested (\$)*

1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

F. Other Direct Costs		Funds Requested (\$)*
1. Materials and Supplies		9,700.00
2. Publication Costs		970.00
3. Consultant Services		0.00
4. ADP/Computer Services		19,400.00
5. Subawards/Consortium/Contractual Costs		0.00
6. Equipment or Facility Rental/User Fees		0.00
7. Alterations and Renovations		0.00
8. Other: Shipping		485.00
Total Other Direct Costs		30,555.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	313,128.24

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. MTDC	22.7	313,128.24	71,080.11
Total Indirect Costs			71,080.11
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	384,208.35

J. Fee	Funds Requested (\$)*
	0.00

K. Budget Justification*	File Name:
	(Only attach one file.)

RESEARCH & RELATED Budget (F-K) (Funds Requested)

A. COMPONENT COVER PAGE

Project Title: POPULATION AND BEHAVIORAL HEALTH SERVICES

Component Project Lead Information:

Redacted by agreement

B. COMPONENT ACCOMPLISHMENTS**B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?**

Population and Behavioral Health Services monitors the populations and implements the Psychological Well Being Program Enrichment Program with Colony Management and Research Services. The purpose of this component is to: (1) behaviorally monitor and socially manage the outdoor colonies using network-based approaches, (2) systematically monitor and manage the indoor colonies of monkeys for behavioral problems, (3) evaluate the efficacy of current and new social and environmental enrichment, (4) develop proactive strategies to reduce the development of behavioral problems, (5) monitor the discharge of animals from the hospital to outdoor colonies to ensure physical and social safety, and (6) lead a cooperative training program that emphasizes the use of positive reinforcement techniques for colony management purposes and constructive human-animal interactions. Each of these areas of emphasis is designed to proactively prevent both physical and behavioral problems.

Specific Aim 1. Provide state-of-the-art behavioral management techniques to promote research and scientifically contribute to the understanding and treatment of human disease with NHP models across the age spectrum. PBHS is dedicated to the development of new and innovative strategies for socialization, training, monitoring and enrichment which helps to provide to the researchers here at the CNPRC with a better research model. Over the next few years, PBHS is looking forward to implementing a number of new strategies in the areas of indoor housing, enrichment, positive reinforcement training, and social group management. Socialization of animals in the indoor colony has always been a priority for PBHS.

Specific Aim 2. Provide exceptional NHP behavioral and behavioral management expertise and services to investigators at the local, regional, and national levels to advance NIH-supported research excellence. PBHS has a wealth of knowledge on Rhesus macaque (*Macaca mulata*) natural history as well as an in depth knowledge of behaviors they exhibit in captivity. This knowledge base allows PBHS staff to educate investigators on both individual animal behavioral profiles as well as group social dynamics and cage histories for all of the outdoor enclosures. As additional scientists are recruited, the number and the variety of research taking place changes, PBHS is in a unique position to help facilitate different study paradigms.

Specific Aim 3. Mentor and train the next generation of translational investigators with NHP behavioral expertise. Population and Behavioral Health Services has participated in the Behavioral Management Consortium (BMC) which helps facilitate behavioral training for anyone working with non-human primates. During the past few years, PBHS has collaborated with the BMC to create standardized terminology for pair introductions, abnormal behaviors and SIB. PBHS staff participated in the BMC/BCMC face to face meeting which helped share and educate members of the Breeding Management Consortium on different aspects of behavioral management. Over the next few years, PBHS will continue to work with the BMC to facilitate further educational material such as NPRC webinars, standardized alopecia recording and standardized social group management strategies.

Specific Aim 4. Ensure the highest standards of responsible conduct of research and animal care. PBHS staff strives to help the CNPRC create the best animal models for research by ensuring the mental health and well-being of the animals. Through behavioral monitoring, socialization indoors and out, and environmental enrichment we work to provide the animals at our facility the most stimulating and species typical environment possible. PBHS staff is continually striving to provide complex and engaging environmental enrichment to the animals at this facility.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File uploaded: B2 Accomplishments.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

Not Applicable

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

File uploaded: B.4. What opportunities for training and professional development has the project provided.pdf

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

1. Head of PBHS is a member of several local, national and international committees and working groups (see above).
2. Head of PBHS provides a report detailed to the IACUC regarding the service's activities for the reported period (i.e. twice a year).
3. PBHS holds a monthly meeting with the Associate Director for Primate Services, Primate Medicine, Colony Management and Research Services, in which details regarding behavioral management activities over the past month are described.
4. Head of PBHS presents studies conducted by PBHS at professional conferences and publishes the findings in leading scientific journals.

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

1. Continue to utilize the plans, procedures that have been developed and incorporated over the past year.

- 2.Enhance the use of the new and improved comprehensive database that we have created in-house.
- 3.Augment the indoor environment by purchasing a large number of hanging toys.

B.2. What was accomplished under these goals?

1. Proportion of animals housed indoors in continuous full contact increased from 48.5% in January 2018 to 61.3% in December 2018.
2. Number of animals housed indoors in continuous full contact increased from 579 in January 2018 to 823 in December 2018.
3. Approximately 250 animals that were housed in intermittent full contact were transitioned to continuous full contact with 93% success rate (an addition of approximately 133 hrs. of full social contact per animal per week).
4. In January 2018, 21.6% of the indoor colony was housed in intermittent full contact. We were able to dramatically decrease the proportion of intermittently paired animals to 0.9% of the indoor colony in December 2018.
5. We established routine rounds aimed at assessing behavioral compatibility of established indoor pairs and trios. These rounds are done together with animal care staff who are familiar with the animals, and serves as a unique platform for fruitful discussions involving the animals' welfare.
6. We began housing animals in continuous full contact while in quarantine. During 2018 we have introduced 26 animals in quarantine.
7. We have fostered 14 infants successfully, obviating the need for nursery rearing for colony management purposes.
8. We have initiated routine reviews of social trauma of both indoor and outdoor animals in order to identify potential triggers, risk factors and trends. These sessions enable us to refine our procedures with the goal of reducing rates of trauma.
9. A new plan to address animals that exhibit behavioral signs of psychological distress has been launched in collaboration with Primate Medicine, Research Services, Colony Management, Research Advisory Committee and the Core Scientists. The plan addresses more categories of behavioral abnormalities, provides additional treatment options, incorporates systemic collection of data and strengthen the communication with our partners.
10. PBHS and Primate Medicine meet on bi-weekly basis to review cases of particular interest of animals noted for abnormal behavior. Primary investigators whose animals are discussed are invited to participate as well. This meeting is additionally being used to identify potential animals for short term terminal studies.
11. We trained animal care staff to identify behavioral indicators of psychological distress and incorporated their observations into the Morning Health reporting system.
12. We have added dozens of feeders to indoor cages in order to stimulate exploratory behavior.
13. Following feedback from care staff and cage wash crew we changed the enviro-dri bedding which has been given as destructible enrichment to soluble paper, which is used as a destructible enrichment item. Browse and rice noodles were added to the list of destructible enrichment items that we provide the animals.
14. We have designed and manufactured new enrichment items for the indoor colony (bar slider, hanging toys).
15. We have incorporated destructible enrichment items such as browse, enviro-dri bedding and rice noodles.
16. PBHS promotes close and effective communication between all arms of Primate Services. As part of this approach, we meet routinely to discuss various topics relating to the welfare of the CNPRC colony. These include: bi-weekly meetings with Primate Medicine and Research Services regarding animals exhibiting behavioral signs of psychological distress, relocation meetings in which Primate Medicine, Colony Management, Research Services and PIs discuss specific cases of outdoor animals, Titi Colony Management meetings (see below), monthly reviews of behavioral management activities with the Associate Director of Primate Services and representatives from additional

services. In addition, PBHS takes an active role in Primate Services meetings and North Colony Management meetings. Finally, PBHS reviews each outdoor enclosure on weekly basis produce a report and share it with the North Colony Management team.

17. PBHS is heavily invested in providing research support to several groups both at the center and outside. Our services to researches vary from study design consultation, animal selection, social introductions and compatibility monitoring, providing social hierarchies' data, monitoring of social reintroductions, room configuration and training. Finally, the PBHS manager is a member of the Vet Review Committee, and serves on advisory committees of two Primary Investigators at the center. In total, we have been involved in over 20 different research projects in various capacities. PBHS played a central role in the identification of visually impaired animals and in the development of the recently approved \$6.5M grant. Head of PBHS has been working closely with several PIs on study designs and means to enhance the welfare of animals assigned to particular studies (e.g., training techniques and increasing pair tenure). Finally, PBHS has been involved in animal selection for shipments, in particular in cases when specific behavioral traits were requested by the purchasing facility.
18. PBHS has been actively participating in social introductions and monitoring of the titi colony animals. In addition, several pairs have been trained on cooperative feeding to facilitate social interactions. Head of PBHS has been involved in the planning and design of several studies involving titi monkeys. In addition, we take an active role in the titi colony management meetings.
19. PBHS members meet on monthly basis to review relevant publications as part of our service's strive to stay up-to-date with the latest findings and innovations. A different member is responsible for presenting a peer-reviewed paper at each meeting.
20. PBHS strives to be a national and international leader in behavioral management. As such, the head of PBHS is a member of the NPRCs Behavioral Management Consortium, chairs the Anxiety/Inhibition New Model development NPRC group, acts as an active member of the American Society of Primatologists Primate Care Committee, serves as a representative in STAR (Supporting Truth about Animal Research: A Coalition of Scientific Societies is an alliance of eight scientific organizations that are invested in supporting and promulgating ethically sound and scientifically valid research with nonhuman animals), and a member of the UK Animals in Science Committee (a non-governmental public body sponsored by the UK Home Office which advises the Secretary of State on all matters concerning the use of animals in scientific procedures). In addition, PBHS supervisor Redacted by agreement is a member of the NPRCs Breeding Colony Management Consortium. Finally, PBHS staff members take a leadership role in the NPRCs tech forum.

B.4. What opportunities for training and professional development has the project provided?

1. PBHS holds monthly journal clubs in which members of the service present scientific peer-reviewed articles, critically examine them and guide a discussion on the topic.
2. PBHS provides training for every new employee at the CNPRC who is going to work with the animals. This training consists of five separate modules including subjects like NHP behavior, environmental enrichment, positive reinforcement training, social housing of NHP, abnormal behaviors and additional indicators of reduced welfare and behavioral management of outdoor groups.
3. PBHS provides a 'training-to-train' course to individuals who show interest in the subject and/or who are planning to incorporate training into their study design.

C. COMPONENT PRODUCTS**C.1 PUBLICATIONS**

Not Applicable

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Not Applicable

C.3 TECHNOLOGIES OR TECHNIQUES

NOTHING TO REPORT

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Not Applicable

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Nothing to report

D. COMPONENT PARTICIPANTS

Not Applicable

E. COMPONENT IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

Not Applicable

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

NOTHING TO REPORT

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

Not Applicable

F. COMPONENT CHANGES

F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

NOTHING TO REPORT

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subjects**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. COMPONENT SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS
Not Applicable
G.2 RESPONSIBLE CONDUCT OF RESEARCH
Not Applicable
G.3 MENTOR'S REPORT OR SPONSOR COMMENTS
Not Applicable
G.4 HUMAN SUBJECTS
G.4.a Does the project involve human subjects?
No
G.4.b Inclusion Enrollment Data
Not Applicable
G.4.c ClinicalTrials.gov
Not Applicable
G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT
Not Applicable
G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)
Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?
No
G.7 VERTEBRATE ANIMALS
Not Applicable
G.8 PROJECT/PERFORMANCE SITES
Not Applicable
G.9 FOREIGN COMPONENT
Not Applicable
G.10 ESTIMATED UNOBLIGATED BALANCE
Not Applicable
G.11 PROGRAM INCOME
Not Applicable
G.12 F&A COSTS
Not Applicable

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

A. Senior/Key Person

Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*
1.	Redacted by agreement				Associate Director Primate Services	Institutional Base Salary	EFFORT			3,792.00	1,444.75	5,236.75
Total Funds Requested for all Senior Key Persons in the attached file												
Additional Senior Key Persons:			File Name:								Total Senior/Key Person	5,236.75

B. Other Personnel

Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
	Secretarial/Clerical						
1	Technical Support	6.0			56,402.50	28,934.48	85,336.98
1	Total Number Other Personnel					Total Other Personnel	85,336.98
Total Salary, Wages and Fringe Benefits (A+B)							90,573.73

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

C. Equipment Description

List items and dollar amount for each item exceeding \$5,000

Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	0.00
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel

Funds Requested (\$)*

1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	0.00
2. Foreign Travel Costs	0.00
Total Travel Cost	0.00

E. Participant/Trainee Support Costs

Funds Requested (\$)*

1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

F. Other Direct Costs		Funds Requested (\$)*
1. Materials and Supplies		27,160.00
2. Publication Costs		0.00
3. Consultant Services		0.00
4. ADP/Computer Services		0.00
5. Subawards/Consortium/Contractual Costs		0.00
6. Equipment or Facility Rental/User Fees		0.00
7. Alterations and Renovations		0.00
Total Other Direct Costs		27,160.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	117,733.73

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. MTDC	22.7	117,733.73	26,725.56
Total Indirect Costs			26,725.56
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	144,459.29

J. Fee	Funds Requested (\$)*
	0.00

K. Budget Justification*	File Name:
	(Only attach one file.)

RESEARCH & RELATED Budget (F-K) (Funds Requested)

A. COMPONENT COVER PAGE

Project Title: GENETICS MANAGEMENT SERVICES

Component Project Lead Information:

Redacted by agreement

B. COMPONENT ACCOMPLISHMENTS**B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?**

Genetic Management Services (GMS) contributes to the California National Primate Research Center (CNPRC) Mission by providing genetic, genomic and bioinformatic analyses, as well as archiving and supplying biological samples including purified DNA. The convergence of genetic and genomic research initiatives within the GMS in conjunction with the approaches implemented by the other units at the CNPRC fosters a better understanding of relevant human disease processes based on the use of the rhesus macaques and titi monkeys as non-human primate (NHP) models.

Specific Aim 1. Oversee Genetic Management of Animal Colony Genetic management is essential for the production of genetically characterized animals for research and for the conservation of their genetic diversity. Retention of genetic diversity among the colony animals ensures each animal's value in terms of maintaining its biomedical potential and also guarantees the entire colony's long term survivability and productivity. Resolution on parentage is central to the construction of multigenerational pedigrees, which in conjunction with a panel of informative markers, are vital for successful genetic management for the planning of breeding programs. Pedigree information is also critical to all units at the CNPRC which rely on pedigree information for designing of research protocols and data analyses.

Specific Aim 2. Manage the CNPRC's DNA Bank GMS banks whole blood samples from the rhesus macaque and titi monkey colony animals for analyses and use in a variety of research protocols. DNA and other biological samples from this repository are made available to researchers both on- and off campus. The LabKey-enabled environment for large-scale sample and data tracking and acquisition system is currently being implemented. This automated system will make the organization of samples more efficient and access to these samples more streamlined. In addition, the CNPRC's biobank is part of the National NHP DNA Bank network to standardize resources across centers and we will continue to expand the inventory of biological samples in the CNPRC repository to eventually include samples from all colony animals.

Specific Aim 3. Provide Continued Research Resources and Expertise We will continue to work with the Genetics and Genomics Working Group (GGWG) to transition from our genetic management (GM) short tandem repeat (STR) panel to the GM and Ancestry Informative (AIMs) Single Nucleotide Polymorphism (SNPs) panels. As we begin the replacement of the current STR database at the CNPRC with the Fluidigm SNP database, we will continue to evaluate the effectiveness of SNPs against STRs by genotyping all newborns and breeding age adults on both these markers and comparing parentage and ancestry analyses based on their genotypes over the five-year period of the grant. Based on these evaluations, we will continue to make improvements to the Fluidigm SNP panels for greater accuracy in parentage and ancestry testing. We will identify disease associated SNPs or phenotype informative SNPs discovery efforts and use these markers to accelerate candidate gene discovery and disease association studies. We will also assist in the development of the GGWG web portal-based information system with improved database structures and metrics for management of genetic information of the colony. The GMS will provide support and consultation to the CNPRC Core and Affiliate Scientists to help develop new NHP models which will facilitate the genetic analyses of human diseases such as hypertrophic cardiomyopathy (HCM). These services will include consultation on colony pedigrees and provenance of NHPs in the colony as well as specific information about the identification of potential heritable disorders.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File uploaded: B2 Accomplishments.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

Not Applicable

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

NOTHING TO REPORT

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

We have communicated our findings through meetings of the Genetic and Genomics Working Group as part of the NPRC Consortium and also through the Breeding Colony Management Consortium. We also present at the American Society of Primatology and the International Primatological Society.

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?**Genetic Analysis**

Prior to transitioning from STRs to SNPs, we compared the effectiveness of STRs with that of SNPs to differentiate the ancestry of macaques (Day et al. 2018). Genetic diversity indices such as allele numbers and expected heterozygosity based on SNP were lower and exhibited lower standard errors than those provided by STR, probably because, unlike STR, most SNP are biallelic and consequently exhibit maximal expected heterozygosity values of 0.50. However, the standard error of estimates of observed heterozygosity based on

SNP was higher than that for STR, perhaps reflecting sampling errors. Only 27 SNP were required to match the resolving power of 17 STR to detect population structure, that is, 1.6 SNP:1 STR. The results suggest that SNPs are poised to become as valuable as STRs for understanding and detecting genetic structure among macaque populations. These results are in line with the findings of Kanthaswamy et al. (2018) where SNP profiles from 3,266 rhesus macaques at the TNPRC colony genetic composition over time and across conventional or SPF animals of Chinese and Indian ancestry. Chinese origin animals were observed to have the least genetically diverse and the most inbred; however, since their derivation from their conventional forbearers, neither the Chinese nor the Indian SPF animals exhibit any significant loss of genetic diversity or differentiation. The TNPRC colony managers have successfully minimized loss in genetic variation across generations. Although founder effects and bottlenecks among the Indian animals have been successfully curtailed, the Chinese subpopulation still shows some influences from these events. Both these studies show that SNPs can be used in lieu of microsatellites to estimate the genetic ancestry of study animals and assess the effectiveness of colony genetic management. However, we are still in the process of evaluating these SNP for parentage testing at the CNPRC. We are in the final stages of implementing a plan for validating the SNP panels for parentage testing which will be conducted at ASU and Genome Center at UC Davis. Results from this phase will also be published in a peer review journal.

B.2. What was accomplished under these goals?

Pedigree records were established for rhesus monkeys born at CNPRC in 2017-2018 through routine parentage testing done at the Veterinary Genetics Laboratory (VGL). Parentage assignment was performed with a panel of 29 microsatellite markers. MHC characterization based on sequence-specific typing by PCR for *Mamu-A*01*, *-A*08* and *-B*01* alleles and 15 microsatellites that span the MHC region was performed in all samples. Genotypes for all markers and pedigree data were electronically transferred to CNPRC as analyses were completed. DNA sequencing for exon 2 of class II *DPB*, *DQA* and *DQB* genes is ongoing for the animals assigned to the SPF program, and parents which had not previously been sequenced. The MHC microsatellite panel developed under this project continues to be used by other NIH-sponsored projects while work is ongoing to develop the SNP analysis.

C. COMPONENT PRODUCTS

C.1 PUBLICATIONS

Not Applicable

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Not Applicable

C.3 TECHNOLOGIES OR TECHNIQUES

NOTHING TO REPORT

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Not Applicable

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Category	Explanation
Other	https://cnprc.ucdavis.edu/genetics/ Genetic Management Services home, history, and history.

