PRIMATE RESEARCH CENTER GRANT **Federal Award Date:** 11/03/2015

Department of Health and Human Services
National Institutes of Health
OFFICE OF THE DIRECTOR, NATIONAL INSTITUTES OF HEALTH

Grant Number: 3P51OD011132-55S1 REVISED
FAIN: P51OD011132

Principal Investigator(s):
MICHAEL M JOHNS, MD

Project Title: Support of Yerkes National Primate Research Center

Ms. Sommers, Holly
Director, Pre-award Grants Adm
1599 Clifton Road NE, 4th Floor
1599-001-1BA
Atlanta, GA 303224250

Award e-mailed to: osp@emory.edu

Period Of Performance:
Budget Period: 08/24/2015 – 04/30/2016
Project Period: 05/01/1997 – 04/30/2016

Dear Business Official:

The National Institutes of Health hereby revises this award (see "Award Calculation" in Section I and "Terms and Conditions" in Section III) to EMORY UNIVERSITY 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 P51OD011132. 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,

Dawn Walker
Grants Management Officer
OFFICE OF THE DIRECTOR, NATIONAL INSTITUTES OF HEALTH

Additional information follows

SECTION I – AWARD DATA – 3P51OD011132-55S1 REVISED

Award Calculation (U.S. Dollars)

Salaries and Wages	$105,682
Fringe Benefits	$25,998
Personnel Costs (Subtotal)	$131,680
Other Costs	$367,334
Federal Direct Costs	$499,014
Federal F&A Costs	$224,556
Approved Budget	$723,570
Total Amount of Federal Funds Obligated (Federal Share)	$723,570
TOTAL FEDERAL AWARD AMOUNT	$723,570
AMOUNT OF THIS ACTION (FEDERAL SHARE)	$0

SUMMARY TOTAL FEDERAL AWARD AMOUNT YEAR (55)	
GRANT NUMBER	**TOTAL FEDERAL AWARD AMOUNT**
3P51OD011132-55S1	$723,570
5P51OD011132-55	$9,510,024
TOTAL	**$10,233,594**

SUMMARY TOTALS FOR ALL YEARS		
YR	**THIS AWARD**	**CUMULATIVE TOTALS**
55	$723,570	$10,233,594

Fiscal Information:

CFDA Name:	Research Infrastructure Programs
CFDA Number:	93.351
EIN:	1580566256A1
Document Number:	PRR000165I
PMS Account Type:	G (Pooled)
Fiscal Year:	2015

IC	CAN	2015
OD	8014499	$723,570

NIH Administrative Data:
PCC: CMP01 / **OC**: 414C / **Released**: eRA Commons User Name 10/30/2015
Award Processed: 11/02/2015 11:00:45 PM

SECTION II – PAYMENT/HOTLINE INFORMATION – 3P51OD011132-55S1 REVISED

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 – 3P51OD011132-55S1 REVISED

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:

a. The grant program legislation and program regulation cited in this Notice of Award.
b. 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) P51OD011132. 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 represents the final year of the competitive segment for this grant. See the NIH Grants Policy Statement Section 8.6 Closeout for complete closeout requirements at: http://grants.nih.gov/grants/policy/policy.htm#gps.

A final expenditure Federal Financial Report (FFR) (SF 425) must be submitted through the eRA Commons (Commons) within 120 days of the expiration date; see the NIH Grants Policy Statement Section 8.6.1 Financial Reports, http://grants.nih.gov/grants/policy/policy.htm#gps, for additional information on this submission requirement. The final FFR must indicate the exact balance of unobligated funds and may not reflect any unliquidated obligations. There must be no discrepancies between the final FFR expenditure data and the Payment Management System's (PMS) quarterly cash transaction data. A final quarterly federal cash transaction report is not required for awards in PMS B subaccounts (i.e., awards to foreign entities and to Federal agencies). NIH will close the awards using the last recorded cash drawdown level in PMS for awards that do not require a final FFR on expenditures or quarterly federal cash transaction reporting. It is important to note that for financial closeout, if a grantee fails to submit a required final expenditure FFR, NIH will close the grant using the last recorded cash drawdown level. If the grantee submits a final expenditure FFR but does not reconcile any discrepancies between

expenditures reported on the final expenditure FFR and the last cash report to PMS, NIH will close the award at the lower amount. This could be considered a debt or result in disallowed costs.

A Final Invention Statement and Certification form (HHS 568), (not applicable to training, construction, conference or cancer education grants) must be submitted within 120 days of the expiration date. The HHS 568 form may be downloaded at: http://grants.nih.gov/grants/forms.htm. This paragraph does not apply to Training grants, Fellowships, and certain other programs—i.e., activity codes C06, R13, R25, S10.

Unless an application for competitive renewal is submitted, a final progress report must also be submitted within 120 days of the expiration date. Instructions for preparing a Final Progress Report are at: http://grants.nih.gov/grants/funding/finalprogressreport.pdf. Any other specific requirements set forth in the terms and conditions of the award must also be addressed in the final progress report. Institute/Centers may accept the progress report contained in competitive renewal (type 2) in lieu of a separate final progress report. Contact the awarding IC for IC-specific policy regarding acceptance of a progress report contained in a competitive renewal application in lieu of a separate final progress report.

NIH strongly encourages electronic submission of the final progress report and the final invention statement through the Closeout feature in the Commons, but will accept an email or hard copy submission as indicated below.

Email: The final progress report and final invention statement may be e-mailed as PDF attachments to: NIHCloseoutCenter@mail.nih.gov.

Hard copy: Paper submissions of the final progress report and the final invention statement may be faxed to the NIH Division of Central Grants Processing, Grants Closeout Center, at 301-480-2304, or mailed to:

National Institutes of Health
Office of Extramural Research
Division of Central Grants Processing
Grants Closeout Center
6705 Rockledge Drive
Suite 5016, MSC 7986
Bethesda, MD 20892-7986 (for regular or U.S. Postal Service Express mail)
Bethesda, MD 20817 (for other courier/express deliveries only)

NOTE: If this is the final year of a competitive segment due to the transfer of the grant to another institution, then a Final Progress Report is not required. However, a final expenditure FFR is required and should be submitted electronically as noted above. If not already submitted, the Final Invention Statement is required and should be sent directly to the assigned Grants Management Specialist.

Treatment of Program Income:
Additional Costs

SECTION IV – OD Special Terms and Conditions – 3P51OD011132-55S1 REVISED

REVISION #1 : This award is revised to address the following issue:

CHANGE IN PI
This revision reflects the PO and GMS approval of the change of principal investigator from Dr. Stewart Caughman to Dr. Michael Johns, in accordance with the grantee's request dated October 15, 2015.

All previous terms and conditions remain in effect.

SUPPLEMENT

This supplemental award provides $723,570 ($499,014 direct costs and $224,556 associated facilities and administrative costs) to support specific pathogen free (SPF) rhesus monkeys that were transferred from the New England Primate Research Center (NPRC) to the Yerkes National Primate Research Center, in accordance with the grantee's request dated 9/25/2014. These funds may not be expended for any other purpose without the written prior approval of the ORIP.

BUDGET PERIOD/AWARD AMOUNT
This grant has been issued with an 8-month budget period with 12 months of monetary support.

PRE-AWARD AUTHORITY
This award includes preaward cost authorization to incur costs for approved grant activities back to the beginning of the parent awards current budget period of May 1, 2015.

SUBJECT FOA
This award is subject to the conditions set forth in PAR-14-226, "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: http://grants.nih.gov/grants/guide/pa-files/PAR-14-226.html

ORIP FUNDING PLAN FOR FY2015
This competing award reflects the NIH Fiscal Policy for Grant Awards for FY2015 (see NIH Guide Notice NOT-OD-15-050) and the implementation of the ORIP FY2015 grants funding policy: http://dpcpsi.nih.gov/orip/rf/fyg_fp2015

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

Excluded by Requester

Written prior approval is required if any of the individuals 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.