D. COMPONENT PARTICIPANTS

Not Applicable

E. COMPONENT IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

Not Applicable

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

NOTHING TO REPORT

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

Not Applicable

F. COMPONENT CHANGES

F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

NOTHING TO REPORT

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subjects**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. COMPONENT SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS
Not Applicable
G.2 RESPONSIBLE CONDUCT OF RESEARCH
Not Applicable
G.3 MENTOR'S REPORT OR SPONSOR COMMENTS
Not Applicable
G.4 HUMAN SUBJECTS
G.4.a Does the project involve human subjects?
No
G.4.b Inclusion Enrollment Data
Not Applicable
G.4.c ClinicalTrials.gov
Not Applicable
G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT
Not Applicable
G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)
Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?
No
G.7 VERTEBRATE ANIMALS
Not Applicable
G.8 PROJECT/PERFORMANCE SITES
Not Applicable
G.9 FOREIGN COMPONENT
Not Applicable
G.10 ESTIMATED UNOBLIGATED BALANCE
Not Applicable
G.11 PROGRAM INCOME
Not Applicable
G.12 F&A COSTS
Not Applicable

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

A. Senior/Key Person

Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*
1.	Redacted by agreement					Associate Director Primate Services	Institutional Base Salary	EFFORT		3,792.00	1,444.75	5,236.75
2.	Redacted by agreement					Genetics Manager				33,604.20	12,803.20	46,407.40
Total Funds Requested for all Senior Key Persons in the attached file												
Additional Senior Key Persons:			File Name:			Total Senior/Key Person						51,644.15

B. Other Personnel

Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
	Secretarial/Clerical						
1	Technical Support	6.0			34,950.00	17,929.35	52,879.35
1	Total Number Other Personnel					Total Other Personnel	52,879.35
Total Salary, Wages and Fringe Benefits (A+B)							104,523.50

RESEARCH & RELATED Budget (A-B) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

C. Equipment Description

List items and dollar amount for each item exceeding \$5,000

Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	0.00
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel

Funds Requested (\$)*

1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	0.00
2. Foreign Travel Costs	0.00
Total Travel Cost	0.00

E. Participant/Trainee Support Costs

Funds Requested (\$)*

1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

F. Other Direct Costs		Funds Requested (\$)*
1. Materials and Supplies		9,700.00
2. Publication Costs		970.00
3. Consultant Services		0.00
4. ADP/Computer Services		0.00
5. Subawards/Consortium/Contractual Costs		0.00
6. Equipment or Facility Rental/User Fees		0.00
7. Alterations and Renovations		0.00
8. Shipping		485.00
Total Other Direct Costs		11,155.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	115,678.50

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. MTDC	22.7	115,678.50	26,259.02
Total Indirect Costs			26,259.02
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	141,937.52

J. Fee	Funds Requested (\$)*
	0.00

K. Budget Justification*	File Name:
	(Only attach one file.)

RESEARCH & RELATED Budget (F-K) (Funds Requested)

ORGANIZATIONAL DUNS*: 8063456170000

Budget Type*: ☐ Project ☒ Subaward/Consortium

Enter name of Organization: University of Arizona

Start Date*: 05-01-2019

End Date*: 04-30-2020

A. Senior/Key Person

Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*
1.	Redacted by agreement				Project Lead	Institutional Base Salary	EFFORT			11,389.00	3,179.00	14,568.00
Total Funds Requested for all Senior Key Persons in the attached file												
Additional Senior Key Persons:			File Name:								Total Senior/Key Person	14,568.00

B. Other Personnel

Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
	Secretarial/Clerical						
0	Total Number Other Personnel					Total Other Personnel	0.00
Total Salary, Wages and Fringe Benefits (A+B)							14,568.00

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E

ORGANIZATIONAL DUNS*: 8063456170000

Budget Type*: ☐ Project ☒ Subaward/Consortium

Enter name of Organization: University of Arizona

Start Date*: 05-01-2019

End Date*: 04-30-2020

C. Equipment Description

List items and dollar amount for each item exceeding \$5,000

Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	0.00
Total Equipment	0.00

Additional Equipment: File Name:

D. Travel

Funds Requested (\$)*

1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	0.00
2. Foreign Travel Costs	0.00
Total Travel Cost	0.00

E. Participant/Trainee Support Costs

Funds Requested (\$)*

1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K

ORGANIZATIONAL DUNS*: 8063456170000

Budget Type*: ☐ Project ☒ Subaward/Consortium

Enter name of Organization: University of Arizona

Start Date*: 05-01-2019

End Date*: 04-30-2020

F. Other Direct Costs		Funds Requested (\$)*
1. Materials and Supplies		8,575.00
2. Publication Costs		0.00
3. Consultant Services		0.00
4. ADP/Computer Services		0.00
5. Subawards/Consortium/Contractual Costs		0.00
6. Equipment or Facility Rental/User Fees		0.00
7. Alterations and Renovations		0.00
Total Other Direct Costs		8,575.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	23,143.00

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. MTDC	56.5	23,143.00	13,075.80
Total Indirect Costs			13,075.80
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	36,218.80

J. Fee	Funds Requested (\$)*
	0.00

K. Budget Justification*	File Name: Subaward A18-1798-S001
	ASU.pdf
	(Only attach one file.)

RESEARCH & RELATED Budget {F-K} (Funds Requested)

Budget - Arizona State University

Budget- Arizona State University	
Cost Categories	05/01/2018-04/30/2019
Senior/ Key Personnel :	
Redacted by agreement	\$11,389
ERE :	\$3,179
Effort (FTE Months; AV/SUM/CAL):	EFFORT
Other Personnel:	\$0
Total Number Other Personnel	0
Total Salary, Wages and ERE:	\$14,568
Equipment:	\$0
Travel:	\$0
1. Domestic	\$0
2. Foreign	\$0
Participant/Trainee Support Costs:	\$0
Other Direct Costs:	
1. Materials and Supplies	\$8,575
2. Publication Costs	\$0
3. Consulting Costs	\$0
4. ADP/ Computer Services	\$0
5. Subaward/ Consortium/Contractual	\$0
6. Equipment or Facility Rentals/User Fees	\$0
7. Alterations and Renovations	\$0
Direct Costs:	\$23,143
Indirect Costs: @ 56.5%	\$13,075
Total Direct and Indirect Costs:	\$36,218

Budget Justification - Arizona State University

PERSONNEL:

Redacted by agreement and Investigator ^{EFFORT} calendar month) Redacted by agreement will devote his effort to the genetic management of the CNPRC and carrying out other activities according to his scope of work above.

FRINGE BENEFITS:

Arizona State University defines fringe benefits as direct costs, estimates benefits as a standard percent of salary applied uniformly to all types sponsored activities, and charges benefits to sponsors in accordance with the Federally-negotiated rates in effect at the time salaries are incurred.

ERE Rates	FY19
Faculty	27.91%

OTHER DIRECT COSTS:

An allocation of \$8,575 is requested for laboratory materials and supplies, including: SNP and STR reagents, pipette tips, gloves, DNA extraction kits, DNA quantification reagents, sample boxes and tubes.

INDIRECT COSTS:

Facilities and Administrative costs are calculated on Modified Total Direct Costs (MTDC) using F&A rates approved by the U.S. Department of Health and Human Services. The most current rate agreement is dated 07/05/2017 and the FY19 rate for on-campus research is 56.5%. MTDC includes salaries and wages, fringe benefits, materials and supplies, services, publications, travel, and the first \$25,000 of each sub-award. Exclusions from MTDC include graduate student tuition remission, participant support, sub-awards over the first \$25,000, capital equipment, and scholarships/fellowships.

A. COMPONENT COVER PAGE

Project Title: PRIMATE ASSAY LABORATORY CORE

Component Project Lead Information:

Redacted by agreement

B. COMPONENT ACCOMPLISHMENTS**B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?**

The Primate Assay Laboratory Core (PAL) provides expertise and a unique portfolio of laboratory tests for both colony management and research applications across scientific disciplines. PAL incorporates demonstrated strengths in immunology, pathogen detection, and endocrinology while leveraging costs of shared personnel and equipment. It will provide experimental design (e.g., assay development and validation, pedigreed samples, control data), execution (e.g., sample processing, performance of assays), and data analysis/interpretation. All components of the Core continue to be nationally and internationally leading reference laboratories for nonhuman primate (NHP) infectious disease testing and endocrine evaluations and provide high-quality consultation services and specialized management and research expertise relative to all nonhuman primate species. PAL has strong ties with NPRC and other NIH supported programs and will continue to build on its international expert reputation and existing infrastructure to meet the needs of nonhuman primate researchers by appropriately applying advancements in scientific discovery and laboratory technology to improve the nonhuman primate resource and thus contribute to a deeper understanding and multi-disciplinary convergence of human and nonhuman physiology and pathology across the life span.

Specific Aim 1. Provide state-of-the-art research tools, assays, and advanced scientific methods relevant to nonhuman primate models of disease and nonhuman primate colony health. PAL will monitor new advances in scientific discovery and laboratory technology to customize appropriate applications for the nonhuman primate model that promote new, improved, and more relevant research projects. In addition, the core will work collaboratively with investigators at the CNPRC and throughout the NPRC system and related institutions to ascertain and meet assay development needs. Past successful applications have included infectious disease detection, monitoring, prevention, and therapy; and endocrine studies of reproduction, metabolism, growth, and development assays used in our laboratory and as an added benefit adapted for use in field studies and in resource-poor areas. The availability of new and advanced analytical methods enables the collection of new information leading to new avenues for collaborative research, more competitive grant applications, a broader base for training, and higher quality publications in major journals.

Specific Aim 2. Provide exceptional NHP expertise and services to researchers at the regional, national, and international levels. PAL has a long-standing history of providing support in experimental design, assisting in data analysis/interpretation, and sharing resources (e.g., test protocols, reagents, and reference samples). Assays are continuously updated and reference standards renewed to ensure accurate results. New assays continue to be developed, adapted, and validated to meet the needs of our other nonhuman primate colonies. PAL will aggressively expand its service beyond our past focus on reproductive and metabolic endocrinology, immunology and pathogen detection. The Core's service-oriented effort also include the preparation of SIV and other infectious virus stocks for investigators and maintenance and training on shared equipment. The core maintains a 1 business day response time for its email address and phone number. Efforts are ongoing to enhance our electronic and other media presence and be even more user friendly.

Specific Aim 3. Mentor and train the next generation of translational nonhuman primate investigators. Core faculty and staff provide training, consultation, and specialized reagents to CNPRC/UCD and other outside students and scientists, and regularly participate in activities at the CNPRC, the NPRC Consortiums, and UC Davis campus committees and working groups to contribute their expertise in endocrinology, immunology, pathogen detection, and other diagnostic testing to ensure that the highest quality standards of animal care and research are met.

Specific Aim 4. Ensure the highest standards of responsible conduct of research and animal care. PAL will continue to respond to all aspects of colony management and research investigations. The Core has expanded this role by promoting specific clinical inquiries and guiding veterinary clinicians in embarking on innovative research projects that emanate from and depend on its expertise. The Core brings specialized expertise in nonhuman primate reproduction and female healthy aging as well as specific pathogen free management that can enhance and expand various specialized segments of the breeding program colony. These activities result in improved colony health and better utilization of the NHP research models of human diseases while ensuring the highest standards for responsible conduct of research and animal care.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File uploaded: B2 Accomplishments.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

Not Applicable

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

File uploaded: B.4. What opportunities for training and professional development has the project provided.pdf.pdf

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

The senior staff has published 12 papers and attended and presented at many professional conferences, workshops, and working groups, including Association of Primate Veterinarians, International Primatological Society, Animal Models of AIDS. Both core directors and the manager are active and take leading roles in the NPRC Consortium Working Groups (Breeding Colony Management, Zika,

Pathogen Detection, Biomarker) [Redacted] chairs the new Pathogen Detection Working Group. In addition, we are now affiliates of the UC Davis Wildlife Health Center component of the One Health Institute. The core continues to send out regular updates to our mailing list of approximately 300 clients. In addition, we regularly review and are currently updating our website. Much of our information will be incorporated in the NPRC Research.org website.

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

As new pathogens, colony management issues, and research questions emerge, PAL will continue to develop, validate, implement, and interpret data generated by the most relevant, efficient, and economical diagnostic tools. We regularly discuss new developments with the NPRC working groups and other colleagues in the field. Thus enabling us to maintain our leadership in providing routine and custom laboratory testing to detect and monitor biomarkers of infection for both nonhuman primate research and colony management at the California National Primate Research Center (CNPRC) and other institutions internationally. Leadership often takes the form of providing consultation, troubleshooting, and resource sharing to assist colleagues (especially those who are new to the field or in the initial stages of establishing their program). As seen by the increasing numbers of custom project requests we are now receiving we will be continuing to provide highly skilled laboratory personnel and advanced instrumentation to provide technical expertise, training, and capacity to assist other investigators whose studies employ them for a wide range of applications.

Some specific plans for the next year include 1) implementation of the new tuberculosis assay locally in our laboratory and internationally via training and shared protocols to meet diagnostic needs and cumulate data to more fully validate the assay. 2) Working through the NPRC Pathogen Detection Working Group to provide proficiency testing, training, and wider promotion of all our laboratories to appropriate users. 3) Providing training for new laboratory staff and students establishing SPF testing. 4) As recommended by the recent NIH Nonhuman Primate Evaluation and Analysis Report, begin to identify and validate appropriate reagents and assays for non-macaque species animal models.

PAL will continue to explore how to best apply our expertise, reagents, and assay platforms to provide laboratory support for studies requiring neuropeptides, cardiac markers, and fetal genetics biomarkers. The shared use of personnel, equipment, reagents, protocols, samples and data for multiple applications across various disciplines supports convergence and advances the CNPRC's vision and mission to continue to improve the nonhuman primate as a research model across the lifespan.

B.2. What was accomplished under these goals?

PAL provides critical support for management of the nonhuman primate research and colony management at the California National Primate Research Center (CNPRC) and for a spectrum of NIH supported investigators nationwide. We have provided 13234 assays for samples from 21 institutions (7 NPRC, 5 Academic, 1 Government, 8 other) from May 1, 2017 to January 25, 2019. There are often multiple projects / investigators per institution. In addition, the core has received requests and provided virus stocks, reagents, controls and samples to more than a dozen investigators.

PAL promotes the nonhuman primate as a model for human studies and provide start-to-finish laboratory assay assistance including experimental design, execution, and data analysis/interpretation. In addition to our routine testing, we have provided customized consultation, assays, sample processing, and technical assistance for 38 projects across various disciplines including infectious disease, neuroscience, cardiology, reproductive biology, respiratory disease, nutrition, psychology, and ophthalmology. This is a growing service area for the core.

PAL leverages its productivity, emergent innovations, and strong ties with institutional, national, and international programs are directed to meet the needs of current investigators and next generation trainees. Major accomplishments during this period include development and initial validation of an assay for Tuberculosis, implementation of Zika assays, adaptation of assays for BSL3 laboratory pathogens, validation of new commercially available antibody and cytokine assays, studies to diagnose simian retroviruses in baboons. Much of this work has been done collaboratively with other US and international primate centers, academic institutions, and private entities with complementary reagents and samples. We also evaluated digital droplet PCR but decided it is not useful for our current priorities.

B.4. What opportunities for training and professional development has the project provided?

Five (5) Undergraduate students were trained in PAL during May 2017 through January 2019. Notably:

1. [Redacted by agreement] completed a vaccine study as an independent undergraduate research project resulting in honors at graduation.
2. [Redacted by agreement] completed nucleic acid automation study in partial fulfillment of her undergraduate degree in global health.
3. [Redacted by agreement] is currently analyzing STLV data in our laboratory to fulfill course work in the Biology Undergraduate Scholars program.

During this review period we have working all the undergraduates received training in basic laboratory safety, sample handling, and assay techniques. As well as:

- support and works with graduate PhD and MPVM students in the research aspects of their projects.
- worked with [Redacted by agreement] on a cytokine study, [Redacted by agreement] on rotavirus, and [Redacted by agreement] and [Redacted by agreement] on cardiac biomarkers.
- provided consultation and training to students and staff in the correct assay selection, performance, reagents and instruments, sample processing, laboratory techniques, data analysis, and application results for their research.
- helped five new investigators and their teams [Redacted by agreement] by providing services and helping set up their laboratories.
- provided training at the Thai National Primate Research Center and the Bornean Orangutan Survival Foundation.

C. COMPONENT PRODUCTS

C.1 PUBLICATIONS

Not Applicable

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Not Applicable

C.3 TECHNOLOGIES OR TECHNIQUES

NOTHING TO REPORT

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Not Applicable

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Category	Explanation
Other	https://cnprc.ucdavis.edu/primate-assay-laboratory-core/ Primate Assay Laboratory Core home, services and rates.

D. COMPONENT PARTICIPANTS

Not Applicable

E. COMPONENT IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

Not Applicable

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

NOTHING TO REPORT

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

Not Applicable

F. COMPONENT CHANGES

F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

NOTHING TO REPORT

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subjects**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. COMPONENT SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS
Not Applicable
G.2 RESPONSIBLE CONDUCT OF RESEARCH
Not Applicable
G.3 MENTOR'S REPORT OR SPONSOR COMMENTS
Not Applicable
G.4 HUMAN SUBJECTS
G.4.a Does the project involve human subjects?
No
G.4.b Inclusion Enrollment Data
Not Applicable
G.4.c ClinicalTrials.gov
Not Applicable
G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT
Not Applicable
G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)
Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?
No
G.7 VERTEBRATE ANIMALS
Not Applicable
G.8 PROJECT/PERFORMANCE SITES
Not Applicable
G.9 FOREIGN COMPONENT
Not Applicable
G.10 ESTIMATED UNOBLIGATED BALANCE
Not Applicable
G.11 PROGRAM INCOME
Not Applicable
G.12 F&A COSTS
Not Applicable

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

A. Senior/Key Person

Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*
1.	Redacted by agreement				Core Leader	Institutional Base Salary	EFFORT			14,912.70	5,681.74	20,594.44
2.					Clinical Director					3,792.00	1,444.75	5,236.75
Total Funds Requested for all Senior Key Persons in the attached file												
Additional Senior Key Persons:		File Name:									Total Senior/Key Person	25,831.19

B. Other Personnel

Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
	Secretarial/Clerical						
3	Technical Support	11.4			86,183.01	44,211.88	130,394.89
3	Total Number Other Personnel					Total Other Personnel	130,394.89
Total Salary, Wages and Fringe Benefits (A+B)							156,226.08

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

C. Equipment Description

List items and dollar amount for each item exceeding \$5,000

Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	0.00
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel

Funds Requested (\$)*

1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	0.00
2. Foreign Travel Costs	0.00
Total Travel Cost	0.00

E. Participant/Trainee Support Costs

Funds Requested (\$)*

1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

F. Other Direct Costs		Funds Requested (\$)*
1. Materials and Supplies		34,920.00
2. Publication Costs		1,940.00
3. Consultant Services		0.00
4. ADP/Computer Services		0.00
5. Subawards/Consortium/Contractual Costs		0.00
6. Equipment or Facility Rental/User Fees		0.00
7. Alterations and Renovations		0.00
8. Radioactive Waste Disposal		2,910.00
Total Other Direct Costs		39,770.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	195,996.08

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. MTDC	22.7	195,996.08	44,491.11
Total Indirect Costs			44,491.11
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	240,487.19

J. Fee	Funds Requested (\$)*
	0.00

K. Budget Justification*	File Name:
	(Only attach one file.)

RESEARCH & RELATED Budget (F-K) (Funds Requested)

A. COMPONENT COVER PAGE

Project Title: INHALATION EXPOSURE CORE

Component Project Lead Information:

Redacted by agreement

B. COMPONENT ACCOMPLISHMENTS**B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?**

The mission of the California National Primate Research Center (CNPRC) Inhalation Exposure Core is to provide a specialized platform for the investigation of health impacts resulting from the inhalable environment and evaluation of therapeutics for the mitigation of respiratory disease, while serving as a valuable educational resource on the science and technology comprising this platform. Under the guidance of CNPRC Core and Affiliate Scientists, gold-standard methods are employed for precise characterization of challenge atmospheres generated by the Inhalation Exposure Core. The Inhalation Exposure Core also supports assessment of pulmonary function and bronchoscopic collection of lung specimens for in vivo disease characterization, as well as response to clinical and preclinical therapeutics. A Faculty Advisory Committee consisting of a convergence of UC Davis faculty experts in respiratory toxicology, aerosol engineering, pulmonary physiology, and infectious diseases has been assembled to advise the Inhalation Exposure Core on strategic development of novel technology and animal models, with the goal of establishing new opportunities for utilization of the Core by regional and national investigators. The Inhalation Exposure Core serves as a national resource that is exclusive to the CNPRC; no other National Primate Research Center (NPRC) or industrial facility has comparable infrastructure. The goals for the next funding period are reflected in the following Specific Aims:

Specific Aim 1. Support state-of-the-art research requiring inhalation exposure technology and scientifically contribute to the understanding and treatment of human disease with NHP models across the age spectrum. The Inhalation Exposure Core provides stable, well-characterized exposures to aerosols and gases including common air pollutants, combustion products, allergens, biologics, and therapeutic agents. The Inhalation Exposure Core will continue to develop unique systems for in vivo inhalation exposure and in vitro atmospheric exposure with an emphasis on nonhuman primates as an animal model for translational investigations and intervention studies. Novel exposure systems and models of disease will be developed under advisement from the Faculty Advisory Committee with a focus on meeting current needs as well as projected needs and opportunities.

Specific Aim 2. Provide exceptional nonhuman primate expertise and services to investigators at the local, regional, and national levels to advance NIH-supported research excellence and foster partnerships in industry to help bring forth new therapies. The Inhalation Exposure Core will continue to provide expertise and services to evaluate health effects of inhalation exposures and pulmonary manifestations of disease processes in the nonhuman primate model. Pulmonary function testing services and bronchoscopy expertise are offered to internal and external investigators with an emphasis on capabilities in longitudinal study designs to investigate disease processes across the lifespan. The Core will leverage capabilities of the Multimodal Imaging Core, Primate Medicine, and Clinical Laboratory Services to enhance health and lung function assessment capabilities.

Specific Aim 3. Mentor and train the next generation of translational investigators with nonhuman primate expertise. The Inhalation Exposure Core's educational resources will be offered under advisement of the Core Faculty Advisory Committee in close collaboration with faculty in the CNPRC Respiratory Diseases Unit and NIH supported UC Davis training programs in lung biology and toxicology. Graduate students, postdoctoral fellows, and faculty identified as interested in aerosol technology, inhalation toxicology, and nonhuman primate respiratory disease models will be offered training in the Inhalation Exposure Core's current science and technology. In collaboration with the Primate Medicine Service, veterinary students and residents will be trained in bronchoscopic methods.

Specific Aim 4. Ensure the highest standards of responsible conduct of research and animal care. The Inhalation Exposure Core, in consultation with the Faculty Advisory Committee on current and future inhalation exposure methods, will provide precise, rigorously characterized and documented exposures to provide for reproducibility and accuracy of dosing. A research veterinarian specializing in large animal models of respiratory disease will lead the core and contribute directly to experimental design and oversee performance of in vivo studies.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File uploaded: B2 Accomplishments.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

Not Applicable

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

File uploaded: B.4. What opportunities for training and professional development has the project provided.pdf.pdf

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

Results of the Inhalation Exposure Core are disseminated to communities of interest using the following strategies:

Publications. A primary strategy by which findings from the Inhalation Exposure Core are disseminated to the broad scientific community as well as the general public is via publication in peer-reviewed journals. Publications are often led by Core Scientists within the Respiratory Diseases Unit.

Speaking Engagements. An additional strategy used by the Inhalation Exposure Core to disseminate information is to present findings in the form of brief oral presentations at national meetings as well as invited seminars. Core Scientists who have leadership roles within the Inhalation Exposure Core have been actively engaged in this area, with numerous invited presentations as well as report of findings through poster sessions at national meetings.

Media. The Inhalation Exposure Core utilizes the CNPRC and UC Davis Office of Research web page to highlight availability of resources and research activities. The Core is also actively promoted for the CNPRC Pilot Program application process.

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

Specific Aim 1. Support state-of-the-art research requiring inhalation exposure technology and scientifically contribute to the understanding and treatment of human disease with NHP models across the age spectrum.