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 Chapter 8 the NIH Grants Policy Statement for the activities and/or expenditures that require NIH approval at http://grants.nih.gov/grants/policy/nihgps/nihgps.pdf

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 http://dpcpsi.nih.gov/orip/

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: Jenelle D. Wiggins
Email: jenelle.wiggins@nih.gov **Phone**: (301) 435-0843 **Fax**: (301) 480-3777

Program Official: John D. Harding
Email: hardingj@mail.nih.gov **Phone**: 301-435-0776 **Fax**: 30- 480-3819

SPREADSHEET SUMMARY
GRANT NUMBER: 3P51OD011132-55S1 REVISED

INSTITUTION: EMORY UNIVERSITY

Budget	Year 55
Salaries and Wages	$105,682
Fringe Benefits	$25,998
Personnel Costs (Subtotal)	$131,680
Other Costs	$367,334
TOTAL FEDERAL DC	$499,014
TOTAL FEDERAL F&A	$224,556
TOTAL COST	$723,570

Facilities and Administrative Costs	Year 55
F&A Cost Rate 1	45%
F&A Cost Base 1	$499,014
F&A Costs 1	$224,556

PRIMATE RESEARCH CENTER GRANT **Federal Award Date:** 08/24/2015

Department of Health and Human Services
National Institutes of Health
OFFICE OF THE DIRECTOR, NATIONAL INSTITUTES OF HEALTH

Grant Number: 3P51OD011132-55S1
FAIN: P51OD011132

Principal Investigator(s):
STEWART W CAUGHMAN, MD

Project Title: Support of Yerkes National Primate Research Center

Ms. Sommers, Holly
Director, Pre-award Grants Adm
1599 Clifton Road NE, 4th Floor
1599-001-1BA
Atlanta, GA 303224250

Award e-mailed to: osp@emory.edu

Period Of Performance:
Budget Period: 08/24/2015 – 04/30/2016
Project Period: 05/01/1997 – 04/30/2016

Dear Business Official:

The National Institutes of Health hereby awards a grant in the amount of $723,570 (see "Award Calculation" in Section I and "Terms and Conditions" in Section III) to EMORY UNIVERSITY 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 P51OD011132. 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,

Dawn Walker
Grants Management Officer
OFFICE OF THE DIRECTOR, NATIONAL INSTITUTES OF HEALTH

Additional information follows

SECTION I – AWARD DATA – 3P51OD011132-55S1

Award Calculation (U.S. Dollars)

Salaries and Wages	$105,682
Fringe Benefits	$25,998
Other Costs	$367,334
Federal Direct Costs	$499,014
Federal F&A Costs	$224,556
Approved Budget	$723,570
Total Amount of Federal Funds Obligated (Federal Share)	$723,570
TOTAL FEDERAL AWARD AMOUNT	$723,570
AMOUNT OF THIS ACTION (FEDERAL SHARE)	$723,570

SUMMARY TOTAL FEDERAL AWARD AMOUNT YEAR (55)	
GRANT NUMBER	**TOTAL FEDERAL AWARD AMOUNT**
3P51OD011132-55S1	$723,570
5P51OD011132-55	$9,510,024
TOTAL	**$10,233,594**

SUMMARY TOTALS FOR ALL YEARS		
YR	**THIS AWARD**	**CUMULATIVE TOTALS**
55	$723,570	$10,233,594

Fiscal Information:

CFDA Name:	Research Infrastructure Programs
CFDA Number:	93.351
EIN:	1580566256A1
Document Number:	PRR000165I
PMS Account Type:	G (Pooled)
Fiscal Year:	2015

IC	CAN	2015
OD	8014499	$723,570

NIH Administrative Data:
PCC: CMP01 / **OC**: 414C / **Released:** eRA Commons User Name 08/18/2015
Award Processed: 06/15/2015 11:31:44 PM

SECTION II – PAYMENT/HOTLINE INFORMATION – 3P51OD011132-55S1

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 – 3P51OD011132-55S1

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a. The grant program legislation and program regulation cited in this Notice of Award.
b. 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.

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This award has been assigned the Federal Award Identification Number (FAIN) P51OD011132. Recipients must document the assigned FAIN on each consortium/subaward issued under this award.

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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 represents the final year of the competitive segment for this grant. See the NIH Grants Policy Statement Section 8.6 Closeout for complete closeout requirements at: http://grants.nih.gov/grants/policy/policy.htm#gps.

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National Institutes of Health
Office of Extramural Research
Division of Central Grants Processing
Grants Closeout Center
6705 Rockledge Drive
Suite 5016, MSC 7986
Bethesda, MD 20892-7986 (for regular or U.S. Postal Service Express mail)
Bethesda, MD 20817 (for other courier/express deliveries only)

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Treatment of Program Income:
Additional Costs

SECTION IV – OD Special Terms and Conditions – 3P51OD011132-55S1

SUPPLEMENT
This supplemental award provides $723,570 ($499,014 direct costs and $224,556 associated facilities and administrative costs) to support specific pathogen free (SPF) rhesus monkeys that were transferred from the New England Primate Research Center (NPRC) to the Yerkes National Primate Research Center, in accordance with the grantee's request dated 9/25/2014. These funds may not be expended for any other purpose without the written prior approval of the ORIP.

BUDGET PERIOD/AWARD AMOUNT
This grant has been issued with an 8-month budget period with 12 months of monetary support.

PRE-AWARD AUTHORITY

This award includes preaward cost authorization to incur costs for approved grant activities back to the beginning of the parent awards current budget period of May 1, 2015.

SUBJECT FOA
This award is subject to the conditions set forth in PAR-14-226, "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: http://grants.nih.gov/grants/guide/pa-files/PAR-14-226.html

ORIP FUNDING PLAN FOR FY2015
This competing award reflects the NIH Fiscal Policy for Grant Awards for FY2015 (see NIH Guide Notice NOT-OD-15-050) and the implementation of the ORIP FY2015 grants funding policy: http://dpcpsi.nih.gov/orip/rf/fyg_fp2015

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

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COMMUNICATIONS/PRESS RELEASE
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The ORIP WWW home page is at http://dpcpsi.nih.gov/orip/

STAFF CONTACTS

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Grants Management Specialist: Jenelle D. Wiggins
Email: jenelle.wiggins@nih.gov **Phone**: (301) 435-0843 **Fax**: (301) 480-3777

Program Official: John D. Harding
Email: hardingj@mail.nih.gov **Phone**: 301-435-0776 **Fax**: 30- 480-3819

SPREADSHEET SUMMARY
GRANT NUMBER: 3P51OD011132-55S1

INSTITUTION: EMORY UNIVERSITY

Budget	Year 55
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Fringe Benefits	$25,998

Other Costs	$367,334
TOTAL FEDERAL DC	$499,014
TOTAL FEDERAL F&A	$224,556
TOTAL COST	$723,570

Facilities and Administrative Costs	Year 55
F&A Cost Rate 1	45%
F&A Cost Base 1	$499,014
F&A Costs 1	$224,556

PI: **JOHNS, MICHAEL M**	Title: Support of Yerkes National Primate Research Center	
Received: 09/25/2014	FOA: PAR14-226	Council: 05/2015
Competition ID: FORMS-C	FOA Title: LIMITED COMPETITION: NATIONAL PRIMATE RESEARCH CENTERS (P51)	
3 P51 OD011132-55S1	Dual: RI	Accession Number: 3737228
IPF: 2384501	Organization: EMORY UNIVERSITY	
Former Number:	Department: EVP Health Affairs	
IRG/SRG: ZRG1 BBBP-T (46)P	AIDS: Y	Expedited: N
Subtotal Direct Costs (excludes consortium F&A) Year 55: 499,014 Year 56: 0 Year 57: 0 Year 58: 0 Year 59: 0	Animals: Y Humans: N Clinical Trial: N Current HS Code: 10 HESC: N	New Investigator: N Early Stage Investigator: N
Senior/Key Personnel:	*Organization:*	*Role Category:*
Stewart Wright Caughman	Emory University	PD/PI

Appendices

YNPRC_IACUC_APPROVAL1018451114,New_Director_Information101845111

OMB Number: 4040-0001
Expiration Date: 06/30/2016

APPLICATION FOR FEDERAL ASSISTANCE
SF 424 (R&R)

3. DATE RECEIVED BY STATE	State Application Identifier

1. TYPE OF SUBMISSION*

○ Pre-application ● Application ○ Changed/Corrected Application

4.a. Federal Identifier
OD011132

b. Agency Routing Number

2. DATE SUBMITTED
2014-09-25

Application Identifier

c. Previous Grants.gov Tracking Number

5. APPLICANT INFORMATION

Organizational DUNS*: 066469933

Legal Name*: Emory University
Department:
Division:
Street1*: 1599 Clifton Road NE, 4th Floor
Street2: 1599-001-1BA
City*: Atlanta
County: DeKalb
State*: GA: Georgia
Province:
Country*: USA: UNITED STATES
ZIP / Postal Code*: 30322-4250

Person to be contacted on matters involving this application
Prefix: Ms. First Name*: Holly Middle Name: Last Name*: Sommers Suffix:
Position/Title: Director, Pre-award Grants Adm
Street1*: 1599 Clifton Road NE, 4th Floor
Street2: 1599-001-1BA
City*: Atlanta
County: DeKalb
State*: GA: Georgia
Province:
Country*: USA: UNITED STATES
ZIP / Postal Code*: 30322-4250
Phone Number*: (404) 727-2503 Fax Number: (404) 727-2509 Email: osp@emory.edu

6. EMPLOYER IDENTIFICATION NUMBER *(EIN) or (TIN)** 1-580566256-A1

7. TYPE OF APPLICANT* O: Private Institution of Higher Education

Other (Specify):
Small Business Organization Type ○ Women Owned ○ Socially and Economically Disadvantaged

8. TYPE OF APPLICATION*

○ New ○ Resubmission
○ Renewal ○ Continuation ● Revision

If Revision, mark appropriate box(es).
● A. Increase Award ○ B. Decrease Award ○ C. Increase Duration
○ D. Decrease Duration ○ E. Other *(specify)* :

Is this application being submitted to other agencies?* ○Yes ●No What other Agencies?

9. NAME OF FEDERAL AGENCY*
National Institutes of Health

10. CATALOG OF FEDERAL DOMESTIC ASSISTANCE NUMBER
TITLE:

11. DESCRIPTIVE TITLE OF APPLICANT'S PROJECT*
Support of Yerkes National Primate Research Center

12. PROPOSED PROJECT
Start Date* 05/01/2015
Ending Date* 04/30/2016

13. CONGRESSIONAL DISTRICTS OF APPLICANT
GA-005

SF 424 (R&R) APPLICATION FOR FEDERAL ASSISTANCE

14. PROJECT DIRECTOR/PRINCIPAL INVESTIGATOR CONTACT INFORMATION

Prefix: First Name*: Stewart Wright Middle Name: Last Name*: Caughman Suffix:
Position/Title: Exec VP, Health Affrs
Organization Name*: Emory University
Department: EVP Health Affairs
Division: Exec.V.P. for Health Affairs
Street1*: 1440 Clifton Rd
Street2: Fourth Floor
City*: Atlanta
County: DeKalb
State*: GA: Georgia
Province:
Country*: USA: UNITED STATES
ZIP / Postal Code*: 303221053
Phone Number*: 404-727-5390 Fax Number: Email*: scaughm@emory.edu

15. ESTIMATED PROJECT FUNDING

a. Total Federal Funds Requested*	$723,570.00
b. Total Non-Federal Funds*	$0.00
c. Total Federal & Non-Federal Funds*	$723,570.00
d. Estimated Program Income*	$80,000.00

16.IS APPLICATION SUBJECT TO REVIEW BY STATE EXECUTIVE ORDER 12372 PROCESS?*

a. YES ○ THIS PREAPPLICATION/APPLICATION WAS MADE AVAILABLE TO THE STATE EXECUTIVE ORDER 12372 PROCESS FOR REVIEW ON:
DATE:

b. NO ● PROGRAM IS NOT COVERED BY E.O. 12372; OR
○ PROGRAM HAS NOT BEEN SELECTED BY STATE FOR REVIEW

17. By signing this application, I certify (1) to the statements contained in the list of certifications* and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances * and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 18, Section 1001)

● I agree*

** The list of certifications and assurances, or an Internet site where you may obtain this list, is contained in the announcement or agency specific instructions.*

18. SFLLL or OTHER EXPLANATORY DOCUMENTATION File Name:

19. AUTHORIZED REPRESENTATIVE

Prefix: First Name*: Aaronette Middle Name: Seaton Last Name*: Floyd Suffix:
Position/Title*: Sponsored Rsch Analyst, Sr.
Organization Name*: Emory University
Department: Office of Sponsored Programs
Division: Research Administration
Street1*: 1599 Clifton Road NE, 4th Floor
Street2: 1599-001-1BA
City*: ATLANTA
County: DeKalb
State*: GA: Georgia
Province:
Country*: USA: UNITED STATES
ZIP / Postal Code*: 30322-4250
Phone Number*: 404-727-2503 Fax Number: 404-727-2509 Email*: asfloyd@emory.edu

Signature of Authorized Representative*
Aaronette Seaton Floyd

Date Signed*
09/25/2014

20. PRE-APPLICATION File Name:

21. COVER LETTER ATTACHMENT File Name:RPJ_P51_Rev_App_Cover_9_25_141018450912.pdf

424 R&R and PHS-398 Specific Table Of Contents

Appendix

Number of Attachments in Appendix: 1

Component Summary

Components	Component Project Title	Organization Name	Contact PD/PI Name or Project Lead Name
Overall	Support of Yerkes National Primate Research Center	Emory University	Caughman, Stewart Wright
Animal-Resources-001 (100)	Support of Yerkes National Primate Research Center--Year 55 Supplement Support for Colony Resources	Emory University	Excluded by Requester

Project/Performance
Site Location(s) Summary

Applicant Organization	City	State/Province	Country
Emory University	Atlanta	GA	UNITED STATES

Organization Name	City	State/Province	Country	Component
Emory University, Yerkes National Primate Research Center	Lawrenceville	GA	UNITED STATES	Animal-Resources-001 (100)
Emory University, Yerkes National Primate Research Center	Lawrenceville	GA	UNITED STATES	Overall

Human Subjects
Clinical Trial
Human Embryonic Stem Cells
Vertebrate Animals
Summary

Components	Human Subjects	Clinical Trial	HESC Involved	Vertebrate Animals
Overall	N		N	Y
Animal-Resources-001 (100)	N		N	Y

Composite Application Budget Summary

Categories	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	TOTALS
Salary, Wages and Fringe Benefits	131,680	0	0	0	0	131,680
Equipment	0	0	0	0	0	0
Travel	0	0	0	0	0	0
Participant/Trainee Support Costs	0	0	0	0	0	0
Other Direct Costs (excluding Consortium)	367,334	0	0	0	0	367,334
Consortium Costs	0	0	0	0	0	0
Direct Costs	499,014	0	0	0	0	499,014
Indirect Costs	224,556	0	0	0	0	224,556
Total Direct and Indirect Costs	723,570	0	0	0	0	**723,570**

Total Direct Costs less Consortium F&A

Category	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	TOTALS
Total Direct Costs less Consortium F&A	499,014	0	0	0	0	**499,014**

Funding Opportunity Number: PAR-14-226. Received Date: 2014-09-25T16:38:19.000-04:00

Component Budget Summary

Components	Categories	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	TOTALS
Animal-Resources-001 (100)	Salary, Wages and Fringe Benefits	131,680	0	0	0	0	131,680
	Equipment	0	0	0	0	0	0
	Travel	0	0	0	0	0	0
	Participant/Trainee Support Costs	0	0	0	0	0	0
	Other Direct Costs (excluding Consortium)	367,334	0	0	0	0	367,334
	Consortium Costs	0	0	0	0	0	0
	Direct Costs	499,014	0	0	0	0	499,014
	Indirect Costs	224,556	0	0	0	0	224,556
TOTALS	Total Direct and Indirect Costs	723,570	0	0	0	0	**723,570**
TOTALS		**723,570**	**0**	**0**	**0**	**0**	**723,570**

Funding Opportunity Number: PAR-14-226. Received Date: 2014-09-25T16:38:19.000-04:00

Categories Budget Summary

Categories	Components	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	TOTALS
R&R Budget - Senior/Key Person Funds Requested	Animal-Resources-001 (100)	9,942	0	0	0	0	9,942
TOTALS		9,942	0	0	0	0	**9,942**
R&R Budget - Other Personnel Funds Requested	Animal-Resources-001 (100)	121,738	0	0	0	0	121,738
TOTALS		121,738	0	0	0	0	**121,738**
R&R Budget - Section A & B. Total Salary, Wages and Fringe Benefits (A+B)	Animal-Resources-001 (100)	131,680	0	0	0	0	131,680
TOTALS		131,680	0	0	0	0	**131,680**
R&R Budget - Section C. Total Equipment	Animal-Resources-001 (100)	0	0	0	0	0	0
TOTALS		0	0	0	0	0	**0**
R&R Budget - Domestic Travel	Animal-Resources-001 (100)	0	0	0	0	0	0
TOTALS		0	0	0	0	0	**0**
R&R Budget - Foreign Travel	Animal-Resources-001 (100)	0	0	0	0	0	0
TOTALS		0	0	0	0	0	**0**
R&R Budget - Section D. Total Travel	Animal-Resources-001 (100)	0	0	0	0	0	0
TOTALS		0	0	0	0	0	**0**
R&R Budget - Tuition/Fees/Health Insurance	Animal-Resources-001 (100)	0	0	0	0	0	0

TOTALS		0	0	0	0	0	**0**
R&R Budget - Stipends	Animal-Resources-001 (100)	0	0	0	0	0	0
TOTALS		0	0	0	0	0	**0**
R&R Budget - Trainee Travel	Animal-Resources-001 (100)	0	0	0	0	0	0
TOTALS		0	0	0	0	0	**0**
R&R Budget - Subsistence	Animal-Resources-001 (100)	0	0	0	0	0	0
TOTALS		0	0	0	0	0	**0**
R&R Budget ī¿½ Other Participants/Trainee Support Costs	Animal-Resources-001 (100)	0	0	0	0	0	0
TOTALS		0	0	0	0	0	**0**
R&R Budget ī¿½ Section E. Total Participants/Trainee Support Costs	Animal-Resources-001 (100)	0	0	0	0	0	0
TOTALS		0	0	0	0	0	**0**
R&R Budget ī¿½ Materials and Supplies	Animal-Resources-001 (100)	0	0	0	0	0	0
TOTALS		0	0	0	0	0	**0**
R&R Budget ī¿½ Publication Costs	Animal-Resources-001 (100)	0	0	0	0	0	0
TOTALS		0	0	0	0	0	**0**
R&R Budget ī¿½ Consultant Services	Animal-Resources-001 (100)	0	0	0	0	0	0
TOTALS		0	0	0	0	0	**0**
R&R Budget ī¿½ ADP/Computer Services	Animal-Resources-001 (100)	0	0	0	0	0	0
TOTALS		0	0	0	0	0	**0**