In the next funding year, we will continue to expand our outreach efforts to increase usage of the Inhalation Exposure Core by UC Davis investigators, as well as investigators from other national institutions. An important goal is to enhance visibility at the national level by publication of core use in peer-reviewed journals. We plan to further expand our capabilities into areas of increasing concern for human disease potential such as biomass combustion product, e-cigarette vaping, and cannabis exposure.

Specific Aim 2. Provide exceptional nonhuman primate expertise and services to investigators at the local, regional, and national levels to advance NIH-supported research excellence and foster partnerships in industry to help bring forth new therapies.

In the next funding year, we will continue to provide support toward ongoing research projects that involve inhalational and atmospheric exposures as well as requiring pulmonary function and bronchoscopic assessments. We will continue to support industry partnerships to foster growth in this area.

Specific Aim 3. Mentor and train the next generation of translational investigators with nonhuman primate expertise.

In the next funding year, we will continue to conduct outreach efforts to increase our local and national visibility, through attendance at national meetings and identification as a campus core facility. CNPRC Pilot Program applicants are an important pool of investigators who request training of postdoctoral fellows, graduate students research assistants and we will market this opportunity to pools of applicants posing a potential mutual benefit for future collaboration.

Specific Aim 4. Ensure the highest standards of responsible conduct of research and animal care.

In the next funding year, we will continue to develop standard operating procedures and implement GLP like record keeping in our regular operations. We will continue to seek input from collaborating investigators on our current practices and data compilation and reporting to insure the highest level of scientific rigor and reproducibility. We will continue to consult with IACUC, CNPRC veterinary staff, and CNPRC Population and Behavior Management staff in order to maintain the highest quality of animal care during inhalation exposure, pulmonary function testing, and bronchoscopy operations conducted by the IEC.

B.2. What was accomplished under these goals?

The accomplishments of the Inhalation Exposure Core can be summarized by the following specific aims:

Specific Aim 1. Support state-of-the-art research requiring inhalation exposure technology and scientifically contribute to the understanding and treatment of human disease with NHP models across the age spectrum.

The Inhalation Exposure Core has developed unique systems for in vivo inhalation exposure and in vitro exposures with an emphasis on nonhuman primates as a translational animal model. The work supported covers a diverse range of disease models including early life and developmental effects of biomass and tobacco smoke, e-cigarette vaping, pulmonary HIV/SIV reservoirs, pulmonary disease effects of chorioamnionitis, as well as assessments of preclinical therapeutics for pulmonary diseases.

Specific Aim 2. Provide exceptional nonhuman primate expertise and services to investigators at the local, regional, and national levels to advance NIH-supported research excellence and foster partnerships in industry to help bring forth new therapies.

The IEC has supported multiple investigators internal and external to the CNPRC with inhalation and atmospheric exposures, pulmonary function testing, and bronchoscopy services. This support includes testing of preclinical therapeutics from our industry partners. The IEC has also supported multiple grant efforts that would further expand our capabilities into areas such as biomass combustion product and cannabis exposure effects.

Specific Aim 3. Mentor and train the next generation of translational investigators with nonhuman primate expertise.

The Inhalation Exposure Core has trained graduate students and faculty in the science of atmosphere exposure and analysis technologies. Training in lung function testing parameters and other biological response measures has also been provided. In collaboration with the Primate Medicine Service, veterinary residents have been trained in bronchoscopic methods and the clinical considerations for pulmonary function testing of the anesthetized nonhuman primate.

Specific Aim 4. Ensure the highest standards of responsible conduct of research and animal care.

The Inhalation Exposure Core, in consultation with the Faculty Advisory Committee on inhalation exposure methods, has provided precise, rigorously characterized and documented exposures for reproducible and accurate dosimetry. A research veterinarian specializing in large animal models of respiratory disease leads the core, contributing directly to experimental design and overseeing performance of in vivo studies while frequently consulting with clinical veterinary staff, IACUC staff, and CNPRC Population and Behavior Management staff on best practices in animal care and use.

B.4. What opportunities for training and professional development has the project provided?

The Inhalation Exposure Core has provided training in inhalation exposure technology offered by the IEC during experiments conducted by the IEC for investigators internal and external to the CNPRC. The IEC also provided an annual wet lab in bronchoscopic techniques to veterinary residents.

C. COMPONENT PRODUCTS

C.1 PUBLICATIONS

Not Applicable

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Not Applicable

C.3 TECHNOLOGIES OR TECHNIQUES

Category	Explanation
Other	<p>In this reporting period the Inhalation Exposure Core has developed in vivo and in vitro exposure methods for the study of the effects of electronic nicotine delivery devices and added the whole body cigarette smoke (CS) exposure equipment with increased dosage capacity over our existing methods.</p> <p>In vitro ENDs exposure: A semi-automated system has been developed based on the Labview software platform to control two independent ENDs devices with associated exposure chambers in order to have two concurrent exposures, e.g. with or without nicotine, and a third filtered air control chamber. The system is designed to run for single acute exposures or multiple chronic exposures.</p> <p>In vivo ENDs exposure: A head dome exposure system capable of four simultaneous independent exposures has been developed to enable multiple "vape" exposures in the conscious, unsedated nonhuman primate. The system is designed to allow concurrent spirometry measurement in order to track basic pulmonary function and provide more accurate dosimetry estimates than our other available methods, e.g. whole body exposure. The system is designed to accept future potential changes in vaped substrates such as cannabinoids.</p> <p>Whole body CS exposure: A pair of 3.5m³ chambers and associated cigarette smoke generator has been added. The use of the chambers allows generation of higher exposure levels than our current large capacity cigarette smoke exposure chamber used for environmental level exposure of nonhuman primates.</p>

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Not Applicable

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Category	Explanation
Other	https://cnprc.ucdavis.edu/inhalation-exposure/ Inhalation Exposure Core home, services and rates.

D. COMPONENT PARTICIPANTS

Not Applicable

E. COMPONENT IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

Not Applicable

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

NOTHING TO REPORT

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

Not Applicable

F. COMPONENT CHANGES

F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

NOTHING TO REPORT

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subjects**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. COMPONENT SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS
Not Applicable
G.2 RESPONSIBLE CONDUCT OF RESEARCH
Not Applicable
G.3 MENTOR'S REPORT OR SPONSOR COMMENTS
Not Applicable
G.4 HUMAN SUBJECTS
G.4.a Does the project involve human subjects?
No
G.4.b Inclusion Enrollment Data
Not Applicable
G.4.c ClinicalTrials.gov
Not Applicable
G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT
Not Applicable
G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)
Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?
No
G.7 VERTEBRATE ANIMALS
Not Applicable
G.8 PROJECT/PERFORMANCE SITES
Not Applicable
G.9 FOREIGN COMPONENT
Not Applicable
G.10 ESTIMATED UNOBLIGATED BALANCE
Not Applicable
G.11 PROGRAM INCOME
Not Applicable
G.12 F&A COSTS
Not Applicable

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

A. Senior/Key Person

Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*
1.	Redacted by agreement					Core Leader	Institutional Base Salary	EFFORT		3,553.04	1,353.71	4,906.75
2.						Core Manager				20,808.00	7,927.85	28,735.85
Total Funds Requested for all Senior Key Persons in the attached file												
Additional Senior Key Persons:			File Name:								Total Senior/Key Person	33,642.60

B. Other Personnel

Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
	Secretarial/Clerical						
1	Technical Support	8.4			43,444.80	22,287.18	65,731.98
1	Total Number Other Personnel					Total Other Personnel	65,731.98
Total Salary, Wages and Fringe Benefits (A+B)							99,374.58

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

C. Equipment Description

List items and dollar amount for each item exceeding \$5,000

Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	0.00
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel

Funds Requested (\$)*

1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	0.00
2. Foreign Travel Costs	0.00
Total Travel Cost	0.00

E. Participant/Trainee Support Costs

Funds Requested (\$)*

1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

F. Other Direct Costs		Funds Requested (\$)*
1. Materials and Supplies		16,975.00
2. Publication Costs		970.00
3. Consultant Services		0.00
4. ADP/Computer Services		0.00
5. Subawards/Consortium/Contractual Costs		0.00
6. Equipment or Facility Rental/User Fees		0.00
7. Alterations and Renovations		0.00
Total Other Direct Costs		17,945.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	117,319.58

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. MTDC	22.7	117,319.58	26,631.54
Total Indirect Costs			26,631.54
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	143,951.12

J. Fee	Funds Requested (\$)*
	0.00

K. Budget Justification*	File Name:
	(Only attach one file.)

RESEARCH & RELATED Budget (F-K) (Funds Requested)

A. COMPONENT COVER PAGE

Project Title: MULTIMODAL IMAGING CORE

Component Project Lead Information:

Redacted by agreement

B. COMPONENT ACCOMPLISHMENTS**B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?**

The Multimodal Imaging Core provides expertise, state-of-the-art services, and assistance in the design, execution, and analysis of imaging studies at the California National Primate Research Center (CNPRC) that spans basic cellular and tissue imaging, to whole-body in vivo imaging in nonhuman primates. The goal of the Core is to support cross cutting convergence approaches with enabling tools in support of primate research for investigators locally, regionally, and nationally. The Core provides qualitative and quantitative imaging methodologies and expertise across multiple spatial scales, and facilitates the use of cutting edge in vivo imaging techniques in nonhuman primates across the lifespan. The Core ensures researchers have the essential intellectual infrastructure to design and conduct high quality imaging studies in the nonhuman primate model, integrating disciplines and technologies that provide innovative opportunities for translational research. The Core also supports the nonhuman primate colonies with diagnostic imaging expertise and services. Dedicated Core Scientists and highly experienced staff are responsible for imaging services, including radiotracer production, administrative support, day-to-day operational management, preventive and routine maintenance, and quality assurance/quality control (QA/QC). The Core eliminates the need for investigators to purchase costly equipment providing efficiency and economy of scale, as well as the requisite expertise to perform high quality imaging studies that ensure rigor and reproducibility. The Specific Aims for the next funding period include:

Specific Aim 1. Provide expertise and a range of imaging services across different spatial scales to ensure cutting-edge technologies, tools, and expertise are available to the research community for studies with nonhuman primate models focused on human health and disease. Plan. The Core will continue to provide high quality imaging services and expand the range of in vivo imaging techniques through new protocols, new imaging agents, and new data analysis/quantitative methods. These efforts will ensure rigor and reproducibility and support the concept of convergence that merges disciplines and technologies thus providing innovative opportunities for translational research in nonhuman primates at the highest quality level. The Core will ensure data integrity/security, archival/retrieval, and QA/QC, and converge research strategies by providing the intellectual infrastructure for transformative solutions that address current human health problems, from the earliest stages of development through infancy, maturation, and aging. The Core is poised to support the imaging needs of new Core and Affiliate Scientists.

Specific Aim 2. Acquire and develop new technologies/instruments and replace instrumentation as needed through NIH and related equipment grant applications. Plan. Core Scientists/faculty have an exceptionally strong record of achievement in obtaining instrumentation grants and other extramural funding for imaging equipment. Core Scientists will continue to identify sources of support to ensure the Core is equipped with state-of-the-art technologies and methodologies for investigators on-site at the CNPRC, and in support of cutting edge translational research across the age spectrum.

Specific Aim 3. Provide assays, techniques, and tools to enhance the nonhuman primate resource for research, training, and aid in colony management, aligning with the broader translational imaging goals at UC Davis converging science, engineering, and diagnostics through precision imaging. Plan. Experienced Core faculty and staff provide a range of assays, tools, and technologies that enhance the imaging services. New opportunities are available to trainees across all career stages through services and funded research projects. The Core promotes faculty and staff expertise for advanced imaging techniques through collaborations with colleagues at national institutions, several of which serve on the Imaging Advisory Committee. The Core will expand model development for translational research, preclinical testing, quantitative imaging, and correlative assays and tools (e.g., established molecular and cellular assays, radiolabeling and trafficking, inflammation biomarkers, transformative whole-body PET). The objective is to ensure the Multimodal Imaging Core is fully aligned with broad translational imaging goals at UC Davis and nationally, and with metrics for imaging protocols proposed for human translation.

Specific Aim 4. Promote high standards of research excellence and animal care. Plan. The Multimodal Imaging Core will continue to provide rigor and research excellence through high quality services, by addressing metrics and deliverables, engaging the Core imaging advisory team, through support of the nonhuman primate colonies, and by meeting current and future research needs of investigators nationwide with transformative solutions that support convergence through innovative technologies, tools, and biomarkers.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File uploaded: B2 Accomplishments.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

Not Applicable

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

File uploaded: B.4. What opportunities for training and professional development has the project provided.pdf

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

Through established websites (e.g., Primate Center, UC Davis Office of Research websites), meetings with individuals and groups, faculty meetings, and special symposia and conferences.

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

The Multimodal Imaging Core will continue to maintain high quality imaging services and expand the range of imaging assays performed in nonhuman primates by introducing new protocols, new radiotracers, and new quantitative imaging methods. Core faculty will continue to work with investigators for the submission of their NIH grant applications and to aid in designing innovative in vivo imaging protocols for their research. Expansion of services and opportunities for preclinical testing of novel radiopharmaceuticals will also be accomplished in collaboration with academic and industry partners in preparation for new human clinical trials.

B.2. What was accomplished under these goals?

The Multimodal Imaging Core provides services to investigators locally, regionally, and nationally, encompassing scales that range from cellular to whole-animal imaging. The goal and overall mission of the Core is to support the research of investigators and trainees in qualitative and quantitative imaging applications, and to assist with study design, data interpretation, extramural/NIH grant submissions, and to conduct preclinical and investigational new drug (IND)-enabling studies. The Multimodal Core provides microscopy services (e.g., sectioning, staining, slide scans) and in vivo imaging services through Core faculty including ultrasound imaging, optical imaging, positron emission tomography/computed tomography (PET/CT), microPET, and total-body PET. In addition, radionuclide production and radiochemistry are provided through a partnership with the UC Davis Center for Molecular and Genomic Imaging. The Multimodal Imaging Core provides the full range of imaging services (e.g., protocol development and optimization, operating high-end state-of-the-art imaging systems, image processing, quantitative imaging analysis, and pharmacokinetics/pharmacodynamics) including radionuclide production, radiotracer synthesis, day-to-day operational management, preventive and routine maintenance, and quality assurance/quality control (QA/QC).

Multimodal Imaging Core faculty have continued to work in an integrated manner to implement the imaging goals of the program, and to ensure investigators have the depth and breadth of innovative imaging opportunities to conduct their research and to submit NIH grants and pre-IND applications. Core faculty have worked directly with investigators and provided key preliminary data and necessary information and assistance on study design for numerous NIH grant submissions. In addition, Core faculty continue to work with funded investigators to identify cohorts of animals for projects and implement their project imaging goals. New grants have been funded and innovative studies initiated. During the current reporting period one of our Affiliate Scientists [Redacted by agreement] transitioned to a Core Scientist (see Reproductive Sciences and Regenerative Medicine Unit), further contributing to the Multimodal Imaging Core as co-lead (along with [Redacted by agreement] and Core lead [Redacted by agreement]). He brings extensive expertise in mathematical methods and computational pipelines for image processing, and quantitative imaging sciences, building synergistically on the commitment of the Reproductive Sciences and Regenerative Medicine Unit and Multimodal Imaging Core to translational state-of-the-art in vivo imaging.

During the current review period the Multimodal Imaging Core has made available several new radiotracers for funded research projects including ¹¹C-butanol and markers of inflammation. Studies have also been ongoing with industry partners including those that have addressed new radiolabeled antibodies and drug biodistribution and pharmacokinetics. A significant number of studies have been completed that focused on the brain using the piPET imaging system, our replacement for the microPET P4 obtained through a funded S10 grant. In addition, several studies with the world's-first total-body PET scanner (EXPLORER) have been undertaken with new imaging protocols established in preparation for the human EXPLORER total-body PET scanner that will be in place for imaging at the UC Davis Medical Center in 2019. These protocols are developed specifically in nonhuman primates for applications in humans. The EXPLORER scanner was selected by Physics World as one of the top-five "Breakthroughs of the Year" and is the first medical imaging system that can capture images of the entire human body simultaneously, scan up to 40 times faster, or use up to 40 times less radiation dose, than current PET imaging systems.

B.4. What opportunities for training and professional development has the project provided?

Trainees at all levels (8 undergraduate, graduate, and postdoctoral trainees during the current review period) work with Core faculty members and gain extensive training opportunities unique to Core capabilities and Core faculty expertise. Trainees supervised by other faculty have also received microscopy training in the Core.

C. COMPONENT PRODUCTS

C.1 PUBLICATIONS

Not Applicable

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Not Applicable

C.3 TECHNOLOGIES OR TECHNIQUES

NOTHING TO REPORT

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Not Applicable

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Category	Explanation
Other	https://cnprc.ucdavis.edu/multimodal-imaging/ Multimodal Imaging Core home, services and rates.

D. COMPONENT PARTICIPANTS

Not Applicable

E. COMPONENT IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

Not Applicable

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

NOTHING TO REPORT

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

Not Applicable

F. COMPONENT CHANGES

F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

NOTHING TO REPORT

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subjects**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. COMPONENT SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS
Not Applicable
G.2 RESPONSIBLE CONDUCT OF RESEARCH
Not Applicable
G.3 MENTOR'S REPORT OR SPONSOR COMMENTS
Not Applicable
G.4 HUMAN SUBJECTS
G.4.a Does the project involve human subjects?
No
G.4.b Inclusion Enrollment Data
Not Applicable
G.4.c ClinicalTrials.gov
Not Applicable
G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT
Not Applicable
G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)
Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?
No
G.7 VERTEBRATE ANIMALS
Not Applicable
G.8 PROJECT/PERFORMANCE SITES
Not Applicable
G.9 FOREIGN COMPONENT
Not Applicable
G.10 ESTIMATED UNOBLIGATED BALANCE
Not Applicable
G.11 PROGRAM INCOME
Not Applicable
G.12 F&A COSTS
Not Applicable

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

A. Senior/Key Person

Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*	
1.	Redacted by agreement				Core Leader	Institutional Base Salary	EFFORT			18,960.00	3,697.20	22,657.20	
2.					Co Core Leader					9,480.00	3,611.88	13,091.88	
Total Funds Requested for all Senior Key Persons in the attached file													
Additional Senior Key Persons:			File Name:								Total Senior/Key Person		35,749.08

B. Other Personnel

Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
	Secretarial/Clerical						
6	Technical Support	15.0			116,129.26	53,363.37	169,492.63
6	Total Number Other Personnel					Total Other Personnel	169,492.63
Total Salary, Wages and Fringe Benefits (A+B)							205,241.71

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

C. Equipment Description	
List items and dollar amount for each item exceeding \$5,000	
Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	0.00
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel	Funds Requested (\$)*
1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	0.00
2. Foreign Travel Costs	0.00
Total Travel Cost	0.00

E. Participant/Trainee Support Costs	Funds Requested (\$)*
1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

F. Other Direct Costs		Funds Requested (\$)*
1. Materials and Supplies		12,610.00
2. Publication Costs		970.00
3. Consultant Services		0.00
4. ADP/Computer Services		2,424.00
5. Subawards/Consortium/Contractual Costs		0.00
6. Equipment or Facility Rental/User Fees		0.00
7. Alterations and Renovations		0.00
Total Other Direct Costs		16,004.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	221,245.71

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. MTDC	22.7	221,245.71	50,222.78
Total Indirect Costs			50,222.78
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	271,468.49

J. Fee	Funds Requested (\$)*
	0.00

K. Budget Justification*	File Name:
	(Only attach one file.)

RESEARCH & RELATED Budget (F-K) (Funds Requested)

A. COMPONENT COVER PAGE

Project Title: FLOW CYTOMETRY CORE

Component Project Lead Information:

Redacted by agreement

B. COMPONENT ACCOMPLISHMENTS**B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?**

The Flow Cytometry Core (FCC) provides instrumentation, expertise, and assistance in studies requiring multiparameter flow cytometry. The goal of the FCC is to provide world-class support for cytometry experiments conducted by investigators and trainees at the California National Primate Research Center (CNPRC). The FCC was newly established in November 2016 to consolidate flow cytometry instruments formerly housed in other CNPRC cores and provide faculty leadership for future acquisition of additional capacity. Cytometric analysis of samples from nonhuman primates requires detailed working knowledge of NHP cell surface and intracellular phenotypes, which often differ slightly from their human counterparts, and familiarity with cross-reactive antibody clones. The FCC also supports the colony through use of its instruments in assays offered by the Clinical Laboratory, including routine four-color analysis of circulating lymphocytes. One dedicated Core Scientist and one staff member are responsible for instrument support, administrative support, day-to-day operational management, preventive and routine maintenance, and quality assurance/quality control (QA/QC). In addition, the FCC is supported by a Faculty Advisory Board, which provides feedback on Core service quality and assists in planning for future instrument acquisition. The Core eliminates the need for investigators to purchase costly equipment and pay for highly experienced staff needed to maintain that equipment, thereby providing efficiency and economy of scale. Furthermore, information gathered in the FCC is commonly combined with other high-content datasets (microbiome, metabolomics, or genomic data) to support convergent analysis that maximizes scientific information obtained from colony animals. The FCC also plays an important role in analysis throughout the NHP lifespan, as cytometry is well suited to analysis of small volumes of fetal or pediatric blood. The Specific Aims for the Core are:

Specific Aim 1. Provide state-of-the-art equipment and analytic services in flow cytometry to enable application of the technology to nonhuman primate models of human health and disease. **Plan.** The Core will continue to offer access to high-quality instrumentation with on-site support from qualified personnel. The Core will also continue to ensure data integrity and security, and will expand its analytic services. Core faculty members (Leader and Faculty Advisory Board) will identify sources of support to ensure the Core is equipped with state-of-the-art equipment and methods for investigators, and expand the instruments available for use with nonhuman primates located on-site at the CNPRC.