R&R Budget ī¿½ Subawards/Consortium/Contractual Costs	Animal-Resources-001 (100)	0	0	0	0	0	0
TOTALS		0	0	0	0	0	**0**
R&R Budget ī¿½ Equipment or Facility Rental User Fees	Animal-Resources-001 (100)	0	0	0	0	0	0
TOTALS		0	0	0	0	0	**0**
R&R Budget ī¿½ Alterations and Renovations	Animal-Resources-001 (100)	0	0	0	0	0	0
TOTALS		0	0	0	0	0	**0**
R&R Budget ī¿½ Other Direct Cost 1	Animal-Resources-001 (100)	339,216	0	0	0	0	339,216
TOTALS		339,216	0	0	0	0	**339,216**
R&R Budget ī¿½ Other Direct Cost 2	Animal-Resources-001 (100)	28,118	0	0	0	0	28,118
TOTALS		28,118	0	0	0	0	**28,118**
R&R Budget ī¿½ Other Direct Cost 3	Animal-Resources-001 (100)	0	0	0	0	0	0
TOTALS		0	0	0	0	0	**0**
R&R Budget ī¿½ Section F. Total Other Direct Cost	Animal-Resources-001 (100)	367,334	0	0	0	0	367,334
TOTALS		367,334	0	0	0	0	**367,334**
R&R Budget ī¿½ Section G. Total Direct Cost (A thru F)	Animal-Resources-001 (100)	499,014	0	0	0	0	499,014
TOTALS		499,014	0	0	0	0	**499,014**
R&R Budget ī¿½ Section H. Indirect Costs	Animal-Resources-001 (100)	224,556	0	0	0	0	224,556
TOTALS		224,556	0	0	0	0	**224,556**

R&R Budget ï¿½ Section I. Total Direct and Indirect Costs (G +H)	Animal-Resources-001 (100)	723,570	0	0	0	0	723,570
TOTALS		723,570	0	0	0	0	**723,570**

Senior/Key Personnel
Summary

Name	Organization	Role on Project	Components
Caughman, Stewart Wright	Emory University	PD/PI(Contact)	Overall
Excluded by Requester	Emory University	Other: Project Lead	Animal-Resources-001 (100)
	Emory University	Other: Colony Director	Animal-Resources-001 (100)

BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

Excluded by Requester

Page 031 of 177 to Page 038 of 177

Withheld pursuant to exemption

Redacted by agreement

of the Freedom of Information and Privacy Act

OMB Number: 4040-0010
Expiration Date: 06/30/2016

Project/Performance Site Location(s)

Project/Performance Site Primary Location

● I am submitting an application as an individual, and not on behalf of a company, state, local or tribal government, academia, or other type of organization.

Organization Name:	Emory University, Yerkes National Primate Research Center
Duns Number:	066469933
Street1*:	2409 Taylor Lane
Street2:	
City*:	Lawrenceville
County:	Gwinnett
State*:	GA: Georgia
Province:	
Country*:	USA: UNITED STATES
Zip / Postal Code*:	30043-2921
Project/Performance Site Congressional District*:	GA-007

File Name

Additional Location(s)

OMB Number: 4040-0001
Expiration Date: 06/30/2016

RESEARCH & RELATED Other Project Information

1. Are Human Subjects Involved?* ○ **Yes** ● **No**

1.a. If YES to Human Subjects

Is the Project Exempt from Federal regulations? ○ Yes ○ No

If YES, check appropriate exemption number: _ 1 _ 2 _ 3 _ 4 _ 5 _ 6

If NO, is the IRB review Pending? ○ **Yes** ○ **No**

IRB Approval Date:

Human Subject Assurance Number

2. Are Vertebrate Animals Used?* ● **Yes** ○ **No**

2.a. If YES to Vertebrate Animals

Is the IACUC review Pending? ○ Yes ● No

IACUC Approval Date: 01-24-2014

Animal Welfare Assurance Number A3180-01

3. Is proprietary/privileged information included in the application?* ○ **Yes** ● **No**

4.a. Does this project have an actual or potential impact - positive or negative - on the environment?* ○ **Yes** ● **No**

4.b. If yes, please explain:

4.c. If this project has an actual or potential impact on the environment, has an exemption been authorized or an environmental assessment (EA) or environmental impact statement (EIS) been performed? ○ Yes ○ No

4.d. If yes, please explain:

5. Is the research performance site designated, or eligible to be designated, as a historic place?* ○ **Yes** ● **No**

5.a. If yes, please explain:

6. Does this project involve activities outside the United States or partnership with international collaborators?* ○ **Yes** ● **No**

6.a. If yes, identify countries:

6.b. Optional Explanation:

	Filename
7. Project Summary/Abstract*	Project_Summary_v3_OVERALL1018451011.pdf
8. Project Narrative*	Narrative_Overview1018451107.pdf
9. Bibliography & References Cited	Bibliography1018450916.pdf
10.Facilities & Other Resources	Resources1018451117.pdf
11.Equipment	Equipment1018450920.pdf

Project Summary

This competing revision application seeks additional support for the Yerkes Base Grant (P51 OD 11132) that will allow expansion of the rhesus macaque specific pathogen free (SPF) colony by the inclusion of SPF animals from the New England Primate Research Center (NEPRC). The YNPRC has recorded substantial progress in the present reporting period (5/1/2011 – present), as reflected in over 540 publications, construction of new animal facilities, and progressive expansion of its research funding base, even in the era of an extremely competitive NIH funding environment. The continued growth of our research base, coupled with the more specialized demands of investigators for genetically well-characterized nonhuman primates, have strained the capacity of our existing rhesus macaque SPF breeding colony, and resulted in the need to obtain significant numbers of animals from outside sources. With the support of ORIP leadership, Yerkes has partnered with the NEPRC to facilitate the transfer of approximately 135 SPF breeding animals from the NEPRC SPF colony. The incorporation of the animals into the Yerkes SPF breeding program will enhance the Center's ability to serve as a resource to core investigators and to scientists nationally and internationally, all for the ultimate goal of advancing human health. These supplemental activities are well-aligned with our central goals of supporting research programs focused on scientific problems relevant to human health, and providing the resource infrastructure and expertise in appropriate scientific and veterinary specialties to support such research.

Narrative-Overview

The central mission of the Yerkes NPRC is to support research in the areas of infectious disease, neuroscience and transplantation that help advance human health. The additional resources provided by this revised application will support the expansion of our breeding colony of rhesus macaques at Yerkes by accepting the transfer of rhesus macaques from the New England Primate Research Center specific pathogen free breeding colony, thereby advancing our ability to support translational research here at Yerkes.

Resources

Laboratory:

The Yerkes Genomics Core, located at the YNPRC Main Station has 850 square feet of laboratory space at the Yerkes main campus. This space houses two full time technicians and one full time bioinformaticist. Equipment within the core includes an Illumina HiSeq1000 genome analyzer, cluster generation PCR system, multiple PCR machines, Affymetrix 3000 7G gene chip scanner, two Affymetrix wash stations, and necessary basic laboratory equipment needed for the operation of this equipment (a complete list is provided in the Equipment section). Each research member has a dedicated Widows machine, but the bioinformaticist has an Illumina-compute workstation for next generation analysis. In addition the Genetics Core has access to the Emory Computing Core for processer or ram intensive next generation sequencing analysis. Excluded by Requester and the bioinformaticist each has a 120 ft. office adjacent to the lab. Each technician has a cubicle adjacent to the lab.

Excluded by Requester has 550 sq feet of genetics laboratory space at the Yerkes Field Station. This space contains bench space for four individuals, Fume hood, and all necessary equipment to perfom relevent genetic analysis, including DNA extraction, PCR, Sanger sequencing and SNP genotyping.

The Yerkes Virology Core, located at the YNPRC Main Station has 983 square feet of laboratory space divided between two rooms. The main laboratory space houses two full time technicians as well as standard equipment for western blotting, PCR, and ELISAs, while the smaller laboratory area is a dedicated PCR clean room. Equipment within the core includes a Bio-rad Bioplex 200 Luminex system, a Perkin Elmer GeneAmp PCR system 9700, an Eppendorf Gradient Thermocycler, a Bio-rad CFX96 Real-time PCR cycler, a GeneQuant RNA/DNA Calculator, a Bio-rad Turboblot, two Apple iMacs, multiple PCR clean hoods, and all the necessary equipment for the performance of PCR, real-time PCR, Western blot analysis, and ELISAs. Both rooms are located on the third floor of the Emory Vaccine Center within the Division of Microbiology and immunology at Yerkes NPRC. Additionally, the Virology Core manages the BSL-3 facilities within the Emory Vaccine Center and has access to these facilities for preparation of viruses and virological products.

Clinical Pathology Laboratory

The clinical pathology laboratory, located at the Yerkes' Main Center, has the capability of performing hemogram evaluations, blood chemistry evaluations, bacterial cultures, parasite examinations, and the capability for determination of phenotype of peripheral blood mononuclear cells and their subsets (B cells, T cells, CD4 cells, CD8 cells and ratio. A separate isolated laboratory is available for working with blood specimens and retrovirus-infected nonhuman primates.

Necropsy and Pathology Laboratory, located at the Yerkes' Main Center, has the capability for postmortem examinations and tissue collection and processing. The necropsy suite with its down-draft table is well suited for conducting extensive postmortem and examinations. In addition, it contains an anteroom for changing into personal protective equipment, four freezers, walk-in cold room, storage room and fume hood. To augment the necropsy examinations, the necropsy room is equipped with computer access to animal records, a computerized necropsy reporting and record keeping systems and a digital camera. Three pathologists are available on an alternating week basis and one supervisor and a necropsy technician also shares duties. Each pathologist has his/her won microscope as well as the department having a five-heading teaching microscope.

The Histology and Electron Microscopy Laboratory has the capability of performing routine histology services including special stains and procedures as requested. The electron microscope laboratory has full capability of processing tissues for ultrastuctural evaluation of tissues and other specimens. Both laboratories are located at the Yerkes' Main Center.

Daily deliveries from the Field Station to the Main Center permit the transport of samples to the YNPRC the Cores as needed.

Clinical: The Clinical Veterinary Medicine, Administration, and Research building (CVMAR) was completed and occupied in 2009 which includes 16,130 total square feet containing the hospital, treatment rooms, and surgical suite. In addition, the building includes office space for the division of veterinary medicine, colony management, research services, and genetics lab. The Field Station has three full time veterinarians, a veterinary resident, and 5 full time veterinary technicians. The Field Station has a dedicated clinical veterinary medicine building for the treatment of sick and injured animals including a digital x-ray machine, a fully equipped surgical suite, including a separate animal prep area and surgeon scrub room, PET scanner, pharmacy two animal treatment rooms, and Specific Animal Location for animal housing.

Animal:
The Field Station consists of Specific Animal Location Specific Animal Location Within this area are compounds for housing the breeding groups and smaller indoor – outdoor Specific Animal Location Specific Animal Location Specific Animal Location See table below. The Field Station located approximately 30 miles northeast of the Main Station on the Emory campus, has a population of 1775 rhesus monkeys, 127 sooty mangabeys, and 27 chimpanzees. Approximately 97% of animals at the Field Station are socially housed.

SPACE SUMMARY TABLE

Overview of Facilities at the YNPRC Field Station

FACILITY	Indoor SQ FT	Outdoor SQ FT	GROSS SQ FT	FUNCTION
Specific Animal Location				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
C-1			560	Office Space
Specific Animal Location				Animal Housing
				Animal Housing/Laboratory
				Animal Housing / Office / Research / Clinical
				Animal Housing
				Animal Housing
				Animal Housing
				Chimp Housing
G-2 Test			600	Chimp Laboratory
G-7			700	Storage

G-8			2,205	Behavioral testing/Kitchen
G-9			660	Office Space
G-10			660	Office Space
G-11			2,520	Office Space
Specific Animal Location				Chimp Housing
G-13			1,640	Shower/Conference
G-14			1,882	Laboratory/Office Space
G-15			1,620	Shower
Specific Animal Location				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
Cage Washer Building			570	Cage Wash
Chow Storage			384	Feed Storage
Shed #1			2,500	Storage
Shop			4,000	Shop Facility
Shop Storage			480	Storage
Specific Animal Location				
TOTAL FIELD STATION	**16,923.5**	**190,382**	**282,213**	

The compound areas are constructed of Specific Animal Location
Specific Animal Location
Specific Animal Location These runs have been constructed or modified with pass through panels that allow for varying housing configurations to augment behavioral management and enrichment techniques in addition to providing a way to introduce animals and form new social groupings.

There are Specific Animal Location
Specific Animal Location has a treatment room and animal housing for SPF clinical cases and animal holding. Specific Animal Location currently has a

treatment room, four rooms for animal holding, and six testing rooms that serve as a behavioral and cognitive testing area for monkeys. There is a chimpanzee cognitive testing area associated with area G2.

Computer:
Each member of the project faculty and staff have desktop computers connected to a University-wide network that provides e-mail and internet access. Computers also provide access to the animal medical research system (ARMS) as well as Vet PACS for review of digital images acquired at the Main Center. Each member of the project faculty and staff have office space and access to network printers, copiers, fax and scanning machines.

Office:
Furnished office space is provided to faculty members at the Field Station [redacted] or main station [redacted] Cubicle space is available at the Field Station for each staff member. Administrative support is provided through the Division of Animal Resources and the Division of Developmental & Cognitive Neuroscience.

Excluded by Requester

Excluded by Requester

Conference room space is also available at both the Main Station and the Field Station for small and large conferences. Conference rooms are all equipped with the capability to project computer presentations and video conferencing.

Other
The onsite facilities maintenance team, staffed by a supervisor and three experienced craftsmen, maintain the buildings, compounds, and caging at the Field Station. On occasion, work is contracted out to provide industry if additional personnel or expertise is needed. The facilities maintenance unit constructs and maintains animal caging, maintains utilities serving animal and people areas, and provides support to ongoing animal management or research programs. The unit has expertise in working with all types of material (metal, plastic, or wood) and in constructing or maintaining primate housing to meet program needs.

Equipment

Veterinary Medicine – Field Station

- 2 Anesthesia machines with isoflurane vaporizers
- 1 Surgivet small animal ventilator
- 2 Anesthesia monitoring devices for ECG, pulse oximeter, indirect blood pressure, respiratory rate and body temperature
- 1 Cardell veterinary monitor for blood pressure and heart rate
- 1 Valleylab Surgistat II electrocautery machine
- 1 Surgivet Convective warming blanket
- Heska Vet/IV 2/2 fluid pump
- 1 New Era syringe pump
- Precision Medical Hi-Flow suction pump
- Digital radiograpy
- Progeny digital dental radiograpy
- Dental unit with high & low speed drills, ultrasonic cleaner
- GE LogiQe Vet ultrasound machine
- 5 digital scales for body weights
- Autoclave
- Gas Sterilizer
- 8 neonatal isolettes
- Olympus BX 41 Microscope with digital camera
- Hand-held refractometer

Field Station Animal Resources

- 60 two-way radios available for communication between all departments at the Field Station
- 1 centrally located three rack cage wash machine
- 1 Bobcat skid steer on premises used to grade compounds, erect enrichment structures and climbers or other maintenance work.
- 1 Dingo mini excavator on premises used to perform compound maintenance and assist with installing enrichment and climbing structures
- 4 gas powered Toro workman utility vehicles on premises used to transport animals, feed or other supplies associated with animal care.
- 3 Electric powered utility vehicles on premises used to transport animals, feed or other supplies associated with animal care.
- 1 transport van utilized to move animals, equipment and supplies. This vehicle is also approved as a back up vehicle to transport animals between facilities. This van is equipped with extra ventilation and the interior is fabricated with surfaces that can be cleaned and sanitized.
- 1 Large capacity trailer mounted pressure washer on premises used to pressure wash compound surfaces and structures
- 1 forklift on premises used to transport cage racks to the cage washer as well as move supplies. An additional Forklift is on site for use by the Facilities crew to move caging, supplies and other equipment.
- 1 walk in cooler centrally located used to store fresh produce.
- 2- 8' x 20' storage containers. These air conditioned units have been sealed and modified to hold dry foods. The temperatures in these units are monitored remotely.
- There are several emergency generators to provide backup power for lights and air handling systems in all animal areas.

Yerkes NPRC Genomics Core

- Beckman refrigerated centrifuge
- Thermo –80 C freezer
- -20 C freezer
- Biological Safety Cabinet
- Laboratory refrigerator

- Illumina HiSeq1000 genome analyzer
- Cluster generation PCR system(C-bot)
- Covaris M220 Focused-ultasonicator
- AB 9700 PCR machines (3)
- Affymetrix 3000 7G gene chip scanner
- Affymetrix wash stations (2)
- Qiagen QIAcube sample prep station
- Qiagen TissueLyser II
- Nanodrop 1000 spectrophotometer
- Qubit Fluorometer
- (3) Widows machines with appropriate software licenses for analysis (Partek, Bioconductor, Golden Helix, Velvet, Bowtie, AceView)
- Illumina-compute workstation for complex analysis
- Access to the Emory Computing Core for processer or ram intensive analysis
- Necessary basic laboratory equipment needed for the operation of this equipment
- Fluidigm C1 Single cell Auto Prep System
- Fluidigme Biomark HD expression assay platform

Excluded by Requester

Genetics Laboratory (Field Station)

- Applied Biosystems 3730 genetic analyzer
- AB 9700 PCR machines (4)
- Software licenses for genetic analysis programs
- Hettich universal 320 centrifuge
- Nanodrop 2000 Spectrophotometer
- Eppendorf 5415 centrifuge
- Sorvall RC5C plus ultra-high speed centrifuge
- Hydra 96 well pooling robot
- Hettich Rotina 420R Bench top refrigerator centrifuge
- Revco Ultra Freezer (-79 C)
- Promega Maxwell Nucleic Acid Extraction system
- -20 freezer
- 4 degree lab refrigerator

Yerkes NPRC Virology Core

- Eppendorf Centrifuge 5417C
- Vortexes (x 4)
- Baker BSC x2
- Thermo Scientific -80C
- Cryofridge -200C
- Precision Waterbath (37oC)
- Corning Stirrer/hotplate
- Beckman Coulter Microfuge R
- Voltage Power Sources (X 4)
- BioRad Turboblot
- ThermoyIne Stirrer/hotplate
- Sartorius Scale
- Mettler PJ 4000 Scale
- GeneQuant RNA/DNA Calculator
- VWR 4oC Fridge
- Precision Waterbath (37oC/57oC)
- Hoefer Orbital Shaker
- Amana Microwave
- BioRad Bioplex 200 Luminex system
- Baker BSC x2

- Kalpana Apple computer
- Amana -20C freezer
- Revco -20oC
- Minicentrifuge
- FIsher Isotemp -20oC
- Eppendorf Gradient Thermocycler
- Applied Biosystems GeneAmp PCR System 9700
- PCR Hood
- BioRadCFX96 Real-time Cycler
- Labnet miniplate spinner MPS1000
- BioRad Power Pac 300