Specific Aim 2. Provide exceptional expertise and consultation to investigators at the local, regional, and national levels to advance use of flow cytometry in NIH-supported research. **Plan.** Successful conduct of many research projects at the CNPRC requires consultation on (i) flow cytometric characteristics of nonhuman primate cells and tissues, (ii) appropriate sorting techniques, and/or (iii) preliminary data. The FCC Leader and staff will continue to provide such information to encourage use of flow cytometry in NIH-supported research. In addition to providing basic information on macaque lymphocyte populations throughout the lifespan, the FCC offers macaque-specific assays supporting groundbreaking immunologic work, e.g., related to "memory" natural killer (NK) cells or to Mamu-E-restricted cytotoxic T lymphocytes.

Specific Aim 3. Provide education and training in flow cytometry and contribute to the broader immunology program at UC Davis. **Plan.** New opportunities will be provided to trainees at all career stages to gain expertise in flow cytometry. The Core will promote faculty and staff expertise for advanced flow cytometric and analysis techniques through attendance at workshops and interactions with collaborators and consultants at national institutions. An overriding objective is to ensure the CNPRC flow cytometry program is closely aligned and integrated with immunology-related programs across the UC Davis campus.

Specific Aim 4. Provide assays, techniques, and tools needed to promote excellence in colony health and animal care. **Plan.** The FCC will continue to offer instrumentation needed for colony management tasks, including basic flow cytometry panels offered through the Clinical Laboratory service. The FCC will operate under a QA/QC system to ensure reliability of data.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File uploaded: B2 Accomplishments.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

Not Applicable

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

File uploaded: B.4. What opportunities for training and professional development has the project provided.pdf.pdf

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

Communication to the UC Davis community is via mailing list and communication to outside users via our web site. The web site was completely revamped in 2018 following Redacted by agreement arrival.

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

We will continue to make progress on the goals listed above. We will focus particularly on expansion of analytic options and our journal club. In the former realm, we hope to educate users about non-standard tools such as Python and R for flow cytometry analysis. In the latter area, we plan to invite several prominent outsiders to speak in the coming year.

B.2. What was accomplished under these goals?

Purchase, installation, and launch of a state-of the art FACSymphony cytometer. We purchased this 5-laser, 28-channel instrument in February 2018. A separate room in CNPRC was renovated to accommodate the instrument, including installation of appropriate electrical outlets, darkening windows to prevent antibody photobleaching, and installing a large table for the cytometer and adjacent computer. Use of this instrument has been steadily increasing as we train new users, in the most recent month to ~120 hours of use, which we estimate is approximately 66% of its realistic capacity.

Transition to a new Flow Cytometry Core Manager. In late 2017 our former Manager, [Redacted by agreement] retired from service and [Redacted by agreement] was hired. [Redacted by agreement] had an extended period of training with [Redacted by agreement] and took over management responsibility, under [Redacted by agreement] direction, beginning in mid 2018. Users have been polled and expressed enthusiasm for [Redacted by agreement] management of the core.

Faculty Advisory Board. The Faculty Advisory Board has met regularly to discuss strategic direction, including acquisition of the new instrument and replacement of [Redacted by agreement]. The board was instrumental in encouraging us to develop the Flow Cytometry journal club.

Flow Sorting and consultation. [Redacted by agreement] prepares the sorter for all users and is sometimes requested to perform sorts as well. In addition, however, the core arranged to recall [Redacted by agreement] and make her available to users for sorting experiments, especially in cases where she has been continually involved in the experiment and her continued work makes scientific sense. She has asked for consultation on 15 occasions in the past year.

Education and training. The Flow Cytometry Core has trained approximately 10 new users during the past year. In addition, [Redacted by agreement] has given additional training to all users wishing to use the new FACSymphony. To date the majority of our ~50 users have been trained to use the new machine. We also invited selected users with anticipated heavy use to the training provision offered by BD when the machine was purchased. Finally, we arranged for a BD scientist to give a presentation about panel design at our Flow Cytometry journal club.

B.4. What opportunities for training and professional development has the project provided?

The Flow Cytometry Core provides individual, 1-on-1 training to all new users, including most new postdoctoral fellows and graduate students conducting immunology studies at the CNPRC. In addition we have instituted a monthly Flow Cytometry journal club at which papers are presented and lunch is served. Presentations include those from faculty (e.g., Redacted by agreement) accomplished and interested users, and outside experts (e.g., the talk mentioned above on panel design for the FACSymphony).

C. COMPONENT PRODUCTS

C.1 PUBLICATIONS

Not Applicable

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Not Applicable

C.3 TECHNOLOGIES OR TECHNIQUES

NOTHING TO REPORT

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Not Applicable

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Category	Explanation
Other	https://cnprc.ucdavis.edu/flow-cytometry-core/ Flow Cytometry Core home, services and rates.

D. COMPONENT PARTICIPANTS

Not Applicable

E. COMPONENT IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

Not Applicable

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

NOTHING TO REPORT

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

Not Applicable

F. COMPONENT CHANGES

F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

NOTHING TO REPORT

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subjects**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. COMPONENT SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS

Not Applicable

G.2 RESPONSIBLE CONDUCT OF RESEARCH

Not Applicable

G.3 MENTOR'S REPORT OR SPONSOR COMMENTS

Not Applicable

G.4 HUMAN SUBJECTS**G.4.a Does the project involve human subjects?**

No

G.4.b Inclusion Enrollment Data

Not Applicable

G.4.c ClinicalTrials.gov

Not Applicable

G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT

Not Applicable

G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)

Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?

No

G.7 VERTEBRATE ANIMALS

Not Applicable

G.8 PROJECT/PERFORMANCE SITES

Not Applicable

G.9 FOREIGN COMPONENT

Not Applicable

G.10 ESTIMATED UNOBLIGATED BALANCE

Not Applicable

G.11 PROGRAM INCOME

Not Applicable

G.12 F&A COSTS

Not Applicable

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

A. Senior/Key Person

Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*	
1.	Redacted by agreement				Core Leader	Institutional Base Salary	EFFORT			18,960.00	5,858.64	24,818.64	
Total Funds Requested for all Senior Key Persons in the attached file													
Additional Senior Key Persons:			File Name:								Total Senior/Key Person		24,818.64

B. Other Personnel

Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
	Secretarial/Clerical						
1	Technical Support	3.6			21,808.80	11,187.91	32,996.71
1	Total Number Other Personnel					Total Other Personnel	32,996.71
Total Salary, Wages and Fringe Benefits (A+B)							57,815.35

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

C. Equipment Description

List items and dollar amount for each item exceeding \$5,000

Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	0.00
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel

Funds Requested (\$)*

1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	0.00
2. Foreign Travel Costs	0.00
Total Travel Cost	0.00

E. Participant/Trainee Support Costs

Funds Requested (\$)*

1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

F. Other Direct Costs		Funds Requested (\$)*
1. Materials and Supplies		3,395.00
2. Publication Costs		0.00
3. Consultant Services		0.00
4. ADP/Computer Services		0.00
5. Subawards/Consortium/Contractual Costs		0.00
6. Equipment or Facility Rental/User Fees		0.00
7. Alterations and Renovations		0.00
Total Other Direct Costs		3,395.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	61,210.35

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. MTDC	22.7	61,210.35	13,894.75
Total Indirect Costs			13,894.75
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	75,105.10

J. Fee	Funds Requested (\$)*
	0.00

K. Budget Justification*	File Name:
	(Only attach one file.)

RESEARCH & RELATED Budget (F-K) (Funds Requested)

A. COMPONENT COVER PAGE

Project Title: NEUROSCIENCE AND BEHAVIOR RESEARCH UNIT

Component Project Lead Information:

Redacted by agreement

B. COMPONENT ACCOMPLISHMENTS**B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?**

The Neuroscience and Behavior (NB) Research Unit specializes in research on sociality, affective processes, cognition, neurobiology, and behavior, utilizing a true lifespan approach by studying animals from the prenatal through aged phases of life. Research in the Unit is translational in nature with the development of many new primate models of human disorders, and with an important focus on the influence of social life on physical and mental health. Core Scientists lead vibrant individual research programs that support the idea of convergence by bringing neurobiological, psychological, and social perspectives to the study of health and disease. Research programs in the NB Unit involve training of large numbers of undergraduates, graduate students, postdoctoral trainees, visiting students, and visiting scientists. Our Core Scientists also contribute significant service to the CNPRC through administrative positions and committee memberships. The NB Unit facilitates significant research programs by investigators outside of UC Davis, especially those interested in working in behavioral neuroscience; those working with monkeys in the rich social environment of our large, outdoor corrals; and those interested in working with the titi monkey colony.

Specific Aim 1. Advance the CNPRC resource through scientific contributions in the domains of neuroscience and behavior that contribute to the understanding and treatment of human psychological disorders and physical health outcomes across the age spectrum using nonhuman primate models. Core and Affiliate Scientists will conduct studies in social, affective, cognitive, and basic neuroscience that are designed to understand the biological mechanisms that contribute to disorders including autism, anxiety, cognitive aging, depression, loneliness, and schizophrenia. Research will also focus on the role of social and affective processes on health-related outcomes including inflammation, respiratory function, and immunity. An important emphasis will be on development of effective interventions, ranging from the pharmacological to the social, which can advance therapeutic treatments for human patients. Studies will utilize subjects from across the lifespan in order to understand the structural and functional changes in brain and behavior that precede clinically-relevant endpoints. Research in the NB Unit will also advance next generation, cutting-edge, technologies (e.g., DREADDs) to better understand the functioning brain.

Specific Aim 2. Contribute unique expertise and service toward utilization of the CNPRC resources by investigators at local, regional, and national levels. Core and Affiliate Scientists in the NB Unit will serve as collaborative hubs for investigators across the United States interested in studying the nervous system, behavior, and brain-behavior relationships in nonhuman primates. Core Scientists will provide their expertise to investigators at all levels, ranging from those who are inexperienced in conducting studies with nonhuman primates to those with substantial experience but who may lack the resources at their own institutions. The mechanisms by which Core Scientists will provide this expertise include collaborations on NIH-funded grant proposals, development of relationships with the private sector, participation in CNPRC-sponsored pilot research projects, and by facilitating access to unique resources in the Unit: the titi monkey colony and the BioBehavioral Assessment program.

Specific Aim 3. Mentor and train the next generation of nonhuman primate translational scientists in research focusing on neuroscience and behavior. Members of the NB Unit will provide training and mentoring opportunities for undergraduates, graduate students, postdoctoral fellows, visiting students and faculty, and junior investigators. Opportunities include participation in cutting-edge research in the Unit, including studies focused on social, affective, cognitive, and basic neuroscience and on the role of social and affective processes in health. Mentorship opportunities for external investigators will include collaborations via the CNPRC's pilot program. Core scientists will continue a formal summer internship program for advanced undergraduate students from Brigham Young University.

Specific Aim 4. Ensure the highest standards of responsible conduct of research and animal care. Core Scientists will continue to insure the responsible conduct of research through their adherence to the 3Rs and all animal welfare regulations. Importantly, Core scientists provide these perspectives to external investigators whose experience with animal (and nonhuman primate) research may be limited. Core scientists will also continue to provide their substantial expertise on rhesus and titi monkey behavior and physiology to enhance the well-being, behavioral management, and the continued success of these colonies.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File uploaded: B2 Accomplishments.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

Not Applicable

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

File uploaded: B.4. What opportunities for training and professional development has the project provided.pdf.pdf

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

In addition to presentations at scientific meetings, and publications in scientific journals and books, work from the NB Unit has been reported in the popular press. Some examples include:

<https://www.sciencedaily.com/releases/2018/05/180502174925.htm>

<https://www.inverse.com/article/37525-jealousy-monogamy-brain-scan-study>

During this time, [Redacted by agreement] gave seven national and international presentations on his research, including one associated with a tour at the Primate Center and directed at the lay audience. Additional public outreach was accomplished through the website BrainFacts.Org, for which [Redacted by agreement] served as Editor-in-Chief until January 2019.

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

[Redacted by agreement] plans to continue his ongoing studies for the biological basis of variation in sociality, as an animal model of the social deficit in autism spectrum disorder, and the neuroimmune sequelae of loneliness in adult male rhesus monkeys.

Over the next year, [Redacted by agreement] will primarily be addressing the development of three new monkey models of cognitive aging and Alzheimer's Disease (AD): 1) HIV-Associated Neurocognitive Disorders (HAND); 2) Tau-based model of the degenerative phase of AD; 3) Abeta Oligomer model of the synaptic phase of AD. In addition, we will expand the sophistication and resolution of our analysis of Zika-induced neuropathology in collaboration with [Redacted by agreement]

[Redacted by agreement] lab is currently conducting NICHD-funded research on the basic neurobiology of pair bonding in female titi monkeys. In addition, they have an NIMH-funded grant to develop methodologies for non-antibody-based visualization of oxytocin receptor.

[Redacted by agreement] will continue to develop her research program studying the neurobiology of emotion and social behavior across the lifespan, including carrying out work on how fetal Zika virus infection impacts development, the development of emotional reactivity during infancy, mood regulation during adulthood, and changes to the emotion system in old age.

[Redacted by agreement] lab will continue their ongoing MIA-model studies and initiate a new antigen-driven maternal autoantibody model.

B.2. What was accomplished under these goals?

Over the course of the reporting period, the Neuroscience and Behavior Unit significantly advanced our goals through scientific contributions and through support of the utilization of CNPRC resources.

1. The brain basis of the social communication deficits in autism spectrum disorder remain unknown, but evidence points to the peptides oxytocin and vasopressin in the brain. To test this idea, [Redacted by agreement] lab identified naturally-occurring low-social rhesus monkeys, and demonstrated, in two independent cohorts of monkeys, that social functioning is associated with concentrations of the peptide vasopressin in cerebrospinal fluid. We also found differences in vasopressin concentrations between a sample of autistic children and matched, medical controls. This project was a collaboration between [Redacted by agreement] and [Redacted by agreement] of Stanford University.
2. During this time frame [Redacted by agreement] lab made extensive progress on rat and monkey analyses of synaptic effects of age and estrogen, funded by Program Project grant from NIA entitled "Estrogen and the Aging Brain" (PO1 AG16765). In both rat hippocampus and monkey dorsolateral prefrontal cortex (dlPFC), they showed that estrogen promoted removal of the key NMDA receptor subunit GluN2B from synapses, protecting against age-associated excitotoxicity. In addition, they showed that the capacity of estrogen treatment to enhance cognitive performance in aged monkeys is retained for at least two years following ovariectomy, and is also retained for at least two years after cessation of treatment, which has important implications for postmenopausal women on estrogen therapy. With respect to monkey dlPFC with aging, they demonstrated that a phospho-tau variant generally associated with Alzheimer's disease is a natural constituent of excitatory synapses and likely plays a key role in proper synaptic function. In addition, they extended their demonstration of both the vulnerability of thin spines to aging and their important role in dlPFC-mediated working memory to the inferior parietal cortex, an area closely linked to dlPFC.
3. [Redacted by agreement] launched a highly collaborative investigation into the developmental neuropathology induced by Zika virus. This work to date has demonstrated that cortical abnormalities that likely impact function are induced by Zika in the absence of the classical pathology of microcephaly and that first trimester infections are more likely to end in fetal demise.
4. Oxytocin is a hormone that has been both implicated in the etiology of autism, as well as proposed as a treatment for autism; however, technological limitations have previously meant that the distribution of this receptor in human brain was unknown; an issue that was resolved when [Redacted by agreement] published a methods validation in April 2017. In a follow-up study, they found that oxytocin receptor differed in brains from typically developing and autism subjects. Typically developing subjects had higher oxytocin receptor binding in the ventral pallidum, while subjects with autism had higher binding in the nucleus basalis of Meynert. These findings have implications for our understanding of the neurobiology of autism, as well as the use of oxytocin as a treatment. [Redacted by agreement] also published articles using socially monogamous titi monkeys to explore the neurobiology of pair bond maintenance, as well as potential hormonal and neural substrates for intimate partner violence.
5. Decades of research demonstrate that monkeys are an excellent model for human cognitive aging, but emotional life changes over the lifespan and emotion-related pathology late may be a behavioral marker of neurodegenerative disease onset and also a cause of mortality. The [Redacted by agreement] Laboratory is carrying out basic science work to establish monkeys as a model emotional aging, and to date, has shown that hormone replacement therapy in an aged menopause model preserves youthful affective responding.
6. [Redacted by agreement] laboratory has continued to carry out neuroimaging of infant rhesus monkeys which were exposed to fetal maternal immune activation as a model of risk for schizophrenia and other psychiatric disorders. The cohort of 27 animals have been imaged through two years of age and a paper highlighting RPPR

the significant alterations in the trajectory of brain development is under preparation for submission in the first quarter of 2019. In addition [Redacted by agreement] group has continued to collaborate on neuroanatomical studies of medial temporal lobe regions involved in memory. The most recent publication has carried out a quantitative analysis of the entorhinal cortex, and interface between the cerebral cortex and the neocortex.

7. [Redacted by agreement] CNPRC based laboratory made progress in five areas of research: (i) Maternal Immune Activation Model, (ii) Treatment Studies, (iii) Novel Eye-Tracking Methods, (iv) Cross-species Comparisons and (v) Autism Antibody Model. A translational program of research using the maternal immune activation model is funded by the UC Davis Conte Center (P50MH106438) to explore the impact of prenatal immune challenge on offspring brain and behavioral development. During this time, Dr. [Redacted by agreement] lab submitted a manuscript documenting hyperdopaminergic function in the striatum of MIA-treated offspring from their pilot cohort. [Redacted by agreement] was invited to serve on an ACNP panel discussion focused on improving rigor and reproducibility of the MIA model and served as senior author on the resulting publication that highlights the unique contributions of the nonhuman primate model.
8. [Redacted by agreement] group made progress in a number of areas, including: 1) Using social network analysis to study how social network connectedness or structure may prove both beneficial to health by socially bottlenecking the spread of infectious agents, or detrimental by promoting the contact-mediated superspreading of such agents; 2) In rhesus macaques, under stable, non-stressed conditions there seems to be a trait-like association between adrenal responsivity and HCC in infancy and adulthood. However, this association may be reduced or eliminated under conditions of social stress; 3) Demonstrating that high rates of aggression do not translate to high rates of socially-inflicted trauma within rhesus social groups. Instead, groups in which high-ranked males police the conflict of their group members show the lowest rates of trauma. 4) Results from a [Redacted by agreement] Lab study show that the occurrence of insubordinate aggression is predicted by both intrinsic factors, such as age and body weight, and external factors, such as alliances. Because insubordination can precipitate social overthrow, determining predictors of insubordination will shed light on mechanisms underlying stability in nepotistic societies such as rhesus monkeys. 5) Investigating the effects of overnight separations on the urinary cortisol concentration of 20 differentially paired adult female rhesus macaques, finding that pairs with "Tense" relationships and overnight separations preventing tactile contact should be avoided. 6) Finding that macaques which were well-connected or formed "friendships" were socially buffered against infection from an enteric bacterial pathogen, *Shigella flexneri*. Yet in an unstable group, social connections enhanced infection risk via direct contact with (potentially) infected individuals. These findings broaden the functioning of social buffering, previously associated with stress-mitigating benefits, into infectious disease resistance.

B.4. What opportunities for training and professional development has the project provided?

1. The Neuroscience and Behavior Unit provides extensive training opportunities at the undergraduate, graduate, postdoctoral and faculty levels, both for local and visiting trainees.
2. The NB Unit has trained a large number of undergraduates during the reporting period (n = 94). These trainees typically spend at least two quarters in a lab undergoing rigorous, hands-on training in various aspects of neuroscience, cellular neurobiology, and behavior; as well as attending lab meetings, journal clubs and seminars. Many of these students go on to graduate, medical or veterinary school. In addition to UC-Davis undergraduates, we host visiting students; during this time period, the [Redacted by agreement] lab hosted three visiting students from Stanford. The [Redacted by agreement] lab also hosted 8 international students (mostly Master's students from French universities) during this period.
3. The NB Unit continues to host a summer internship program for advanced undergrads from Brigham Young University; typically there are 6-10 students per summer, who work on ongoing projects in multiple labs, as well as conduct their own studies under the direction of their BYU advisor, [Redacted by agreement]. The program is hosted locally by [Redacted by agreement].
4. Graduate student trainees are accepted through the Neuroscience, Psychology, and Animal Behavior training programs. Graduate student trainees have included [Redacted by agreement]
[Redacted by agreement]
5. Postdoctoral trainees have included [Redacted by agreement]
[Redacted by agreement]
[Redacted by agreement] is now a lecturer in Evolutionary Biology at the University of Wolverhampton and in August, [Redacted by agreement] will start a tenure-track Assistant Professor position at Utah State University.
6. [Redacted by agreement] has offered R, Network, Cytoscape and Access workshops for staff.

C. COMPONENT PRODUCTS

C.1 PUBLICATIONS

Not Applicable

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Not Applicable

C.3 TECHNOLOGIES OR TECHNIQUES

NOTHING TO REPORT

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Not Applicable

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Category	Explanation
Other	https://cnprc.ucdavis.edu/our-science/neuroscience-and-behavior/ Neuroscience and Behavior Unit home, history, and articles.