Clinical Pathology Lab

- Sysmex semi-automated hematology analyzers (2)
- Spectrophotometer
- FACS Calibre flow cytometer
- FACScan Flow Cytometer
- Light microscopes (5)
- Incubators (4)
- Nu-Aire biological safety hoods
- Centrifuges (4)
- Abbott i-Stat analyzer

Necropsy and Pathology Facilities

- Ultra-Cold freezers (4)
- Microscopes with cameras (in pathologists' offices) (3)
- Five-headed teaching microscope (in office area)
- Digital camera
- Walk in cold room
- Downdraft table
- Fume Hood

Histology and Electron Microscopy Lab

- Tissue-Tek VIP Tissue Processor
- Tissue-Tek DRS Stainer
- Tissue Embedding Center
- Automatic Microtome
- Dissecting Scope
- Rotary Microtomes (2)
- Microscopes (2)
- Digital Scale
- Waterbaths (4)
  Microwave
- Slide warmers (2)
- Darkfield Scope
- Knife Sharpener
- Zeiss EM 10 Electron Microscope
- Leica Ultracut Ultramicrotome
- Gatan Digital Camera System
- Diamond Knife
- Vacuum Evaporator
- Refrigerator

OMB Number: 4040-0001
Expiration Date: 06/30/2016

RESEARCH & RELATED Senior/Key Person Profile (Expanded)

PROFILE - Project Director/Principal Investigator

Prefix:	First Name*: Stewart Wright	Middle Name	Last Name*: Caughman	Suffix:

Position/Title*:	Exec VP, Health Affrs
Organization Name*:	Emory University
Department:	EVP Health Affairs
Division:	Exec.V.P. for Health Affairs
Street1*:	1440 Clifton Rd
Street2:	Fourth Floor
City*:	Atlanta
County:	DeKalb
State*:	GA: Georgia
Province:	
Country*:	USA: UNITED STATES
Zip / Postal Code*:	303221053

Phone Number*: 404-727-5390 Fax Number: E-Mail*: scaughm@emory.edu

Credential, e.g., agency login: eRA Commons User Name

Project Role*: PD/PI Other Project Role Category:

Degree Type: MD Degree Year: 1979

	File Name
Attach Biographical Sketch*:	Caughman_Biosketch_yh_20140925101845095 2.pdf
Attach Current & Pending Support:	

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OMB Number: 0925-0001

1. Project Director / Principal Investigator (PD/PI)

Prefix:
First Name*: Stewart Wright
Middle Name:
Last Name*: Caughman
Suffix:

2. Human Subjects

Clinical Trial? ○ No ○ Yes
Agency-Defined Phase III Clinical Trial?* ○ No ○ Yes

3. Permission Statement*

If this application does not result in an award, is the Government permitted to disclose the title of your proposed project, and the name, address, telephone number and e-mail address of the official signing for the applicant organization, to organizations that may be interested in contacting you for further information (e.g., possible collaborations, investment)?

○ Yes ● No

4. Program Income*

Is program income anticipated during the periods for which the grant support is requested? ○ Yes ● No

If you checked "yes" above (indicating that program income is anticipated), then use the format below to reflect the amount and source(s). Otherwise, leave this section blank.

Budget Period*	Anticipated Amount ($)*	Source(s)*

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5. Human Embryonic Stem Cells

Does the proposed project involve human embryonic stem cells?* ● No ○ Yes

If the proposed project involves human embryonic stem cells, list below the registration number of the specific cell line(s) from the following list: http://grants.nih.gov/stem_cells/registry/current.htm. Or, if a specific stem cell line cannot be referenced at this time, please check the box indicating that one from the registry will be used:

Cell Line(s): Specific stem cell line cannot be referenced at this time. One from the registry will be used.

6. Inventions and Patents (For renewal applications only)

Inventions and Patents*: ○ Yes ○ No

If the answer is "Yes" then please answer the following:

Previously Reported*: ○ Yes ○ No

7. Change of Investigator / Change of Institution Questions

❑ Change of principal investigator / program director

Name of former principal investigator / program director:

Prefix:

First Name*:

Middle Name:

Last Name*:

Suffix:

❑ Change of Grantee Institution

Name of former institution*:

PHS 398 Research Plan

Please attach applicable sections of the research plan, below.

OMB Number: 0925-0001

1. Introduction to Application (for RESUBMISSION or REVISION only)	Introduction_Overall_v410184511 31.pdf
2. Specific Aims	Overall_Specific_Aims1018450967.pdf
3. Research Strategy*	Overall_Res_Strategy1018451148.pdf
4. Progress Report Publication List	Prog_Rept_Pub_List1018450928.pdf
Human Subjects Sections	
5. Protection of Human Subjects	
6. Inclusion of Women and Minorities	
7. Inclusion of Children	
Other Research Plan Sections	
8. Vertebrate Animals	Vertebrate_Animals1018450932.pdf
9. Select Agent Research	
10. Multiple PD/PI Leadership Plan	
11. Consortium/Contractual Arrangements	
12. Letters of Support	
13. Resource Sharing Plan(s)	Resource_Sharing_Plan1018450935.pdf
Appendix (if applicable)	
14. Appendix	New_Director_Information1018451119.pdf YNPRC_IACUC_APPROVAL1018451114.pdf

INTRODUCTION

This competing revision application seeks additional support for the Yerkes National Primate Research Center (YNPRC) Base Grant (P51 OD 11132) that will allow expansion of the rhesus macaque specific pathogen free (SPF) colony by the inclusion of SPF animals from the New England Primate Research Center (NEPRC). The YNPRC has recorded remarkable progress in the present reporting period (5/1/2011 – present), as evidenced by numerous high quality publications (over 540, including multiple publications in high profile journals), construction of new animal facilities, including a state-of-the-art transplantation and BL3 facility, and expansion of its research funding base, even in the era of an extremely competitive NIH funding environment, with a 13% increase in research funding in FY 2014.

The continued growth of our research base at Yerkes, coupled with the more specialized demands of investigators for genetically well-characterized nonhuman primates, have strained the capacity of our existing rhesus macaque SPF breeding colony, and resulted in the need to obtain animals from outside sources. With the support of ORIP leadership, Yerkes has partnered with the NEPRC to facilitate the transfer of approximately 135 SPF breeding animals from the NEPRC SPF colony. The NEPRC SPF rhesus macaque breeding colony was established in 1988 and represents one of the oldest and best-characterized SPF rhesus macaque colonies in the United States. Virologic monitoring for B virus, STLV, SIV, and SRV has been conducted using rigorously established protocols with no breaks in SPF status since 1992. Breeding has been carefully managed, and the entire breeding colony has undergone comprehensive MHC class I typing using next generation sequencing techniques. The planned closure of the NEPRC puts at risk a valuable resource that represents an investment of tens of millions of research dollars and necessitates transfer of this valuable resource to other NRPCs.

The incorporation of the NEPRC animals into the Yerkes SPF breeding program will preserve this invaluable resource, as well as enhance the YNPRC's ability to serve as a resource to core investigators and to scientists nationally and internationally, all for the ultimate goal of advancing human health. The additional funding requested in this application provides support for the ongoing care of the breeding animals, including detailed virologic monitoring and genetic characterization. These supplemental activities are well-aligned with our central goals of supporting research programs focused on scientific problems relevant to human health, and providing the resource infrastructure and expertise in appropriate scientific and veterinary specialties to support such research.

SPECIFIC AIMS

The Yerkes National Primate Research Center of Emory University is one of eight National Primate Research Centers sponsored by the Office of Research Infrastructure Programs of the National Institutes of Health. With the support of the P51 grant, the Yerkes Primate Center operates two principal facilities: a Main Station on the Emory University campus, which provides animal housing facilities, research laboratories and support services and a 117 acre Field Station located 30 miles north of Atlanta, which provides housing for nonhuman primate breeding colonies, research laboratories including a genetics laboratory, and facilities for studies of the social behavior and biology of semi-free ranging nonhuman primates. The central objectives of our Center are:

- Carry out basic and applied research using nonhuman primates in the service of developing knowledge, treatments, interventions, and cures that will benefit humanity.
- Provide regional and national resources for data, consultative expertise, biologic and genetic material and specialized facilities and equipment useful in supporting primate related research.
- Study the natural biology of primate species that are of research importance for the purpose of enhancing their scientific utility, health and well-being through appropriate laboratory and field studies.
- Develop improved practices of primate breeding, husbandry and genetic definition to help meet research needs for pedigreed, disease-free animals of defined quality, and assure the continued availability of species of biomedical research importance.
- Provide opportunities for research involvement and experience in primatology to graduate students, postdoctoral fellows, visiting scientists and faculty members, as well as high school students and teachers.
- Disseminate the findings of studies and technical advances in primate research to the scientific community by reports in internationally recognized, refereed journals, professional conferences, and on-site open-house opportunities

Rhesus macaques are one of the most common nonhuman primate species used in biomedical research, both at the national level and at the Yerkes NPRC. The rhesus macaque is widely acclaimed as the premier preclinical model of HIV infection, as well as a preeminent model for neuroscience, transplant medicine and infectious diseases other than HIV. In recent years, there has been an increase in the demand for specific pathogen free (SPF) rhesus macaques in general, and SPF macaques with specific genetic backgrounds in particular. At Yerkes, we have observed progressive increases over the past four years in the requests for rhesus macaques, coupled with the expansion of our research funding base, which grew by 13% in FY 2014. The central objective of this competing revision application is to provide support for the incorporation of animals from the NEPRC breeding colony to the Yerkes SPF breeding colony. **Specifically, we propose the integration of NEPRC rhesus macaques into the Yerkes breeding colony to augment the supply of SPF rhesus macaques available to support NIH-funded research**

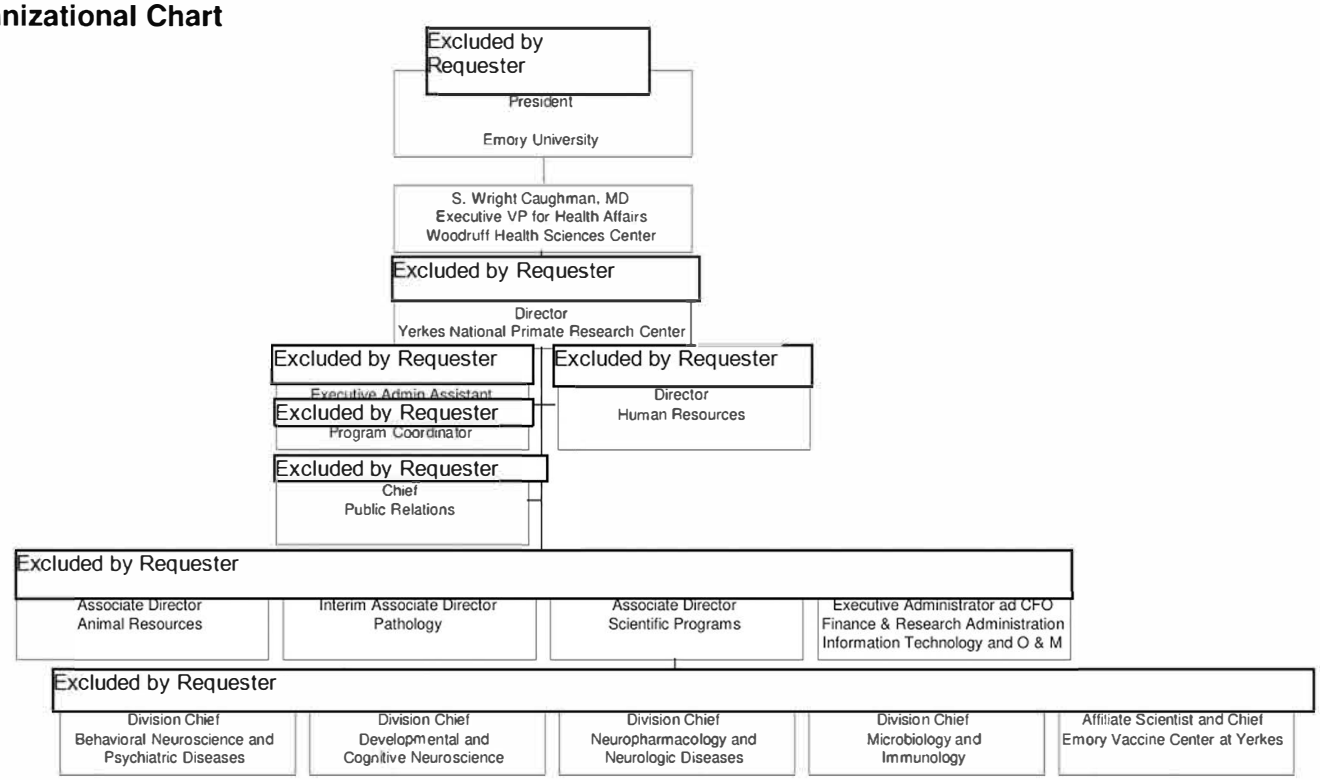
The growth of the fully pedigreed, SPF colonies at the YNPRC by integration of the NEPRC animals will provide a supply of high-quality and well-characterized rhesus macaques for investigators at Emory University and elsewhere that will support our research mission for decades to come.

RESEARCH STRATEGY

The Yerkes National Primate Research Center of Emory University is one of eight National Primate Research Centers sponsored by the Office of Research Infrastructure Programs of the National Institutes of Health. The Yerkes Center was founded by Dr. Robert M. Yerkes, Yale University, as the Laboratory of Primate Biology in Orange Park, Florida in 1930. This laboratory, the first in the United States dedicated to the use of nonhuman primates as research subjects, became affiliated with Emory University in 1956. In 1965, the laboratory and the nonhuman primates were moved to new facilities on the Emory campus as one of the NIH-sponsored Regional Primate Research Centers. The designation as a National Primate Research Center occurred in 2001. The original research programs of Dr. Yerkes were directed toward studies of the behavior and biology of nonhuman primates, especially the chimpanzee. Since becoming affiliated with Emory University and especially during the past 20 years, the research programs of the Yerkes Center have become much more diversified. Although behavioral studies continue to be important at the Yerkes Center, the major core research programs now include emphases in microbiology and immunology, neuroscience, developmental disorders, and neurological and psychiatric diseases. This evolution of change in the focus of our research program is in alignment with the focus on translational research by the National Institutes of Health and by the Office of Research Infrastructure Programs.

The Yerkes National Primate Research Center is a unit of the Robert W. Woodruff Health Sciences Center of Emory University. The Principal Investigator of this grant, Dr. S. Wright Caughman, is the Executive Vice President of Health Affairs for the University. He reports to the President of Emory University, who reports to the Board of Trustees. The Yerkes Center Director, Excluded by Requester reports to Dr. Caughman and serves as one of the Deans and Directors of the University. The Center Director is responsible for the overall administration and general operation of the Center with respect to research activities, support services, allocation of resources, faculty and staff appointments, base grant budget and other Center responsibilities.

Organizational Chart



Background and Mission

Mission Statement

Yerkes National Primate Research Center of Emory University conducts innovative biomedical and biobehavioral research to improve the health and well-being of humans and nonhuman primates. We foster an open exchange of ideas, interdisciplinary and collaborative research, and publication of fundamental discoveries. We provide the resources, training, and leadership to foster scientific creativity and excellence. We espouse the highest standards of scientific integrity, mutual respect for colleagues, and compassionate and conservative use of a diverse population of nonhuman primates and other laboratory animals.

Core Values

The core values of the Woodruff Health Sciences Center, of which Yerkes National Primate Research Center is a part, are Caring, Excellence and Integrity. During our Yerkes strategic planning sessions, our faculty and staff developed a set of six core values (Excellence, Collegiality, Stewardship, Integrity, Creativity/Innovation, and Individual Opportunity) that very much aligned with those of the Woodruff Health Sciences Center.

Vision Statement

To be recognized as the leading center in the world for both basic and applied research using nonhuman primates in the service of humanity.

The YNPRC conducts its program in accordance with the objectives defined by the Office of Research Infrastructure Programs, National Institutes of Health. The objectives of this program, as stated in the ORIP Administrative Document National Primate Research Centers Program Guidelines (Seventh Edition), are to provide funds for (a) specialized research resources (physical facilities, technology, professional and technical staffing and a variety of nonhuman primate species) for research studies applicable to the solution of human health problems, (b) pilot research projects, and (c) studies on nonhuman primate biology that improve the health and well-being of the animals. Support is provided through the Program to:

- Provide regional and national resources for normative data, consultative and collaborative expertise, biologic and genetic material, and specialized facilities and equipment useful in supporting primate-related research
- Conduct pilot (basic and applied) biomedical research projects in areas requiring the use of nonhuman primates, which are aimed at the solution of human health and societal problems, and which should lead to independent grant support related to the disease or health problem being studied
- Study the natural biology of primate species that are of potential research importance for the purpose of enhancing their scientific utility, health, and well-being through appropriate laboratory and field studies
- Develop improved practices of primate breeding, husbandry and genetic definition to help meet research needs for pedigreed, disease-free animals of defined quality, and to assure the continued availability of species of biomedical research importance whose wild populations are considered threatened or endangered
- Provide opportunities for research involvement and experience in primatology to undergraduate and graduate students, postdoctoral fellows, visiting scientists, and junior faculty members, as well as short-term learning assignments for students of the health professions
- Disseminate the findings of studies and technical advances in nonhuman primate research to the scientific community, by reports in internationally recognized, peer-reviewed journals and other appropriate media

The significance of the Center's mission arises from the conduct of a research program focused on scientific problems relevant to human health and the NIH mission in providing resource infrastructure and expertise in appropriate scientific and veterinary specialties to support such a program and to enhance the Center's ability to serve as a resource to core investigators as well as to scientists regionally, nationally and internationally. The program is aligned with the NIH mission, the ORIP strategic plan and with national health priorities.

The Yerkes National Primate Center and its closely affiliated scientific centers (Emory Vaccine Center, Emory Center for AIDS Research, the Emory Transplant Center, and the Emory Institute for Drug Development) have produced a cadre of interdisciplinary teams to address issues in vaccinology, immunology, immunobiology, neuropharmacology, behavioral neuroscience, cognitive neuroscience, behavioral neuroendocrinology, visual neuroscience, imaging, and functional genomics. This network provides a rich fabric of scientific and technological expertise that enhances the scientific outcomes of all scientists doing research at Yerkes, including core staff scientists, and outside investigators from Emory University Departments and other institutions.