D. COMPONENT PARTICIPANTS

Not Applicable

E. COMPONENT IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

Not Applicable

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

NOTHING TO REPORT

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

Not Applicable

F. COMPONENT CHANGES

F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

NOTHING TO REPORT

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subjects**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. COMPONENT SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS
Not Applicable
G.2 RESPONSIBLE CONDUCT OF RESEARCH
Not Applicable
G.3 MENTOR'S REPORT OR SPONSOR COMMENTS
Not Applicable
G.4 HUMAN SUBJECTS
G.4.a Does the project involve human subjects?
No
G.4.b Inclusion Enrollment Data
Not Applicable
G.4.c ClinicalTrials.gov
Not Applicable
G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT
Not Applicable
G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)
Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?
No
G.7 VERTEBRATE ANIMALS
Not Applicable
G.8 PROJECT/PERFORMANCE SITES
Not Applicable
G.9 FOREIGN COMPONENT
Not Applicable
G.10 ESTIMATED UNOBLIGATED BALANCE
Not Applicable
G.11 PROGRAM INCOME
Not Applicable
G.12 F&A COSTS
Not Applicable

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

A. Senior/Key Person

Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*
1.	Redacted by agreement				Core Leader, Core Scientist	Institutional Base Salary	EFFORT			27,588.00	5,379.66	32,967.66
2.					Core Scientist, Emeritus					0.00	0.00	0.00
3.					Core Scientist					18,960.00	7,223.76	26,183.76
4.					Core Scientist					10,192.10	3,883.19	14,075.29
5.					Core Scientist					11,909.46	2,322.34	14,231.80
6.					Core Scientist					0.00	0.00	0.00
7.					Core Scientist					18,387.00	9,432.53	27,819.53

Total Funds Requested for all Senior Key Persons in the attached file

Additional Senior Key Persons:

File Name:

Total Senior/Key Person

115,278.04

B. Other Personnel

Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
1	Secretarial/Clerical	3.0			9,547.38	4,897.81	14,445.19
1	Total Number Other Personnel					Total Other Personnel	14,445.19
					Total Salary, Wages and Fringe Benefits (A+B)		129,723.23

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

C. Equipment Description	
List items and dollar amount for each item exceeding \$5,000	
Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	0.00
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel	Funds Requested (\$)*
1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	0.00
2. Foreign Travel Costs	0.00
Total Travel Cost	0.00

E. Participant/Trainee Support Costs	Funds Requested (\$)*
1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

F. Other Direct Costs		Funds Requested (\$)*
1. Materials and Supplies		3,395.00
2. Publication Costs		6,790.00
3. Consultant Services		0.00
4. ADP/Computer Services		0.00
5. Subawards/Consortium/Contractual Costs		0.00
6. Equipment or Facility Rental/User Fees		0.00
7. Alterations and Renovations		0.00
Total Other Direct Costs		10,185.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	139,908.23

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. MTDC	22.7	139,908.23	31,759.17
Total Indirect Costs			31,759.17
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	171,667.40

J. Fee	Funds Requested (\$)*
	0.00

K. Budget Justification*	File Name:
	(Only attach one file.)

RESEARCH & RELATED Budget (F-K) (Funds Requested)

A. COMPONENT COVER PAGE

Project Title: INFECTIOUS DISEASES RESEARCH UNIT

Component Project Lead Information:

Redacted by agreement

B. COMPONENT ACCOMPLISHMENTS**B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?**

The Infectious Disease Research (ID) Unit at the California National Primate Research Center (CNPRC) develops and advances nonhuman primate models of acute and chronic infectious diseases on a wide range of infectious pathogens and uses these models for studies of mechanisms of infectious agent pathogenesis, transmission, and development of novel vaccines and therapies. Additionally, the Unit's research is contributing to the management and health of the nonhuman primates housed at the CNPRC through development of infectious disease diagnostics used for maintaining specific-pathogen free animals and through pathogenesis and transmission studies, thus ensuring availability of high-quality subjects for many biomedical research applications. Members of this Unit also engage the expertise of other CNPRC Scientific Research Units and Cores as well as existing campus resources and programs to facilitate basic host-pathogen research studies in nonhuman primates, and seek opportunities for potential translation of these studies into clinical application. Importantly, this Unit closely aligns with the prominent theme of "One Health" at UC Davis through appointments in the Center for Comparative Medicine (CCM), the Schools of Medicine (SOM) and Veterinary Medicine (SVM), and interactions with the Clinical and Translational Sciences Center (CTSC). Infectious disease studies in this Unit are performed with well-established analytical methods as well as emerging "-omics" and imaging approaches and technologies that build on robust intramural and extramural collaborations including scientists in both academia and industry. Such collaborations will enable ID Unit members, together with other CNPRC scientists, to embrace the concept of "convergence" by bringing together investigators from different fields of study, including bioinformatics and novel live-phase imaging modalities (bioengineering), for optimal development and use of preclinical nonhuman primate models of infectious diseases. Importantly the expertise of the ID Unit can be readily deployed to address emerging and re-emerging pathogens; a recent example is the development of the Zika virus infection model in macaques at CNPRC.

Specific Aim 1. Advance the CNPRC resource through scientific contributions to understanding hostpathogen interactions and treatment of infectious diseases across the age spectrum. The ID Unit will advance the CNPRC resource through scientific contributions towards the understanding of host-pathogen interactions and treatment of infectious diseases. Accordingly, Unit members fulfill several functions: (1) conduct mechanistic and interventional studies using the nonhuman primate as a laboratory animal model for infectious diseases, (2) contribute towards the understanding of lifespan health by investigating immune ontogeny and aging, particularly in relation to host responses to pathogen infection, the role of persistent infections on immune function, and age-related changes in vaccine responses, and (3) provide scientific expertise to advance the development of novel microbiome resources for nonhuman primates. Pathogens include simian immunodeficiency virus, Zika virus, cytomegalovirus, herpes simplex virus, and *Helicobacter pylori*. The commitment of the Provost and respective Deans of the Schools of Medicine and Veterinary Medicine, and the Colleges of Biological Sciences, Engineering, and Letters and Sciences to new faculty positions includes two ID Unit Core Scientist positions. One of the new faculty recruitments is proposed at the junior investigator level and one with a more established research program.

Specific Aim 2. Provide nonhuman primate expertise and services to investigators at the regional and national levels to advance NIH-supported research excellence. The ID Unit provides unique expertise and service towards enhancement of CNPRC resources as related to infectious diseases, at both a regional and national level. This includes development of methodologies and reagents using the nonhuman primate as a laboratory animal model, and involves interactions with the Pathogen Detection Lab and collaborations with extramural investigators.

Specific Aim 3. Mentor and train the next generation of translational nonhuman primate investigators. A central mission is to mentor and train new investigators at all career stages in the development of expertise in the design and study of nonhuman primate models of human health and disease, team science, and the conduct of multidisciplinary translational investigations, including participation in Pilot Projects. The CNPRC has partnered with the CCM in developing a weekly meeting series that provides a venue for robust discussion of ongoing and planned research in animal models; this dynamic meeting approach benefits early stage scientists in the design and conduct of experimental studies as well as in preparing grant applications and manuscripts.

Specific Aim 4. Ensure the highest standards of animal care and research for the CNPRC resource. ID Unit Core Scientists will continue to play an active role in maintaining the health of CNPRC colony animals through participation in the Colony Management Committee, Infection Control Committee, and other key infrastructure and administrative functions related to immunology and infectious diseases.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File uploaded: B2 Accomplishments.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

Not Applicable

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

File uploaded: B.4. What opportunities for training and professional development has the project provided.pdf

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

ID Unit members publish their nonhuman primate research studies in peer-reviewed, open access scientific journals. In addition, ID Unit members and their laboratory personnel give oral and poster presentations at national scientific conferences. Most of the work related to HIV and AIDS at the center has been presented at the 35th and 36th Annual Symposium on Nonhuman Primate Models of HIV/AIDS. At these meetings, researchers from national and international academic institutions as well as from private industry presented new findings in AIDS research based primarily on studies in nonhuman primates. The symposia also provided forums for discussions between clinicians and researchers on best utilization of nonhuman primate models of HIV infection and pathogenesis to enhance translation of prevention, treatment, and cure findings to HIV patients.

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

The Core and Affiliate scientists in the Unit will continue to conduct and expand their own research programs, foster collaborations with outside scientists, contribute to the CNPRC resources, and train individuals at all levels of research with nonhuman primates.

HIV/AIDS research

- Expand studies of reservoir depletion therapies to achieve cure and develop HIV/SIV vaccine strategies.
- Test the ability of vaginal rings containing CD4-mimetics to block vaginal transmission of SHIV in macaques.
- Test the ability of vaginal rings containing a combination of synthetic estrogens and progestins to block vaginal transmission of SHIV.

Zika-related research

- Test efficacy of monoclonal antibodies against congenital zika syndrome.

Microbiome-related research

- Demonstrate the role of early life microbiome on vaccine-elicited immune response in macaques.
- Demonstrate the role of the early life microbiome on bio behavior of rhesus macaques.
- Determine the temporal changes of the gut microbiome of the SPF animals at CNPRC.

Vaccine research

- Test mucosal HIV vaccines to prevent oral HIV transmission.
- Test Chikungunya VLP vaccine in a cynomolgus macaque model.
- Test a nanoparticle-based vaccine targeting PCSK9 to lower low-density lipoprotein cholesterol (LDL-C) in non-human primates.
- Develop a novel vaccine against multidrug-resistant gonorrhea. The objective of the proposed studies is to optimize the dose regimen of a novel *Neisseria gonorrhea* vaccine aimed at inducing protective antibody responses.
- Develop and test universal influenza vaccines using an RNA vaccine platform in macaques.
- Test a self-replicating and disseminating version of RhCMV expressing the EBOV glycoprotein vaccine in rhesus macaques.

B.2. What was accomplished under these goals?

HIV/AIDS research:

[Redacted by agreement] demonstrated that anti-CD3/CCR5 bispecific antibodies can achieve long-term depletion of the vast majority of CCR5+ cells from blood and tissue for reducing available T cell targets of virus infection. Results from the ongoing work using this target depletion strategy demonstrated cure in 2 of 7 SIV-infected infant macaques administered ART treatment beginning one week after infection. The investigators also found that rIL-21-IgFc treatment decreases immune activation and maintains effective antiviral responses by CD8+ T cells in blood, but this maintenance is not associated with lower viral loads. The rIL-21-IgFc treatment also did not generally support Th17 cell populations, but Th17 cells remained strongly and independently associated with control of plasma viremia. Moreover, two strategies for HIV latency reversal were tested. The first strategy involved collaborative work between [Redacted by agreement] who found that HIV latency is reversed by ACSS2-driven histone crotonylation, supporting continued work on a new class of latency-reversing agents (LRAs). In the second strategy, a traditional Chinese medicine agent, Euphorbia kansui, was tested as an LRA in SIV-infected and ART-suppressed rhesus macaques. This medicine showed promise in being safe and inducing increased SIV RNA:DNA levels (i.e. latency reversal) among treated animals.

[Redacted by agreement] in close collaboration with [Redacted by agreement] (Duke) and [Redacted by agreement] (UNC), are using a pediatric rhesus macaque model to develop HIV vaccine strategies aimed at reducing the risk of postnatal HIV transmission through breastfeeding.

[Redacted by agreement] reported that increased monocyte turnover is associated with reactivation of latent tuberculosis in SIV and Mtb co-infected rhesus macaques. Their studies also applied mathematical modeling to demonstrate changes in neutrophil and macrophage kinetics during natural aging in rhesus macaques.

Cytomegalovirus (CMV) research:

Collaborative work between [Redacted by agreement] showed that subclinical cytomegalovirus (CMV) infection heightens host immunity and gut microbiota changes in response to environmental exposures. This may contribute to the heterogeneity in host immune responses to vaccines and environmental stimuli at the population level.

Dr Barry continued working with investigators from Duke University [Redacted by agreement] and Tulane University [Redacted by agreement] to optimize the utility of the NHP model of congenital HCMV transmission. Two major findings were reported: (1) Plasmablast responses to RhCMV infection have been characterized and reveals characteristics of the early maternal RhCMV-specific humoral immune responses to primary RhCMV infection in rhesus monkeys. (2) The presence of durable and potentially neutralizing antibodies (NAb) at the time of primary RhCMV infection could prevent transmission of maternal RhCMV to the fetus, and therefore, CMV-specific NAb should be a primary target of vaccines to eliminate this congenital infection.

Zika-related research:

Zika virus (ZIKV) infection of pregnant women can cause fetal microcephaly and other neurologic defects. Scientists in the NB Units and ID Units [Redacted by agreement] have developed a nonhuman primate model of congenital Zika virus infection. In a collaborative research project with scientists at the Blood Systems Research Institute/UC San Francisco, scientists at CNPRC have performed a series of studies using rhesus macaques to understand the transfusion transmissibility of ZIKV relative to nucleic acid testing (NAT) detectability. In an additional collaborative study with scientists at the US

FDA, the investigators determined the comprehensive tissue/organ distribution of ZIKV in experimentally infected macaques with virus assays identical to those used in clinical practice.

In collaboration with investigators at NIH [Redacted by agreement] and Duke University [Redacted by agreement] a Zika DNA vaccine was tested for efficacy in a pregnancy model. The vaccine protected the dams against prolonged viremia and also protected the fetuses against infection and brain pathology. In an additional collaboration with investigators at Rockefeller University [Redacted by agreement] [Redacted by agreement] monoclonal antibodies were found to protect nonpregnant macaques from ZIKV infection.

Herpes simplex virus 2 (HSV-2) research:

Research led by [Redacted by agreement] examined herpes simplex virus 2 (HSV-2) which is a common sexually transmitted infection with a highly variable clinical course. Many infections quickly become subclinical, with episodes of spontaneous virus reactivation. During this reporting cycle, an animal model of subclinical HSV-2 infection that simulates human infection has been successfully developed.

Microbiome related research:

Microbiome studies are underway to develop novel approaches for infectious disease therapy. These studies were initiated by [Redacted by agreement] at UCSF to expand characterization of the microbiome in relation to immune responses in human babies that are being evaluated in [Redacted by agreement] laboratory at UC Davis CNPRC.

Cervicovaginal bacteria cause inflammation that in turn increases risk for HIV infection. Profiling the cervicovaginal microbiome, therefore, is instrumental for vaccine development. Toward that aim, Dr. [Redacted] showed that the microbiome profile captured by cervicovaginal lavage is comparable to samples obtained by vaginal swabs which is a less invasive procedure and thus may serve as a relevant and repeated sampling strategy in NHP vaccine studies.

Helicobacter pylori research:

The gastric pathogen, *H. pylori* is prevalent in all developing countries and causes peptic ulcer and gastric cancer, the second most common cause of cancer death. [Redacted by agreement] studies both bacterial and host factors critical for infection, colonization, and pathogenesis in a wide age-range of rhesus macaques. In this animal model [Redacted by agreement] and his collaborators examined the interplay between expression of host glycans that serve as receptors for *H. pylori*, and expression of bacterial outer membrane proteins (OMPs) that serve as adhesins. Recent evidence clearly demonstrates that while *H. pylori* causes gastric disease, it also protects against asthma and other inflammatory diseases. To examine this in the rhesus macaque model, the Solnick lab members collaborated with [Redacted by agreement] to examine the effect of *H. pylori* on airway epithelial cells. The results suggest that *H. pylori* can elicit IL-8 in primary pediatric airway epithelium in a type IV secretion dependent manner that has implications on pathogenesis and targeting intervention strategies.

Vaccine research:

Effects of RhCMV infection and RhCMV-vectored SIV vaccines are being examined in collaborative work with [Redacted by agreement] both ID Unit) as well as [Redacted by agreement] (Center for Comparative Medicine). They demonstrated that subclinical cytomegalovirus infection associates with altered host immunity, gut microbiota and vaccine responses. A spectrum of immune responses to various RhCMV-vectored SIV vaccines, some with mutations in immunomodulatory genes carried by the virus will be studied next.

Influenza A virus (IAV) vaccines offer little protection from mismatched viruses with antigenically distant hemagglutinin (HA) glycoproteins. [Redacted by agreement] began studies to determine if a cationic lipid/DNA complex (CLDC) adjuvant could induce heterosubtypic protection if added to a whole inactivated IAV vaccine.

To develop a meningococcal vaccine, [Redacted by agreement] in close collaboration with investigators at Children's Hospital Oakland Research Institute (CHORI), is testing the immunogenicity of novel meningococcal vaccines that would improve upon currently existing vaccines.

In collaborative work with the Primate Medicine Unit, [Redacted by agreement] studied a modified dose of canine distemper-measles (CDM) vaccine in rhesus macaques for assessing efficacy. The results of this study demonstrated that the quarter dose was less effective at inducing antibodies while the groups receiving the full dose or half a dose expressed similar antibody titers at 12 months after vaccination. By using a half dose, the 50% cost reduction may provide sufficient monetary incentive to maintain and/or modify measles virus vaccination programs at NHP facilities.

CMV Vaccine. [Redacted by agreement] and collaborators demonstrated in the RhCMV model of HCMV infection that rhesus macaques immunized against the viral IL-10 protein manifest delayed RhCMV acquisition and altered immune responses to the infection when it does occur. The results demonstrate that viral IL-10 is a key regulator of successful host immune responses to RhCMV, and viral IL-10 represents an important target for vaccine strategies against CMV.

B.4. What opportunities for training and professional development has the project provided?

ID Unit investigators mentors and train graduate students, post-doctoral fellows, and undergraduate students. Each mentor meets on a regular basis with each trainee to discuss project goals and research progress.

C. COMPONENT PRODUCTS

C.1 PUBLICATIONS

Not Applicable

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Not Applicable

C.3 TECHNOLOGIES OR TECHNIQUES

NOTHING TO REPORT

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Not Applicable

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Category	Explanation
Other	https://cnprc.ucdavis.edu/our-science/infectious-diseases/ Infectious Diseases Unit home, history, and articles.

D. COMPONENT PARTICIPANTS

Not Applicable

E. COMPONENT IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

Not Applicable

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

NOTHING TO REPORT

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

Not Applicable

F. COMPONENT CHANGES

F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

NOTHING TO REPORT

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subjects**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. COMPONENT SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS

Not Applicable

G.2 RESPONSIBLE CONDUCT OF RESEARCH

Not Applicable

G.3 MENTOR'S REPORT OR SPONSOR COMMENTS

Not Applicable

G.4 HUMAN SUBJECTS**G.4.a Does the project involve human subjects?**

No

G.4.b Inclusion Enrollment Data

Not Applicable

G.4.c ClinicalTrials.gov

Not Applicable

G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT

Not Applicable

G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)

Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?

No

G.7 VERTEBRATE ANIMALS

Not Applicable

G.8 PROJECT/PERFORMANCE SITES

Not Applicable

G.9 FOREIGN COMPONENT

Not Applicable

G.10 ESTIMATED UNOBLIGATED BALANCE

Not Applicable

G.11 PROGRAM INCOME

Not Applicable

G.12 F&A COSTS

Not Applicable

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

A. Senior/Key Person

Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*
1.	Redacted by agreement				Unit Leader, Core Scientist	Institutional Base Salary				37,920.00	14,447.52	52,367.52
2.					Core Scientist					18,960.00	3,697.20	22,657.20
3.					Core Scientist					9,480.00	3,611.88	13,091.88
4.					Core Scientist					18,960.00	7,223.76	26,183.76
5.					Core Scientist					18,960.00	3,697.20	22,657.20
6.					Core Scientist					14,912.70	5,681.74	20,594.44
7.					Core Scientist					12,420.00	3,837.78	16,257.78
8.					Core Scientist, Emeritus					0.00	0.00	0.00
9.					Core Scientist, Emeritus					0.00	0.00	0.00

Total Funds Requested for all Senior Key Persons in the attached file

Additional Senior Key Persons: File Name:

Total Senior/Key Person 173,809.78

B. Other Personnel

Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
	Secretarial/Clerical						
1	Technical Support	3.0			21,289.50	10,921.51	32,211.01
1	Total Number Other Personnel					Total Other Personnel	32,211.01
					Total Salary, Wages and Fringe Benefits (A+B)		206,020.79

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

C. Equipment Description

List items and dollar amount for each item exceeding \$5,000

Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	0.00
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel

Funds Requested (\$)*

1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	3,880.00
2. Foreign Travel Costs	0.00
Total Travel Cost	3,880.00

E. Participant/Trainee Support Costs

Funds Requested (\$)*

1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

F. Other Direct Costs		Funds Requested (\$)*
1. Materials and Supplies		3,880.00
2. Publication Costs		3,880.00
3. Consultant Services		0.00
4. ADP/Computer Services		0.00
5. Subawards/Consortium/Contractual Costs		0.00
6. Equipment or Facility Rental/User Fees		0.00
7. Alterations and Renovations		0.00
Total Other Direct Costs		7,760.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	217,660.79

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. MTDC	22.7	217,660.79	49,409.00
Total Indirect Costs			49,409.00
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	267,069.79

J. Fee	Funds Requested (\$)*
	0.00

K. Budget Justification*	File Name:
	(Only attach one file.)

RESEARCH & RELATED Budget (F-K) (Funds Requested)

A. COMPONENT COVER PAGE

Project Title: REPRODUCTIVE SCIENCES AND REGENERATIVE MEDICINE RESEARCH UNIT

Component Project Lead Information:

Redacted by agreement

B. COMPONENT ACCOMPLISHMENTS**B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?**

Core Scientists contribute to the California National Primate Research Center (CNPRC) mission through NIH supported programs and publications; by service to the greater research community; by enhancing the nonhuman primate resource with new assay and model development, innovative in vivo imaging tools and biomarkers, and participation in the management of the nonhuman primate colonies; and by mentoring the next generation of investigators in the use of the monkey as a model for human health and disease. Core Scientists have outstanding track records in the formation of multidisciplinary partnerships and teams that embrace convergence as demonstrated by grants, publications, and leadership positions in UC Davis Centers and programs. Examples include the NIH-supported Clinical and Translational Science Center and West Coast Metabolomics Center; Stem Cell Program, Institute for Regenerative Cures, and Good Manufacturing Practices Facility; Center for Molecular and Genomic Imaging and Radiochemistry Research and Training Facility; and Center for Health and the Environment. Core and Affiliate Scientists bring their extensive expertise and strong track records as collaborative hubs for multidisciplinary partnerships in lifespan health—from early developmental stages through aging populations; regenerative medicine, tissue engineering, and gene therapy; translational in vivo imaging; and the conduct of investigational new drug (IND)-enabling studies for clinical translation. Core Scientists contribute substantially to the CNPRC mission by enhancing the resource, mentoring trainees and new Core and Affiliate Scientists, and supporting convergence as an approach to addressing human health challenges. The goals for the next funding period include the following:

Specific Aim 1. Advance the CNPRC resource through scientific achievements and research excellence focused on the developmental underpinnings of disease, regenerative medicine and gene therapy, precision health, and translational in vivo imaging. Plan. The goals for the next funding period support convergence by engaging a broad range of scientific expertise exemplified by collaborative teams that will develop and validate precision models; track cells and teratogenic viruses; and partner across research domains on common areas of interest such as the role of inflammation in disease. Reproductive health is tightly linked with the CNPRC's focus on lifespan health, and the impact of environmental exposures on development and during lifetime transitions. Long-standing expertise in organ and immune ontogeny will be crucial in the focus on infectious teratogens (e.g., Zika virus). Progress in the regenerative medicine/tissue engineering and gene therapy fields will build on existing strengths such as xenogeneic primates and innovative in vivo imaging methods that address crucial gaps and roadblocks to translation. These efforts include the Precision Medicine Toolbox where tools are tailored to age and disease (e.g., fetal, infant, aged; blood and kidney disorders). Teams will utilize gene editing approaches to develop new animal models of disease, and in vivo imaging will focus on precision tools and biomarkers that will enable convergence on novel hypotheses.

Specific Aim 2. Contribute unique expertise and services to enhance the CNPRC as a local, regional, and national resource. Plan. The extensive expertise of Core Scientists contributes to an infrastructure of services in established Cores (e.g., Flow Cytometry, Multimodal Imaging, Primate Assay); through outreach efforts in the NHLBI Center for Fetal Gene Transfer for Heart, Lung, and Blood Diseases; in grants and contracts where Core Scientists serve as collaborative hubs; and through public-private partnerships. Core Scientists also maintain biorepositories of cells and tissues for collaborative opportunities, pilot projects, and NIH grant submissions.

Specific Aim 3. Mentor and train the next generation of translational nonhuman primate investigators. Plan. Core Scientists ensure trainees at all career stages develop expertise in primatology; the design, development, and study of nonhuman primate models of human health and disease; team science; and the conduct of multidisciplinary translational investigations that support convergence. Core/Affiliate Scientists will continue to provide quality mentoring to undergraduate and graduate trainees; participate in training programs for fellows and junior faculty (e.g., Building Independent Research Careers in Women's Health; CTSC T and K programs; K12s); serve as Instructors-of-Record for campus core courses; plan seminars, symposia, and workshops; and mentor junior and mid-career Affiliate Scientists along a path towards integration as Core Scientists in priority areas (e.g., developmental disorders, regenerative medicine, translational imaging).

Specific Aim 4. Promote high standards of research excellence and animal care. Plan. Core Scientists will continue to contribute their expertise to ensure high quality standards and research excellence through collaborative research teams, Cores, and outreach programs; support of the primate colonies; through participation in the UC Davis campus Animal Care and Biosafety Programs; and by providing investigators nationwide the essential engagement to ensure rigor and reproducibility for their research.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File uploaded: B2 Accomplishments.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

Not Applicable

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

File uploaded: B.4. What opportunities for training and professional development has the project provided.pdf.pdf

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

Through established websites (e.g., Primate Center, UC Davis Office of Research), meetings with individuals and groups, faculty meetings, special symposia, and conferences.

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

A priority is Precision Health with a focus on the early onset of disease, early life genomics, regenerative medicine/gene therapy, somatic cell genome editing, healthy aging, and translational in vivo imaging; developing and validating precision primate models of human disease; and designing new imaging biomarkers and quantitative imaging tools. Core Scientists will continue to build and sustain partnerships and multidisciplinary collaborative opportunities, in addition to new NIH grants and public-private partnerships. Reproductive Sciences and Regenerative Medicine Unit Core and Affiliate Scientists will ensure that trainees at all career stages are mentored in the design, development, and study of nonhuman primate models of human disease; team science; and the conduct of multidisciplinary translational investigations.

B.2. What was accomplished under these goals?

Core Scientists in the Reproductive Sciences and Regenerative Medicine Unit contribute to the CNPRC mission through NIH-supported research programs and peer-reviewed publications (31 in the current reporting period); services to the greater research community in Primate Center Cores (e.g., Flow Cytometry Core, Multimodal Imaging Core), NIH-supported Centers (e.g., Gene Therapy Center) and outreach programs; by enhancing the nonhuman primate resource with new assay and model development, innovative in vivo imaging methods, and participating in the management of the reproductive colony; and by mentoring the next generation of investigators in the use of the monkey as a model for human health and disease (17 undergraduates, 8 graduate students, 25 in the pluripotent stem cell training course, 5 postdoctoral trainees, 3 pilot recipients). Unit Core Scientists continue to serve in leadership roles in UC Davis Centers and programs including the NIH-supported Clinical and Translational Science Center (CTSC) and Comprehensive Cancer Center; the UC Davis Stem Cell Program; and the Center for Molecular and Genomic Imaging (CMGI) and Radiochemistry Research and Training Facility. Unit Core Scientists bring their unique expertise and strong track record to collaborative multidisciplinary partnerships and teams in gamete biology and reproductive toxicology; organ system and immune ontogeny; regenerative medicine, stem cell transplantation, tissue engineering, and gene therapy; lifespan health—from the earliest developmental stages to aging populations; in vivo imaging for translational research; and the conduct of pre-clinical and investigational new drug (IND)-enabling studies for clinical translation. The depth and breadth of expertise and services contributes substantially to the Primate Center mission, significantly enhances the resource, and ensures that investigators nationwide can conduct innovative state-of-the-art investigations with nonhuman primates at the highest quality level.

Examples of accomplishments during the current reporting period include:

- Treatment options for kidney disease, a growing health concern across age groups, are limited, and there are few kidney donors to meet the demand. Studies have focused on new scaffolds and organoid cultures that utilize developmental principles to differentiate pluripotent stem cells towards renal lineages, and with the goal of repairing kidneys damaged by obstructive renal disease.
- The NHLBI Center for Fetal Monkey Gene Transfer for Heart, Lung, and Blood Diseases, established in 2001, continues to serve as a unique resource that addresses essential questions in gene delivery and provides NHLBI-funded investigators collaborative opportunities to test new vector constructs that advance the field.
- Examples of preclinical studies that addressed long-term safety with lentiviral or adeno-associated virus (AAV) vectors have provided the necessary data to gain approval for the conduct of new clinical trials in children (e.g., Pompe disease, Canavan's disease).
- The liver is a major off-target organ in gene therapy approaches for musculoskeletal disorders. Studies compared the muscle tropism and transduction efficiency of a liver de-targeted AAV variant following systemic administration in rhesus monkeys. Results indicated sustained levels of expression in skeletal muscle over two years and validated the translational potential and safety of such vectors for gene therapy of muscle-related diseases in humans such as Duchenne muscular dystrophy.
- NIH-funded studies are focused on developing an innovative approach to translational nonhuman primate models of human congenital diseases using breakthrough technologies in genetic engineering. The outcome of these studies will demonstrate the feasibility of this new approach for primate models of human congenital diseases that will be predictive for modeling human-derived mutations.
- Congenital Zika Syndrome remains a global public health concern. Zika virus has met Redacted by agreement criteria for teratogenic classification because of the brain malformations reported. Three NIH-funded grants are addressing the direct relationship between infection prenatally versus at birth, the interactions between early neural precursor cells and microglia, and the relationship of the maternal immune system to prenatal and postnatal outcomes. Studies also focus on the use of in vivo imaging methods to monitor viral trafficking during pregnancy.
- Microglia begin colonizing the primitive forebrain after neural tube closure and populate regions of the developing cortex that include the proliferative zones. To better define cellular interactions between

microglia and proliferative cells, lentiviral vector-mediated gene transfer was performed to label early gestation fetal cerebrocortical cells to express the enhanced green fluorescent protein. These published studies showed that microglial cells make extensive contacts with neural precursor cells throughout the proliferative zones and that microglial cells contribute to the interactive milieu in which cortical precursor cells function. Studies also highlighted a distinct subset of microglial cells, which have been called based on location, periventricular microglia.

- Understanding why some oocytes do not mature is essential to understanding infertility. Studies have shown that failed-to-mature primate oocytes complete a large portion of the transition in transcriptome composition associated with normal maturation, but manifest numerous differences that indicate incomplete transcriptional repression and cytoplasmic maturation affecting multiple processes.
- Trophoblast stem cells are crucial for embryo implantation and placentation. Environmental toxicants that compromise their function could impact fetal viability, pregnancy, and progeny health. Low-level chronic exposure of nonhuman primate trophoblast stem cells to environmental toxicants has shown negative effects on cytokine signaling and other pathways for DNA repair and cell migration.
- Obesity is reaching pandemic proportions and is a major risk factor for certain malignancies, but the impact of obesity on immune responses in general and in cancer immunotherapy is poorly understood. Studies demonstrated, across multiple species and models, that obesity results in increased immune aging, tumor progression, and PD-1-mediated T-cell dysfunction which is driven, at least in part, by leptin.
- A retrospective analysis of cohorts of animals from the BioBehavioral Assessment Program were shown to exhibit responses that were associated with either adiposity or weight gain during pregnancy. These results amplify public health concerns implicating maternal adiposity with postnatal neurobehavioral outcomes.
- Seminal studies in nonhuman primates have focused on using the scaled primate EXPLORER total-body positron emission tomography (PET) scanner to develop new imaging protocols that will be safe and efficacious for use in humans (see Multimodal Imaging Core).

Other accomplishments during the current reporting period include:

- Core Scientist [Redacted by agreement] (joint appointment in Infectious Diseases Unit) was named a 2019 Chancellor's Fellow, the university's annual honors program recognizing associate professors for high achievement in the quality and excellence of research and teaching.
- Core Scientist [Redacted by agreement] was named the 2018 recipient of the prestigious Paul C. Aebersold Award for outstanding achievement in basic nuclear medicine science by the Society of Nuclear Medicine and Molecular Imaging.
- Affiliate Scientist [Redacted by agreement] transitioned to a Core Scientist during the current review period. [Redacted by agreement] has expertise in quantitative imaging science, and he has developed mathematical methods and computational pipelines for image segmentation, registration, and image analysis, including the assessment of machine learning approaches. He complements the Unit's leadership and long-standing commitment to translational in vivo imaging, and disorders associated with lifespan health and aging, including those that focus on sex-related differences.
- New NIH-funded grants and studies with industry partners (12).
- Peer-reviewed publications (31).

B.4. What opportunities for training and professional development has the project provided?

Many studies conducted in the Unit include a range of trainees (undergraduate [17] to graduate students [8], and postdoctoral fellows [5]). In addition, graduate students have received training in the pluripotent stem cell training course offered in the Translational Human Stem Cell Shared Research facility (25). Junior faculty new to primate research and their trainees have been mentored and trained through funded pilot projects (3).

C. COMPONENT PRODUCTS

C.1 PUBLICATIONS

Not Applicable

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Not Applicable

C.3 TECHNOLOGIES OR TECHNIQUES

Category	Explanation
Other	https://research.ucdavis.edu/ Established UC Davis Office of Research website.
Other	https://cnprc.ucdavis.edu/ Established websites include the Primate Center website.

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Not Applicable

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Category	Explanation
Other	https://cnprc.ucdavis.edu/our-science/reproductive-sciences-and-regenerative-medicine/ Reproductive Sciences and Regenerative Medicine Unit home, history, and articles.

D. COMPONENT PARTICIPANTS

Not Applicable

E. COMPONENT IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

Not Applicable

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

NOTHING TO REPORT

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

Not Applicable

F. COMPONENT CHANGES

F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

NOTHING TO REPORT

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subjects**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. COMPONENT SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS

Not Applicable

G.2 RESPONSIBLE CONDUCT OF RESEARCH

Not Applicable

G.3 MENTOR'S REPORT OR SPONSOR COMMENTS

Not Applicable

G.4 HUMAN SUBJECTS**G.4.a Does the project involve human subjects?**

No

G.4.b Inclusion Enrollment Data

Not Applicable

G.4.c ClinicalTrials.gov

Not Applicable

G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT

Not Applicable

G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)

Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?

Yes

hESC Registration number(s) from the NIH Registry:

0043

0062

The explanation of a change in the use of hESCs

G.7 VERTEBRATE ANIMALS

Not Applicable

G.8 PROJECT/PERFORMANCE SITES

Not Applicable

G.9 FOREIGN COMPONENT

Not Applicable

G.10 ESTIMATED UNOBLIGATED BALANCE

Not Applicable

G.11 PROGRAM INCOME

Not Applicable
G.12 F&A COSTS
Not Applicable

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

A. Senior/Key Person

Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*
1.	Redacted by agreement				Unit Leader	Institutional Base Salary	EFFORT			37,920.00	7,394.40	45,314.40
2.					Core Scientist					18,960.00	7,223.76	26,183.76
3.					Core Scientist					5,688.00	2,167.13	7,855.13
4.					Core Scientist					9,480.00	2,929.32	12,409.32
5.					Core Scientist, Emeritus					0.00	0.00	0.00
6.					Core Scientist, Emeritus					0.00	0.00	0.00

Total Funds Requested for all Senior Key Persons in the attached file

Additional Senior Key Persons:

File Name:

Total Senior/Key Person

91,762.61

B. Other Personnel

Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
	Secretarial/Clerical						
2	Technical Support	2.28			14,647.03	7,513.93	22,160.96
2	Total Number Other Personnel					Total Other Personnel	22,160.96
					Total Salary, Wages and Fringe Benefits (A+B)		113,923.57

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

C. Equipment Description

List items and dollar amount for each item exceeding \$5,000

Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	0.00
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel

Funds Requested (\$)*

1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	0.00
2. Foreign Travel Costs	0.00
Total Travel Cost	0.00

E. Participant/Trainee Support Costs

Funds Requested (\$)*

1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

F. Other Direct Costs		Funds Requested (\$)*
1. Materials and Supplies		2,910.00
2. Publication Costs		5,820.00
3. Consultant Services		0.00
4. ADP/Computer Services		0.00
5. Subawards/Consortium/Contractual Costs		0.00
6. Equipment or Facility Rental/User Fees		0.00
7. Alterations and Renovations		0.00
Total Other Direct Costs		8,730.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	122,653.57

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. MTDC	22.7	122,653.57	27,842.36
Total Indirect Costs			27,842.36
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	150,495.93

J. Fee	Funds Requested (\$)*
	0.00

K. Budget Justification*	File Name:
	(Only attach one file.)

RESEARCH & RELATED Budget (F-K) (Funds Requested)

A. COMPONENT COVER PAGE

Project Title: RESPIRATORY DISEASES RESEARCH UNIT

Component Project Lead Information:

Redacted by agreement

B. COMPONENT ACCOMPLISHMENTS**B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?**

The mission of the Respiratory Diseases (RD) Research Unit is to improve human health by conducting fundamental investigations and interventional studies for the treatment of lung disease. Areas of scientific expertise for RD Unit Core and Affiliate Scientists include respiratory toxicology, mucosal immunology and neurophysiology, with an emphasis on understanding the pathophysiology of asthma and chronic obstructive pulmonary disease (COPD). The respiratory system is the largest interface between the organism and the environment, making it the primary target for airborne toxicants and microbes. The fact that development of the respiratory system takes place over an extended period following birth in primate species (e.g., 8-10 years in humans), makes this organ system particularly vulnerable to the effects of environmental challenges, ultimately to the detriment of health for exposed individuals. Understanding how environment alters cellular, molecular, and metabolic pathways that direct the etiology of lung disease across the lifespan is a central research theme for the RD Unit, which leverages the unique resources provided by CNPRC Inhalation Exposure Core. Core and Affiliate Scientists within the RD Unit converge upon complex research problems by vertical integration of expertise and establishing horizontal collaborative links with investigators on a local, national and international level. It is anticipated that recruitment of new faculty to the RD Unit will reinforce the solid foundation established by current Core and Affiliate Scientists, while bringing new capabilities to further support research convergence. Goals for the next funding period are reflected in the following Specific Aims:

Specific Aim 1. Conduct state-of-the-art research and scientifically contribute to the understanding and treatment of respiratory disorders across the age spectrum. RD Unit Core and Affiliate Scientists will continue to conduct independent and collaborative research using the nonhuman primate as a translational animal model for human respiratory disease. The CNPRC resource will be utilized by RD Unit investigators to study the contribution of environmental challenge on respiratory toxicology, mucosal immunity, lung structure, and airway physiology, all within the context of lifespan health. In coordination with other CNPRC Research Units as well as external collaborators, the RD Unit will continue to innovate by establishing new teams of investigators for integrative strategic initiatives.

Specific Aim 2. Provide exceptional expertise and services to investigators at the local, regional and national levels to advance NIH-supported research excellence. RD Unit Core and Affiliate Scientists promote the CNPRC resource by serving as nationally-recognized experts in the field of respiratory disease and facilitating nonhuman primate research conducted by external investigators. Recent construction of the NIH C06-supported Respiratory Diseases Center located on-site at the CNPRC has provided expanded inhalation exposure capabilities and new avenues for investigation of human respiratory disease using the nonhuman primate as a laboratory animal model. The RD Unit will continue to serve as a specialized biological specimen repository for catalogued nonhuman primate samples obtained through NIH funded studies in respiratory disorders such as asthma.

Specific Aim 3. Train and mentor the next generation of translational investigators in respiratory diseases. To encourage future growth of respiratory research at the CNPRC, RD Unit Core and Affiliate Scientists will continue to support the development of investigators who are new to nonhuman primate models of lung disease. Recent faculty hires to the RD Unit as well as graduate student/postdoctoral trainees will be mentored by RD Unit Core Scientists. We will also use the CNPRC Pilot Research Program as a mechanism to identify promising junior investigators who can take advantage of the opportunities provided by nonhuman primate models of respiratory disease established by the Unit.

Specific Aim 4. Ensure the highest standards of responsible conduct of research and animal care for the CNPRC resource. RD Unit Core and Affiliate Scientists will play an active role in maintaining the health of CNPRC colony animals through key leadership positions in service cores and management. From a clinical perspective, Core and Affiliate Scientists will work directly with Primate Medicine veterinary staff to share specialized expertise in human lung-related procedures and respiratory conditions.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File uploaded: B2 Accomplishments.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

Not Applicable

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

File uploaded: B.4. What opportunities for training and professional development has the project provided.pdf.pdf

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

Results of the Respiratory Diseases Unit are disseminated to communities of interest using the following strategies:

Publications. A primary strategy by which findings from the RD Unit are disseminated to the broad scientific community as well as the general public is via publication in peer-reviewed journals.

Speaking Engagements. An additional strategy used by the RD Unit to disseminate information is to present findings in the form of brief

oral presentations at national meetings as well as invited seminars.

RD Unit Core Scientists have been actively engaged in this area, with numerous invited presentations as well as report of findings through poster sessions at national meetings.

Media. The RD Unit utilizes the CNPRC web page to highlight various research activities as well as participate on national committees that provide oversight on air quality.

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

During the next reporting period, the Respiratory Diseases Unit will continue to make progress toward our original specific aims by (1) conducting state-of-the-art collaborative research using the nonhuman primate as a model of respiratory disease (2) mentoring investigators new to nonhuman primate research through pilot projects and other funding mechanisms (3) train new postdoctoral fellows, graduate students and undergraduates in conducting nonhuman primate research and (4) support the colony by serving as an intellectual resource for respiratory disease in nonhuman primates.

B.2. What was accomplished under these goals?

Specific Aim 1. Conduct state-of-the-art research and scientifically contribute to the understanding and treatment of respiratory disorders across the age spectrum. RD Unit Core and Affiliate Scientists have conducted independent and collaborative research using the nonhuman primate as a translational animal model for human respiratory disease. The CNPRC resource was utilized by RD Unit investigators to study the contribution of environmental challenge on respiratory toxicology, mucosal immunity, lung structure, and airway physiology, all within the context of lifespan health. In coordination with other CNPRC Research Units as well as external collaborators, the RD Unit has continued to innovate by establishing new teams of investigators for integrative strategic initiatives.

Specific Aim 2. Provide exceptional expertise and services to investigators at the local, regional and national levels to advance NIH-supported research excellence. RD Unit Core and Affiliate Scientists have promoted the CNPRC resource by serving as nationally-recognized experts in the field of respiratory disease and facilitating nonhuman primate research conducted by external investigators. The NIH C06-supported Respiratory Diseases Center located on-site at the CNPRC has provided expanded inhalation exposure capabilities and new avenues for investigation of human respiratory disease using the nonhuman primate as a laboratory animal model. The RD Unit will continue to serve as a specialized biological specimen repository for catalogued nonhuman primate samples obtained through NIH funded studies in respiratory disorders such as asthma.

Specific Aim 3. Train and mentor the next generation of translational investigators in respiratory diseases. To encourage future growth of respiratory research at the CNPRC, RD Unit Core and Affiliate Scientists has continued support the development of investigators who are new to nonhuman primate models of lung disease. Recent faculty hires to the RD Unit as well as graduate student/postdoctoral trainees have been mentored by RD Unit Core Scientists. We have also used the CNPRC Pilot Research Program as a mechanism to identify promising junior investigators who can take advantage of the opportunities provided by nonhuman primate models of respiratory disease established by the Unit.

Specific Aim 4. Ensure the highest standards of responsible conduct of research and animal care for the CNPRC resource. RD Unit Core and Affiliate Scientists have played active role in maintaining the health of CNPRC colony animals through key leadership positions in service cores and management. From a clinical perspective, Core and Affiliate Scientists as worked directly with Primate Medicine veterinary staff to share specialized expertise in human lung-related procedures and respiratory conditions.

B.4. What opportunities for training and professional development has the project provided?

Type of trainee	Number of trainees
Postdoctoral Fellow	2
Graduate Student	8
Undergraduate Student	6
Other Type (1)/post-baccalaureate	2
Other Type (2)	
Total	18

Postdoctoral Fellows and Graduate Students on the UC Davis Campus can take advantage of multiple career development opportunities, including an NIH supported FUTURE program which encourages career exploration for biomedical graduate students and postdoctoral scholars. In addition, there are campus wide symposia specifically targeted for postdoctoral fellows, graduate students and undergraduates; all RDU trainees are encouraged to attend. RD Unit Postdoctoral Fellows and Graduate Students attend national scientific meetings such as the American Thoracic Society and participate in a T32 training grant program for Lung Biology as well as the annual UC Davis Lung Research Day.

C. COMPONENT PRODUCTS

C.1 PUBLICATIONS

Not Applicable

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Not Applicable

C.3 TECHNOLOGIES OR TECHNIQUES

Category	Explanation
Models	Through the Inhalation Exposure Core, new exposure modalities (e-cigarettes, wood smoke) have been developed.

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Not Applicable

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Category	Explanation
Research Material	The RD Unit continues to make available nonhuman primate biospecimens to the scientific community. Most recently, an NIH grant by affiliate scientist Redacted by agreement utilized archived specimens from the RD Unit, which resulted in a new publication.
Other	https://cnprc.ucdavis.edu/our-science/respiratory-diseases/ Respiratory Diseases Unit home, history, and articles.
Other	https://cnprc.ucdavis.edu/our-services/associated-laboratories-and-centers/respiratory-building/ Respiratory Diseases home and history.

D. COMPONENT PARTICIPANTS

Not Applicable

E. COMPONENT IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

Not Applicable

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

NOTHING TO REPORT

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

Not Applicable

F. COMPONENT CHANGES

F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

NOTHING TO REPORT

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subjects**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. COMPONENT SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS
Not Applicable
G.2 RESPONSIBLE CONDUCT OF RESEARCH
Not Applicable
G.3 MENTOR'S REPORT OR SPONSOR COMMENTS
Not Applicable
G.4 HUMAN SUBJECTS
G.4.a Does the project involve human subjects?
No
G.4.b Inclusion Enrollment Data
Not Applicable
G.4.c ClinicalTrials.gov
Not Applicable
G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT
Not Applicable
G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)
Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?
No
G.7 VERTEBRATE ANIMALS
Not Applicable
G.8 PROJECT/PERFORMANCE SITES
Not Applicable
G.9 FOREIGN COMPONENT
Not Applicable
G.10 ESTIMATED UNOBLIGATED BALANCE
Not Applicable
G.11 PROGRAM INCOME
Not Applicable
G.12 F&A COSTS
Not Applicable

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

A. Senior/Key Person

Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*
1.	Redacted by agreement				Unit Leader	Institutional Base Salary	EFFORT			35,530.40	13,537.08	49,067.48
2.					Core Scientist					18,960.00	3,697.20	22,657.20
3.					Core Scientist					17,521.70	6,675.77	24,197.47
4.					Core Scientist					14,766.60	5,626.07	20,392.67

Total Funds Requested for all Senior Key Persons in the attached file

Additional Senior Key Persons:

File Name:

Total Senior/Key Person

116,314.82

B. Other Personnel

Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
1	Secretarial/Clerical	3.0			11,242.50	5,767.40	17,009.90
1	Total Number Other Personnel					Total Other Personnel	17,009.90
					Total Salary, Wages and Fringe Benefits (A+B)		133,324.72

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

C. Equipment Description

List items and dollar amount for each item exceeding \$5,000

Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	0.00
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel

Funds Requested (\$)*

1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	0.00
2. Foreign Travel Costs	0.00
Total Travel Cost	0.00

E. Participant/Trainee Support Costs

Funds Requested (\$)*

1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

F. Other Direct Costs		Funds Requested (\$)*
1. Materials and Supplies		2,910.00
2. Publication Costs		5,820.00
3. Consultant Services		0.00
4. ADP/Computer Services		0.00
5. Subawards/Consortium/Contractual Costs		0.00
6. Equipment or Facility Rental/User Fees		0.00
7. Alterations and Renovations		0.00
Total Other Direct Costs		8,730.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	142,054.72

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. MTDC	22.7	142,054.72	32,246.42
Total Indirect Costs			32,246.42
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	174,301.14

J. Fee	Funds Requested (\$)*
	0.00

K. Budget Justification*	File Name:
	(Only attach one file.)

RESEARCH & RELATED Budget (F-K) (Funds Requested)

A. COMPONENT COVER PAGE

Project Title: NPRC CONSORTIUM

Component Project Lead Information:

Redacted by agreement

B. COMPONENT ACCOMPLISHMENTS**B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?**

The mission of the NPRC Consortium is to strengthen communications, leverage system-wide resources, and facilitate sharing of information and best practices across institutions. Established in partnership with the Office of Research Infrastructure Programs/Division of Comparative Medicine, the Consortium consists of working groups in the areas of Behavioral Management, Clinical and Surgical Techniques, Breeding Colony Management, Computational Methods and Resources, Genetics/Genomics, Occupational Health and Safety, Integrity/Compliance, Outreach, Pathology, Phenotype Mining and New Model Development, Rigor and Reproducibility, Training, and the Zika virus. Comprised of experts from major disciplines within each NPRC, the Working Groups apply their combined expertise to address priority issues and challenges identified within their respective domains. The Specific Aims will be achieved through the approaches described below and in close partnership with the Consortium Project Management and Informatics Group.

Specific Aim 1. Provide increased support for nonhuman primate research through the NPRC Director leadership and prioritization of Working Group goals. **Plan.** The NPRC Directors will continue to provide direction and goals for the NPRC Consortium Working Groups. The highest-level priorities include: (1) ensuring communication of information about available NPRC resources, (2) facilitating access to the NPRCs for a broad constituency of investigators, (3) identifying strategic areas of NPRC cooperation to further improve the collective scientific value of the national nonhuman primate resources, and (4) developing strategic information focused specifically on the value of conducting nonhuman primate research to advance human health. As these priorities continue to evolve, the Working Groups will be called upon to provide contributions from their respective areas of expertise.

Specific Aim 2. Creation of ad hoc Working Groups to drive specific improvements in nonhuman primate expertise and facilitate sharing of information. **Plan.** In addition to the existing Working Groups, the NPRC Directors will continue to establish temporary ad hoc groups as necessary, to provide direction for resolution of issues and facilitate sharing of information regarding high-priority challenges and opportunities, e.g., Zika virus. The makeup of the ad hoc groups may include cross-Working Group representation, depending on the characteristics of the specific issue.

Specific Aim 3. Continue support for sharing of information and best practices to mentor and train NPRC staff and external participants as appropriate. **Plan.** One of the greatest strengths of the Consortium Working Groups has been the identification and sharing of best practices from individual NPRCs that are subsequently adopted at other NPRCs and institutions. The Working Groups will continue to pursue activities that facilitate the sharing of challenges and implementation of solutions at both the individual NPRC and Consortium levels. The three existing Working Group education forums, i.e., Pathology - Virtual Slide Conferences, Training - Virtual Grand Rounds, and the Clinical and Surgical Techniques web conferences, will continue as important channels to share expertise and best practices across the NPRCs and with the external nonhuman primate research community. The Consortium will continue to increase external participation in the education forums and will pursue new channels for disseminating NPRC expertise and information.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File uploaded: B2 Accomplishments.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

Not Applicable

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

File uploaded: B.4. What opportunities for training and professional development has the project provided.pdf.pdf

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

The annual working group progress reports highlight the results of the education forums in terms of reach and topics. The reports are distributed to the NPRC Directors and NIH/ORIP/DCM.

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

Behavioral Management Consortium (BMC) – Continue the quarterly BMC webinar series, expand participation, Implement the BI/anxiety temperament test across centers, Share information on the effects of social housing on ID studies, Complete alopecia scoring training and cross-center reliability, Conduct the 2019 F2F meeting of the BMC to address priority topics, Continue collaborative research activities.

Biomarkers Working Group (BWG) – Conduct a 2019 ASP meeting workshop and F2F meeting of the BWG, Continue cross-center comparisons of essential steroids, Establish a reference range for essential hormones, Enhance the NPRCresearch.org BWG section

Breeding Colony Management Consortium (BCMC) – Continue discussions related to infection control, Continue subgroup activities, e.g., Limb fractures, CHB, Population modeling (PM), Nursery rearing, Wound scoring, Social housing in quarantine, Continue NHP supply

and demand discussions, Establish a Marmoset working group, Work with Pathogen Detection group on the TB GIFT assay, Further extend Animal Locator to external institutions, Conduct a joint F2F meeting with the Pathology working group, Conduct a NHP management webinar with the USDA

Clinical And Surgical Techniques Working Group (CAST) – Continue the monthly CAST webinars, Distribute “Institutional Guidelines for Common Research Procedures” survey, Expand participation

Computational Methods and Resources Group (CMRG) – Facilitate the NPRCs in exploring Computational Integration (CI) applications, Deploy PM tools to additional centers, Complete migration of the function library to TNPRC, Integrate with LabKey, Provide CHB support through CI, Develop CMRG section for NPRCresearch.org, Conduct monthly CMRG calls, Deploy the CMRG server.

Genetics and Genomics Working Group (GGWG) – Conduct a bioinformatics tool survey, Continue uploading new rhesus SNPs and other variant data to the GVD, incorporate data from other species, Allocate additional meeting time to non-rhesus topics, Continue collaboration with the SBWG, Pursue NPRCmanager enhancements, Discuss and share experience concerning additional genetic and genomic technologies

Integrity/Compliance Working Group (ICWG) – Reinstitute the quarterly web conferences, Conduct a F2F meeting, to expand discussion on priority topics, Revisit existing reporting tools

New Model Development Working Group (NMDWG) – Publication of the CNPRC-based LVH model, Continued development of the BI/Anxiety model, Active engagement and support for NPRC-based development of novel macaque genetic models, Co-chairs to participate in the joint BCMC/PWG F2F

Occupational Health and Safety (OHS) – Work to reconvene the B-virus group to update the 2002 recommendations, Develop common indicators to benchmark between NPRCs, Post presentations and materials on the Consortium website, Continue to focus on needle safe practices and devices, Conduct a F2F meeting to address priority topics

Outreach Working Group (OWG) – Represent the NPRCs at outreach events, Provide the NIH Program Officer with notification of new high-profile publications, Produce new NPRC outreach materials, Begin development of a Strategic Plan for the OWG, Continue to support the NPRC.org and NPRCresearch.org websites with updated materials and data, Continue collaboration with AMP, Share materials and techniques

Pathogen Detection Working Group (PDWG) – Continue regularly scheduled web conference meetings, Refine and complete the cross-center inventory and PD section for NPRCresearch.org, Continue application of new scientific discoveries and technological advances, Share assays and data for emerging viruses, Conduct a F2F meeting for proficiency panel analysis

Pathology Working Group (PWG) – Convene a joint F2F meeting with the BCMC, Continue the monthly Virtual Slide Conferences, Continue expansion of PPID content, Increase PPID utilization, Pursue the rollout of the Biomaterials Query System (BQS), Determine a migration path for the Pathology curation system

Project Management and Informatics Group (PMIG) – Provide coordination support and web conference hosting for all Consortium wgs, Expand awareness and utilization of the Animal Locator, BQS and other wg resources, Continue to maintain, expand, and enhance NPRCresearch.org, Conduct monthly VSC, VGR, CAST, and quarterly BMC webinars, expand participation, Coordinate and host the annual NHP Management webinar, Participate in the NPRC strategic planning sessions, Complete transition out of the Confluence wiki environment, Maintain the underlying infrastructure, Research new image processing solutions for the PPID

Rigor and Reproducibility Working Group (RRWG) – Complete draft of the working paper and send out for review, Participate in the NIH NHP R&R workshop, Conduct a F2F meeting to align with NIH R&R initiatives, Continue to interface with journals, Promote data sharing

Specialized Breeding Working Group (SBWG) – Revise and submit the final report to the NPRC Directors

Training Consortium (TWG) – Continue the monthly Virtual Grand Rounds webinars, Expand participation

Zika Working Group (ZWG) - Continue monthly web conference meetings with center updates, Identify/adopt common methods to improve reproducibility across centers, Conduct a third F2F meeting to further understand the pathogenesis of Zika infection of NHPs

With the addition of three new working groups this past year, there is a possibility that additional funds will be requested to support some of their activities; e.g., travel to Face-to-Face meetings, testing reagents, and shipping of samples. These items will be included in the proposed Consortium budget for next year that is currently under development. When completed, the proposed budget will go to the NPRC Directors, who will prioritize and determine what they want to support. A decision is expected in April 2019.

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Redacted by

B.2. What was accomplished under these goals?

Behavioral Management Consortium (BMC) – Convened an ID Social Housing (SH) Subgroup, Advanced the BI/Anxiety project, Conducted annual regulatory queries survey, Developed a trainer exchange program, Expanded use of SH in quarantine (w/BCMC), Conducted alopecia scoring training at 5 centers, achieved inter-facility reliability, Increased BMC tech forum utilization (46 topics to date), Collaborated on outreach activities including 2 workshops, 1 symposium, and 5 publications, Launched the BMC webinar series

Biomarkers Working Group (BWG) – Formed the Biomarkers working group (5 centers), Developed and expanded a Biomarkers inventory and related section on NPRCresearch.org, Created a pooled rhesus sample to use for cross-NPRC assay comparisons, CLEA certified tests.

Breeding Colony Management Consortium (BCMC) – Continued progress on projects with the BMC, CMRG and the SBWG, Joint F2F meeting with the BMC, Conducted the 2018 NHP Management Webinar, Convened 5 BCMC subgroups to address priority topics, Served as a lead organization for discussions regarding NHP supply and demand, Continued work on population modeling, Implemented workflow upgrades with CMRG, Implemented a new Animal Locator system, Developed 7 surveys to identify best practices across centers.

Clinical And Surgical Techniques Working Group (CAST) – Conducted 16 CAST webinars, Developed a procedures survey, Expanded webinar participation, Implemented procedural refinements across centers

Computational Methods and Resources Group (CMRG) – Ported and adapted the CI development environment to TNPRC, Engaged centers on use of the tools, Enhanced the population modeling (PM) application, Presented workshop at 2018 APV, Reviewed CMRG concepts and progress with P51 site reviewers and NPRC Directors, Convened a CMRG working group

Genetics and Genomics Working Group (GGWG) – Adoption of the ONPRC NPRCmanager tool at multiple centers, NPRCmanager enhancements, Expanded the GVD to 97M SNPs, Implemented a GSWG section on NPRCResearch.org, Reviewed/discussed approaches to genetic management, Discussed various issues related to new NHP models, Participated in the SBWG meetings, Began to discuss non-rhesus species items

Integrity/Compliance Working Group (ICWG) – Conducted sessions on OLAW reporting, FOIA requests, and humane endpoints for NHP studies, Identified and prioritized future topics across centers

New Model Development Working Group (NMDWG) – Continued development of the LVH and BI/Anxiety models (both led by the CNPRC), Presented and began transition to a new approach to model development, Conducted 5 presentations of models under development, Conducted mGAP overviews for the group

Occupational Health and Safety (OHS) – Continued to function as a resource to its members and the research community, continued to advocate for reconvening the B-virus WG, Established criteria to collect data on needle stick injuries, conducted a F2F meeting at the TNPRC to address priority topics.

Outreach Working Group (OWG) – Supported development and rollout of NPRC.org, Reached approximately 50k people through various F2F outreach activities, Utilized local websites and social media to interact with millions in the general public, Shared materials and techniques across centers, Supported expansion of nprcresearch.org, Provided assistance to AMP in developing a “Come See Our World” campaign

Pathogen Detection Working Group (PDWG) – Established the PDWG, Conducted regular web meetings, developed an initial cross-center inventory of pathogens, assays, capabilities and related items, developed a prototype Pathogen Detection section on NPRCresearch.org, Conducted a F2F meeting in conjunction with the recent BCMC F2F meeting

Pathology Working Group (PWG) – Conducted 18 Virtual Slide Conferences (VSCs), Expanded VSC participation, distributed monthly PPID emails, increased number of registered PPID users to 618, continued expansion of PPID content

Project Management and Informatics Group (PMIG) – New animal locator system, 3 new sections and new branding on NPRCresearch.org, Launched the new BMC webinar series, Enhanced the Biomaterials Query System (BQS), Coordinated the launch of 3 new working groups, Major security and hosting upgrades, Began work to port the Consortium website out of Confluence, Coordinated and hosted 57 webinars

Rigor and Reproducibility Working Group (RRWG) – Continued development of the R&R manuscript, most sections complete, Interfaced with journals to encourage participation in having authors meet guidelines

Specialized Breeding Working Group (SBWG) – Discussed questions, issues and concerns related to the identification, characterization, evaluation and development of new NHP models of human diseases, Developed a series of questions associated with a “phenotype first” and “genotype first” approaches

Training Consortium (TWG) – Conducted 18 Virtual Grand Rounds webinars, expanded participation

Zika Working Group (ZWG) - Conducted monthly web meetings to share information across centers, Developed a joint manuscript led by the WNPRC, Conducted a F2F meeting - 14 presentations, Expanded awareness of NHP Zika models with NIH colleagues

B.4. What opportunities for training and professional development has the project provided?

The NPRC Consortium includes four Working Group (WG) education forums, 1) Pathology WG - Virtual Slide Conferences, 2) Training WG - Virtual Grand Rounds, 3) the Clinical and Surgical Techniques WG webinars, and 4) Behavioral Management Consortium webinar series. These monthly sessions (item 4 is quarterly) are important channels to share expertise and best practices across the NPRCs and with the external NHP research community. Over 54 institutions (47 external) participate in one or more of the Consortium's education forums.

Seeing that these are informal sessions conducted via web conference, the exact number and classification of the participants is unknown. Local participation takes place in a conference room setting, using a single group login.

C. COMPONENT PRODUCTS

C.1 PUBLICATIONS

Not Applicable

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Not Applicable

C.3 TECHNOLOGIES OR TECHNIQUES

NOTHING TO REPORT

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Not Applicable

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Category	Explanation
Research Material	NPRCresearch.org Through expansion of the website, we began adding sections to share NPRC resources with the external NHP research community. These include Genetics, Behavioral management, and Biomarkers resources. Three new sections are also under development. A new Animal Locator system shares information about available animals and animal needs across the NPRCs and with a small number of external organizations.

D. COMPONENT PARTICIPANTS

Not Applicable

E. COMPONENT IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

Not Applicable

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

NOTHING TO REPORT

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

Not Applicable

F. COMPONENT CHANGES

F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

NOTHING TO REPORT

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subjects**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. COMPONENT SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS
Not Applicable
G.2 RESPONSIBLE CONDUCT OF RESEARCH
Not Applicable
G.3 MENTOR'S REPORT OR SPONSOR COMMENTS
Not Applicable
G.4 HUMAN SUBJECTS
G.4.a Does the project involve human subjects?
No
G.4.b Inclusion Enrollment Data
Not Applicable
G.4.c ClinicalTrials.gov
Not Applicable
G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT
Not Applicable
G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)
Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?
No
G.7 VERTEBRATE ANIMALS
Not Applicable
G.8 PROJECT/PERFORMANCE SITES
Not Applicable
G.9 FOREIGN COMPONENT
Not Applicable
G.10 ESTIMATED UNOBLIGATED BALANCE
Not Applicable
G.11 PROGRAM INCOME
Not Applicable
G.12 F&A COSTS
Not Applicable

RPPR - Other-6681

RESEARCH & RELATED BUDGET - SECTION A & B FINAL

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

A. Senior/Key Person

Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*
1.	Redacted by agreement				Associate Director Operations	Institutional Base Salary	EFFORT			0.00	0.00	0.00
Total Funds Requested for all Senior Key Persons in the attached file												
Additional Senior Key Persons:			File Name:								Total Senior/Key Person	0.00

B. Other Personnel

Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
	Secretarial/Clerical						
0	Total Number Other Personnel					Total Other Personnel	0.00
Total Salary, Wages and Fringe Benefits (A+B)							0.00

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

C. Equipment Description	
List items and dollar amount for each item exceeding \$5,000	
Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	0.00
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel	Funds Requested (\$)*
1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	10,476.00
2. Foreign Travel Costs	0.00
Total Travel Cost	10,476.00

E. Participant/Trainee Support Costs	Funds Requested (\$)*
1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

F. Other Direct Costs		Funds Requested (\$)*
1. Materials and Supplies		0.00
2. Publication Costs		0.00
3. Consultant Services		451,585.00
4. ADP/Computer Services		0.00
5. Subawards/Consortium/Contractual Costs		15,195.00
6. Equipment or Facility Rental/User Fees		0.00
7. Alterations and Renovations		0.00
Total Other Direct Costs		466,780.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	477,256.00

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. MTDC	22.7	477,256.00	108,337.11
Total Indirect Costs			108,337.11
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	585,593.11

J. Fee	Funds Requested (\$)*
	0.00

K. Budget Justification*	File Name:
	(Only attach one file.)

RESEARCH & RELATED Budget (F-K) (Funds Requested)

A. COMPONENT COVER PAGE

Project Title: OUTREACH – PUBLIC INFORMATION OFFICE

Component Project Lead Information:

Redacted by agreement

B. COMPONENT ACCOMPLISHMENTS**B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?**

The California National Primate Research Center (CNPRC) is focused on advancing community awareness of the scientific achievements and the critical role nonhuman primate (NHP) models play in the understanding of human health and disease from conception through maturation and aging.

Specific Aim 1. Advance awareness of CNPRC scientific contributions through effective communications to the media and lay community. Plan. A key goal is to ensure information is readily available to raise awareness about the CNPRC mission and scientific achievements. An ongoing objective is to build upon CNPRC public relations success during the current funding period using established outreach and communications programs such as the National Primate Research Center's Consortium Outreach Working Group. The goal for the next funding period is to broaden outreach goals through interactive websites, podcasts, increased social media presence, participation in national science events, and through tours, local media, the CNPRC newsletter, and promotional materials. An expanded presence in social media is a critical component to promoting the CNPRC and to inform new groups regarding the importance of translational research and the crucial role of NHPs in the advancement of human health.

Specific Aim 2. Ensure that investigators at the local, regional, and national levels are aware of the CNPRC NHP expertise and resources. Plan. The primary objective is to ensure ready access to and awareness of expertise, resources, and services for NIH supported studies through: (1) refinement of the CNPRC website functionality, (2) enhanced marketing strategies, and (3) printed and electronic marketing materials for scientific meetings and other networking opportunities. Communications between the NPRCs will be expanded through the NPRC Consortium Working Groups to encourage new partnerships and outreach efforts. The Outreach/Public Information Office will also enhance and leverage its contacts on campus to further this aim and forge new partnerships with regional and national universities, and the scientific community.

Specific Aim 3. Efficiently communicate information to the next generation of translational investigators on the spectrum of research and training opportunities at the CNPRC. Plan. The CNPRC website will be enhanced to ensure research highlights, resources, and career opportunities in a format appealing to trainees at all career stages. The Center's PIO will continue to offer and conduct tours of the Center to give a better understanding of the type of research we do at the CNPRC and give students an opportunity to hear from our scientists, researchers, veterinarians and animal care staff. In addition, the Center's PIO will create content that appeals to this demographic including but not limited to videos, podcasts, websites and promotional materials to cultivate interest in NHP research and training opportunities. Part of this strategy involves developing robust social media presences and utilizing technological advances to communicate information in new and innovative ways.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File uploaded: B2 Accomplishments.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

Not Applicable

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

File uploaded: B.4. What opportunities for training and professional development has the project provided.pdf

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

NOTHING TO REPORT

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

In the next reporting period, the CNPRC will rehire a new PIO and that person will resume the student intern training program. In addition, the CNPRC is well underway in revamping its marketing program utilizing UCD Campus resources. New marketing materials, improvements to the internet site as well as other materials will be accomplished in the next base grant year.

B.2. What was accomplished under these goals?

During this reporting period, the Public Information Officer left the University and the two student interns graduated. These positions have remained vacant due to financial constraints, however, the websites (both internet and intranet) have been maintained through contract services.

The CNPRC has engaged marketing resources on the UCD Campus to continue to revamp the website and marketing materials. The CNPRC will be hiring a new PIO in the next base grant year to continue to support the Center.

B.4. What opportunities for training and professional development has the project provided?

The two student interns received two years of training in both graphic design and web development and graduated with their degrees. Once a new PIO is hired this training program will be resumed.

C. COMPONENT PRODUCTS**C.1 PUBLICATIONS**

Not Applicable

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Not Applicable

C.3 TECHNOLOGIES OR TECHNIQUES

NOTHING TO REPORT

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Not Applicable

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Nothing to report

D. COMPONENT PARTICIPANTS

Not Applicable

E. COMPONENT IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

Not Applicable

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

NOTHING TO REPORT

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

Not Applicable

F. COMPONENT CHANGES

F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

During this reporting period, the Public Information Officer left the University and the two student interns graduated. These positions have remained vacant due to financial constraints, however, the websites (both internet and intranet) have been maintained through contract services. The CNPRC has engaged marketing resources on the UCD Campus to continue to revamp the website and marketing materials.

The CNPRC will be hiring a new PIO in the next base grant year to continue to support the Center. In the next reporting period, the CNPRC will rehire a new PIO and that person will resume the student intern training program. The two student interns received two years of training in both graphic design and web development and graduated with their degrees. Once a new PIO is hired this training program will be resumed. In addition, the CNPRC is well underway in revamping its marketing program utilizing UCD Campus resources. New marketing materials, improvements to the internet site as well as other materials will be accomplished in the next base grant year.

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subjects**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. COMPONENT SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS
Not Applicable
G.2 RESPONSIBLE CONDUCT OF RESEARCH
Not Applicable
G.3 MENTOR'S REPORT OR SPONSOR COMMENTS
Not Applicable
G.4 HUMAN SUBJECTS
G.4.a Does the project involve human subjects?
No
G.4.b Inclusion Enrollment Data
Not Applicable
G.4.c ClinicalTrials.gov
Not Applicable
G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT
Not Applicable
G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)
Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?
No
G.7 VERTEBRATE ANIMALS
Not Applicable
G.8 PROJECT/PERFORMANCE SITES
Not Applicable
G.9 FOREIGN COMPONENT
Not Applicable
G.10 ESTIMATED UNOBLIGATED BALANCE
Not Applicable
G.11 PROGRAM INCOME
Not Applicable
G.12 F&A COSTS
Not Applicable

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RPPR - Other-6686

RESEARCH & RELATED BUDGET - SECTION A & B **FINAL**

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

A. Senior/Key Person

Prefix	First Name*	Middle Name	Last Name*	Suffix	Project Role*	Base Salary (\$)	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits (\$)*	Funds Requested (\$)*
1.	Redacted by agreement					Associate Director Operations	Institutional Base Salary	EFFORT		3,792.00	1,444.75	5,236.75
Total Funds Requested for all Senior Key Persons in the attached file												
Additional Senior Key Persons:			File Name:								Total Senior/Key Person	5,236.75

B. Other Personnel

Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
1	Undergraduate Students	3.0			15,660.00	203.58	15,863.58
	Secretarial/Clerical						
1	Total Number Other Personnel					Total Other Personnel	15,863.58
					Total Salary, Wages and Fringe Benefits (A+B)		21,100.33

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

C. Equipment Description

List items and dollar amount for each item exceeding \$5,000

Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	0.00
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel

Funds Requested (\$)*

1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	0.00
2. Foreign Travel Costs	0.00
Total Travel Cost	0.00

E. Participant/Trainee Support Costs

Funds Requested (\$)*

1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

F. Other Direct Costs		Funds Requested (\$)*
1. Materials and Supplies		2,425.00
2. Publication Costs		0.00
3. Consultant Services		0.00
4. ADP/Computer Services		0.00
5. Subawards/Consortium/Contractual Costs		0.00
6. Equipment or Facility Rental/User Fees		0.00
7. Alterations and Renovations		0.00
8. Other: Copy/Printing/Brochures		8,730.00
Total Other Direct Costs		11,155.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	32,255.33

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. MTDC	22.7	32,255.33	7,321.96
Total Indirect Costs			7,321.96
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	39,577.29

J. Fee	Funds Requested (\$)*
	0.00

K. Budget Justification*	File Name:
	(Only attach one file.)

RESEARCH & RELATED Budget (F-K) (Funds Requested)

A. COMPONENT COVER PAGE

Project Title: PILOT RESEARCH PROGRAM

Component Project Lead Information:

Redacted by agreement

B. COMPONENT ACCOMPLISHMENTS**B.1 WHAT ARE THE MAJOR GOALS OF THE PROJECT?**

The mission of the CNPRC Pilot Research Program is to engage investigators external to the National Primate Research Center (NPRC) system to participate in nonhuman primate research and launch high-impact extramurally funded research projects utilizing innovative nonhuman primate models to inform critical advances in human health. The CNPRC Pilot Research Program provides administrative support, research infrastructure and scientific expertise to investigators, with the goal of generating preliminary data for the development of competitive NIH grant proposals using nonhuman primate models of human health and disease. The CNPRC Pilot Research Program funds collaborative projects with NPRC Core Scientists, with the rationale that expertise of NPRC Core Scientists can facilitate new areas of study by investigators who have not previously considered nonhuman primate models, or investigators who might not have access to and thus not include nonhuman primates in their research. CNPRC pilot proposals that address relevant biomedical/translational research topics across the nonhuman primate lifespan and align with scientific research unit emphasis (Neuroscience and Behavior, Infectious Diseases, Reproductive Sciences and Regenerative Medicine, Respiratory Diseases) as well as core facilities are prioritized. In alignment with the thematic vision of convergence for the CNPRC, the Pilot Research Program provides a platform for integration of groundbreaking scientific ideas brought forth by external investigators leveraged with existing areas of expertise provided by Core Scientists. Our goals for the next funding period are reflected in the following Specific Aims:

Specific Aim 1. Conduct state-of-the-art research and scientifically contribute to the understanding and treatment of human disease with NHP models across the age spectrum through the Pilot Research Program. The Pilot Research Program will promote cutting-edge science by seeking applications from highly qualified junior and senior investigators who show significant potential to become established nonhuman primate researchers. The Program will attract the most promising investigators using a robust outreach approach to target top-tier national institutions, with the aim of casting a wide net to obtain a competitive pool of prospective applicants. To further increase the likelihood of future funding success by applicants, proposals submitted to the Program will undergo a rigorous two-step review process using NIH scoring criteria and summary statements.

Specific Aim 2. Provide exceptional NHP expertise and services to Pilot Research Program investigators at the local, regional, and national levels to advance NIH-supported research excellence. The Pilot Research Program will support awardees by providing the highest quality of veterinary care, animal facilities, regulatory compliance, and scientific cores for the successful completion of proposed studies. Critical to the successful outcome of awarded studies is the provision of specialized technical and scientific knowledge by collaborating CNPRC Core Scientists, who work directly with awardees before, during, and after the completion of Pilot projects. Awardees will be encouraged to translate their findings into high-impact peer reviewed publications and NIH grant applications in an expeditious fashion.

Specific Aim 3. Mentor and train the next generation of translational investigators with NHP expertise. The Pilot Research Program focuses on support of investigators new to nonhuman primate research, with an emphasis on junior investigators. Applicants are encouraged to incorporate laboratory trainees into their proposals to promote education and training in the use of nonhuman primates in research at all career levels of the science workforce, with the goal of further contributing to the pipeline of future nonhuman primate investigators. To foster development of new collaborations and facilitate successful funding outcomes, investigators who apply to the Program will receive extensive guidance from participating CNPRC Core Scientists and the Associate Director of Research throughout the application process.

Specific Aim 4. Ensure the highest standards of responsible conduct of research and animal care. Active participation of Core Scientists in the Pilot Program is essential to ensure that each awardee engaged in projects at the CNPRC is compliant with all laboratory and animal care regulatory processes necessary for laboratory research using nonhuman primates. Core Scientists provide critical oversight in the health and safety of trainees, and facilitate the development of experimental designs that support best practices for conducting research using nonhuman primates.

B.1.a Have the major goals changed since the initial competing award or previous report?

No

B.2 WHAT WAS ACCOMPLISHED UNDER THESE GOALS?

File uploaded: B2 Accomplishments.pdf

B.3 COMPETITIVE REVISIONS/ADMINISTRATIVE SUPPLEMENTS

Not Applicable

B.4 WHAT OPPORTUNITIES FOR TRAINING AND PROFESSIONAL DEVELOPMENT HAS THE PROJECT PROVIDED?

File uploaded: B.4. What opportunities for training and professional development has the project provided.pdf

B.5 HOW HAVE THE RESULTS BEEN DISSEMINATED TO COMMUNITIES OF INTEREST?

Results of the Pilot Research Program are disseminated to communities of interest using the following strategies:

Publications. A primary strategy by which findings from the Pilot Research Program are disseminated to the broad scientific community as well as the general public is via publication in peer-reviewed journals. Publications are by funded investigators include collaborating

Core Scientists.

Speaking Engagements. An additional strategy used by the Pilot Research Program to disseminate information is to present findings in the form of brief oral presentations at national meetings as well as invited seminars.

Media. The Pilot Research Program uses the CNPRC and UC Davis Office of Research web page to advertise the annual call for letters of intent, highlight availability of resources and research activities.

Cores are actively promoted for the CNPRC Pilot Program application process.

B.6 WHAT DO YOU PLAN TO DO DURING THE NEXT REPORTING PERIOD TO ACCOMPLISH THE GOALS?

During the next reporting period, the Pilot Research Program will continue to make progress toward our original specific aims by continuing to broadly advertise the program through various mediums to encourage applicants of the highest caliber. Current and past awardees will continue to receive support and mentoring from CNPRC Core Scientists to facilitate publications and new grant submissions.

B.2. What was accomplished under these goals?

Specific Aim 1. Conduct state-of-the-art research and scientifically contribute to the understanding and treatment of human disease with NHP models across the age spectrum through the Pilot Research Program. The Pilot Research Program has promoted cutting-edge science by seeking applications from highly qualified junior and senior investigators who show significant potential to become established nonhuman primate researchers. The Program has attracted the most promising investigators using a robust outreach approach to target top-tier national institutions, with the aim of casting a wide net to obtain a competitive pool of prospective applicants. To further increase the likelihood of future funding success by applicants, all proposals submitted to the Program have undergone a rigorous two-step review process using NIH scoring criteria and summary statements. For the current reporting period, we received a total of 41 letters of intent and requested 20 full proposals. We have awarded a total of 8 pilot projects from 6 junior and 2 senior investigators. Five out of eight pilot projects awards were from investigators external to UC Davis.

Specific Aim 2. Provide exceptional NHP expertise and services to Pilot Research Program investigators at the local, regional, and national levels to advance NIH-supported research excellence. The Pilot Research Program has continued to support awardees by providing the highest quality of veterinary care, animal facilities, regulatory compliance, and scientific cores for the successful completion of proposed studies. Critical to the successful outcome of awarded studies is the provision of specialized technical and scientific knowledge by collaborating CNPRC Core Scientists, who work directly with awardees before, during, and after the completion of Pilot projects. Awardees have been encouraged to translate their findings into high-impact peer-reviewed publications and NIH grant applications in an expeditious fashion. Both new publications and grant proposal submissions have been generated during this current funding period, including a new R01 grant to [Redacted by agreement] with a subaward to CNPRC Core Scientist [Redacted by agreement] (R01HD094634 090118-083123, Year 1 Direct Costs: \$522,412).

Specific Aim 3. Mentor and train the next generation of translational investigators with NHP expertise. The Pilot Research Program focuses on support of investigators new to nonhuman primate research, with an emphasis on junior investigators. Applicants have been encouraged to incorporate laboratory trainees into their proposals to promote education and training in the use of nonhuman primates in research at all career levels of the science workforce, with the goal of further contributing to the pipeline of future nonhuman primate investigators. To foster development of new collaborations and facilitate successful funding outcomes, investigators have received extensive guidance from participating CNPRC Core Scientists and the Associate Director of Research throughout the application process. Laboratory trainees who have benefited from gaining nonhuman primate experience through the pilot program include a first-year veterinary student, 4 PhD students, a post-baccalaureate, and a pulmonary critical care fellow

Specific Aim 4. Ensure the highest standards of responsible conduct of research and animal care. Active participation of Core Scientists in the Pilot Program is essential to ensure that each awardee engaged in projects at the CNPRC is compliant with all laboratory and animal care regulatory processes necessary for laboratory research using nonhuman primates. Core Scientists have provided critical oversight in the health and safety of trainees, and have facilitated the development of experimental designs that support best practices for conducting research using nonhuman primates.

B.4. What opportunities for training and professional development has the project provided?

Trainees of the 2017-2018 Pilot Research Program included the following:

Type of trainee	Number of trainees
Postdoctoral Fellow	1
Graduate Student	4
Undergraduate Student	
Professional Student	1
Total	4

Laboratory trainees who have benefited from gaining nonhuman primate experience through the pilot program include a first-year veterinary student, 4 PhD students, a post-baccalaureate, and a pulmonary critical care fellow.

C. COMPONENT PRODUCTS

C.1 PUBLICATIONS

Not Applicable

C.2 WEBSITE(S) OR OTHER INTERNET SITE(S)

Not Applicable

C.3 TECHNOLOGIES OR TECHNIQUES

Category	Explanation
Instruments or equipment	In a Pilot Research Program awarded to [Redacted by agreement] (UC Berkeley), calcium imaging in the nonhuman primate brain by adapting and extending a commercially-available, miniature, one-photon fluorescence microscope is currently being tested.

C.4 INVENTIONS, PATENT APPLICATIONS, AND/OR LICENSES

Not Applicable

C.5 OTHER PRODUCTS AND RESOURCE SHARING

Category	Explanation
Other	https://cnprc.ucdavis.edu/our-science/pilot-research-program/ Call for Pilot Project Letters of Intent & Pilot Research Program Recipients. The Pilot Research Program advertises new calls for letter of intent through the CNPRC website as well as social media. The program call is also distributed on a national level through CTSC and CFAR programs.

D. COMPONENT PARTICIPANTS

Not Applicable

E. COMPONENT IMPACT

E.1 WHAT IS THE IMPACT ON THE DEVELOPMENT OF HUMAN RESOURCES?

Not Applicable

E.2 WHAT IS THE IMPACT ON PHYSICAL, INSTITUTIONAL, OR INFORMATION RESOURCES THAT FORM INFRASTRUCTURE?

Not Applicable

E.3 WHAT IS THE IMPACT ON TECHNOLOGY TRANSFER?

NOTHING TO REPORT

E.4 WHAT DOLLAR AMOUNT OF THE AWARD'S BUDGET IS BEING SPENT IN FOREIGN COUNTRY(IES)?

Not Applicable

F. COMPONENT CHANGES

F.1 CHANGES IN APPROACH AND REASONS FOR CHANGE

Not Applicable

F.2 ACTUAL OR ANTICIPATED CHALLENGES OR DELAYS AND ACTIONS OR PLANS TO RESOLVE THEM

NOTHING TO REPORT

F.3 SIGNIFICANT CHANGES TO HUMAN SUBJECTS, VERTEBRATE ANIMALS, BIOHAZARDS, AND/OR SELECT AGENTS**F.3.a Human Subjects**

No Change

F.3.b Vertebrate Animals

No Change

F.3.c Biohazards

No Change

F.3.d Select Agents

No Change

G. COMPONENT SPECIAL REPORTING REQUIREMENTS

G.1 SPECIAL NOTICE OF AWARD TERMS AND FUNDING OPPORTUNITIES ANNOUNCEMENT REPORTING REQUIREMENTS

Not Applicable

G.2 RESPONSIBLE CONDUCT OF RESEARCH

Not Applicable

G.3 MENTOR'S REPORT OR SPONSOR COMMENTS

Not Applicable

G.4 HUMAN SUBJECTS**G.4.a Does the project involve human subjects?**

No

G.4.b Inclusion Enrollment Data

Not Applicable

G.4.c ClinicalTrials.gov

Not Applicable

G.5 HUMAN SUBJECTS EDUCATION REQUIREMENT

Not Applicable

G.6 HUMAN EMBRYONIC STEM CELLS (HESCS)

Does this project involve human embryonic stem cells (only hESC lines listed as approved in the NIH Registry may be used in NIH funded research)?

No

G.7 VERTEBRATE ANIMALS

Not Applicable

G.8 PROJECT/PERFORMANCE SITES

Not Applicable

G.9 FOREIGN COMPONENT

Not Applicable

G.10 ESTIMATED UNOBLIGATED BALANCE

Not Applicable

G.11 PROGRAM INCOME

Not Applicable

G.12 F&A COSTS

Not Applicable

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ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019 End Date*: 04-30-2020

A. Senior/Key Person

Prefix	First Name*	Middle	Last Name*	Suffix	Project Role*	Base	Calendar	Academic	Summer	Requested	Fringe	Funds Requested (\$)*
						Salary (\$)	Months	Months	Months	Salary (\$)*	Benefits (\$)*	
1.	Redacted by agreement					Institutional Base Salary	EFFORT			0.00	0.00	0.00
2.										0.00	0.00	0.00
					Associate							
					Director							
					Research							
					Associate							
					Director							
					Operations							
Total Funds Requested for all Senior Key Persons in the attached file												
Additional Senior Key Persons: File Name:											Total Senior/Key Person	0.00

B. Other Personnel

Number of Personnel*	Project Role*	Calendar Months	Academic Months	Summer Months	Requested Salary (\$)*	Fringe Benefits*	Funds Requested (\$)*
	Post Doctoral Associates						
	Graduate Students						
	Undergraduate Students						
	Secretarial/Clerical						
0	Total Number Other Personnel					Total Other Personnel	0.00
Total Salary, Wages and Fringe Benefits (A+B)							0.00

RESEARCH & RELATED Budget {A-B} (Funds Requested)

RESEARCH & RELATED BUDGET - SECTION C, D, & E

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

C. Equipment Description

List items and dollar amount for each item exceeding \$5,000

Equipment Item	Funds Requested (\$)*
Total funds requested for all equipment listed in the attached file	0.00
Total Equipment	0.00
Additional Equipment: File Name:	

D. Travel

Funds Requested (\$)*

1. Domestic Travel Costs (Incl. Canada, Mexico, and U.S. Possessions)	0.00
2. Foreign Travel Costs	0.00
Total Travel Cost	0.00

E. Participant/Trainee Support Costs

Funds Requested (\$)*

1. Tuition/Fees/Health Insurance	0.00
2. Stipends	0.00
3. Travel	0.00
4. Subsistence	0.00
5. Other:	
0 Number of Participants/Trainees	Total Participant Trainee Support Costs
	0.00

RESEARCH & RELATED Budget (C-E) (Funds Requested)

RESEARCH & RELATED BUDGET - SECTIONS F-K

ORGANIZATIONAL DUNS*: 047120084

Budget Type*: ☒ Project ☐ Subaward/Consortium

Enter name of Organization: UNIVERSITY OF CALIFORNIA AT DAVIS

Start Date*: 05-01-2019

End Date*: 04-30-2020

F. Other Direct Costs		Funds Requested (\$)*
1. Materials and Supplies		0.00
2. Publication Costs		0.00
3. Consultant Services		0.00
4. ADP/Computer Services		0.00
5. Subawards/Consortium/Contractual Costs		300,000.00
6. Equipment or Facility Rental/User Fees		0.00
7. Alterations and Renovations		0.00
Total Other Direct Costs		300,000.00

G. Direct Costs	Funds Requested (\$)*
Total Direct Costs (A thru F)	300,000.00

H. Indirect Costs			
Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base (\$)	Funds Requested (\$)*
1. MTDC	22.7	300,000.00	68,100.00
Total Indirect Costs			68,100.00
Cognizant Federal Agency			
(Agency Name, POC Name, and POC Phone Number)			

I. Total Direct and Indirect Costs	Funds Requested (\$)*
Total Direct and Indirect Institutional Costs (G + H)	368,100.00

J. Fee	Funds Requested (\$)*
	0.00

K. Budget Justification*	File Name:
	(Only attach one file.)

RESEARCH & RELATED Budget (F-K) (Funds Requested)