As is detailed through this proposal, the Yerkes National Primate Research Center has demonstrated significant accomplishments during the last funding period and proposes work in this revision application consistent with the stated objectives. In particular, the Yerkes Primate Center has developed an outstanding core research program, extensive collaborative relationships with scientists based in other Emory University departments and hospitals, and a broad collaborative network of affiliate and collaborative investigators including those from the CDC, Children's Healthcare of Atlanta hospitals, and the Atlanta Veterans Affairs Medical Center. Additionally, the Yerkes Center has established close links with the Emory University Clinical Translational Science Award (CTSA; the Emory CTSA involves the Morehouse School of Medicine and the Georgia Institute of Technology and is called the Atlanta Clinical Translational Science Institute, ACTSI).

Organizational Framework

- **Brief History and Relationship to Emory University**

The Yerkes National Primate Research Center of Emory University is one of eight National Primate Research Centers sponsored by the Office of Research Infrastructure Programs of the National Institutes of Health. The Yerkes Center was founded by Dr. Robert M. Yerkes, Yale University, as the Laboratory of Primate Biology in Orange Park, Florida in 1930. This laboratory, the first in the United States dedicated to the use of nonhuman primates as research subjects, became affiliated with Emory University in 1956. In 1965, the laboratory and the nonhuman primates were moved to new facilities on the Emory campus as one of the NIH-sponsored Regional Primate Research Centers. The designation as a National Primate Research Center occurred in 2001. The original research programs of Dr. Yerkes were directed toward studies of the behavior and biology of nonhuman primates, especially the chimpanzee. Since becoming affiliated with Emory University and especially during the past 20 years, the research programs of the Yerkes Center have become much more diversified. Although behavioral studies continue to be important at the Yerkes Center, the major core research programs now include emphases in microbiology and immunology, neuroscience, developmental disorders, and neurological and psychiatric diseases. This evolution of change in the focus of our research program is in alignment with the focus on translational research by the National Institutes of Health and by the Office of Research Infrastructure Programs. Administratively, the Yerkes Center is a Division of the Robert W. Woodruff Health Sciences Center.

- **The Robert W. Woodruff Health Sciences Center**

The Robert W. Woodruff Health Sciences Center coalesces those components within Emory University concerned with patient care, education of health professionals, research affecting health and illness and policies for prevention and treatment of disease. The Health Sciences Center consists of the School of Medicine, the Nell Hodgson Woodruff School of Nursing, the Rollins School of Public Health, Emory University Hospitals and Clinics, and the Yerkes National Primate Research Center. The Health Sciences Center provides clinical care through Emory University Hospital, the Emory Clinic, Emory Midtown Hospital, and its major affiliates that include Grady Memorial Hospital, Atlanta Veterans' Affairs Medical Center, Children's Healthcare of Atlanta, and Wesley Woods Geriatric Center. Research funding within the Health Sciences Center was $479.3 million in FY14, representing a substantial increase in recent years and over 92% of the

Emory University's overall funding. The Woodruff Center has some 2,511 faculty members, 1,557 adjunct and volunteer faculty and collaborative scientists and a staff of 15,167 including Emory Healthcare.

- **Emory University**

Emory University, founded in 1836, has grown into a teaching, research and service institution with an enrollment of approximately 10,250 students including undergraduates, graduate students and professional students. The University campus stands on 631 hilly and wooded acres six miles northeast of downtown Atlanta. A co-educational, privately administered University, Emory awards approximately 3,500 degrees annually. The University's main divisions include Emory College, Oxford College, the Woodruff Health Sciences Center, the School of Theology, the School of Law, Emory Business School and the Graduate School of Arts and Sciences.

- **Organization and Administrative Structure of the Yerkes Center**

The Yerkes National Primate Research Center is a unit of the Robert W. Woodruff Health Sciences Center of Emory University. The Principal Investigator of this grant, Dr. S. Wright Caughman, is the Executive Vice President for Health Affairs and Director of the Robert W. Woodruff Health Science Center. He reports to Dr. Excluded by Requester the President of Emory University, who reports to the Board of Trustees. The Yerkes Center Director, Excluded by Requester reports to the Executive Vice President of Health Affairs and serves as one of the Deans and Directors of the University. The Yerkes Director is responsible for the overall administration and general operation of the Center with respect to research activities, support services, allocation of resources, faculty and staff appointments, base grant budget and other Center responsibilities. The Center senior administration includes an Associate Director for Scientific Programs, Associate Director for Animal Resources, Associate Director for Pathology and Executive Administrator/Chief Business Officer. The Yerkes Center has four core scientific research Divisions.

The Yerkes Center currently houses approximately 3100 nonhuman primates including chimpanzees and six species of monkeys. There are 18 core scientists, 14 service faculty and 28 scientists in residence at Yerkes. The remainder of the 124 faculty holds affiliate, collaborative or visiting scientist positions. In addition to the faculty, there are 406 staff employees (FTE).

In program planning and policy, the Yerkes Director is guided by the recommendations of outside advisors, including a National Science Advisory Board, Emory University policy and oversight, and several internal committees, as well as by NIH and ORIP policies and guidelines. Additionally, the Yerkes Science Advisory Committee and the Yerkes Resources Allocation Advisory Committee evaluates all research proposals, with respect to mission relevance and resource availability and provides recommendations and data summaries. The daily operations of the Center are the responsibility of the Yerkes Director, together with the Associate Director for Scientific Programs, the Executive Administrator (also called the Chief Business Officer), and the Associate Director for the Division of Animal Resources and the Associate Director for Pathology. The Associate Director for Animal Resources is responsible for veterinary services, animal care, animal records and enrichment, regulatory compliance, research services, colony management, environmental health and safety and occupational health. Also, the Division of Animal Resources provides research support services for outside investigators.

National Scientific Advisory Board: The NSAB advises the Center Director with regard to strategic planning, program activities, scientific growth of the Center and administrative organization and management. The NSAB meets annually, on site, and also convenes as necessary by conference calls. The NSAB membership includes:

Cognition/Aging
Excluded by Requester
Professor & Chair, Department of Anatomy & Neurobiology
Private Source School of Medicine
Genetics
Excluded by Requester
Associate Professor, Department of Molecular and Human Genetics and

Human Genome Sequencing Center
Private Source

Imaging
Excluded by Requester
Professor of Physiology & Pharmacology and Radiology
Private Source

Immunology/Vaccine/Infectious Diseases
Excluded by Requester
Director, AIDS and Cancer Virus Program
Private Source

Neuroscience
Excluded by Requester
Professor of Psychology and Psychiatry & Biobehavioral Sciences
Associate Director for Research of the Brain Research Institute
University of California, Los Angeles
Excluded by Requester
Dean of Basic Sciences and the Graduate School of Biomedical Sciences
Professor, Department of Neuroscience
Private Source

Service Resources
Excluded by Requester
Excluded by Requester
Department of Veterinary Sciences
Director, Michael E. Keeling Center for Comparative Medicine and Research
University of Texas MD Anderson Cancer Center

Scientific Advisory Committee: The Scientific Advisory Committee (SAC), which is comprised of the Center Director, Division Chiefs, Yerkes Chief Business Officer, the Chief of Public Affairs, and staff scientists, reviews all scientific proposals from non-Yerkes/Emory investigators for scientific merit and availability of resources, prior to review by the RAAC and initiation of any project using nonhuman primates at the Yerkes Center. A Study Intent Questionnaire (SIQ) is completed and submitted, via the Yerkes website, to the SAC facilitator who then forwards the SIQ to the appropriate Yerkes Division Chief/PI for further review. If the project is deemed feasible, the Yerkes Division Chief/PI will contact the investigator requesting completion of a Research Intent Proposal (RIP) that will be entered into the SAC database and reviewed by the SAC to determine whether Yerkes has the resources to support the proposed study. Yerkes/Emory investigators are not required to submit a SIQ, but must submit a RIP at the time they route a grant to Yerkes Business & Finance Office for review. RIP's submitted by Yerkes/Emory investigators are not reviewed by the committee but are recorded in the SAC database used for tracking resource allocation. This committee meets monthly in order to review requests in a timely manner.

Resource Allocation Advisory Committee: The Resource Allocation Advisory Committee (RAAC), prior to initiation of any IACUC protocol, must review all projects, both internal and external, requiring Center resources. This committee meets monthly to review and make recommendations regarding research applications requiring animal and other Center resources. This committee also tracks resource commitments and actions needed to meet these requirements in instances where resource limitations (e.g. animals or space) preclude immediate availability. A new subcommittee of RAAC was created to focus on individual animal assignments in order to improve the efficiency of the assignment process. An electronic RAAC program designed by Yerkes IT was implemented by this committee in 2013. This program facilitates electronic submission and tracking of RAAC applications along with an innovative program for identifying animals for assignments.

Animal Resources Management: The Center has a team for Animal Resources Management at the Main Station. This group meets monthly and includes members from Veterinary Staff, Animal Care, Behavioral Management, Research Resources, Occupational Health and Safety, Training and Facilities Management.

The group reviews new and ongoing projects that affect animal resources such as animal acquisitions and shipments, quarantine, new research protocols and facility maintenance and construction needs that affect animal housing areas. The goal of this group is to enhance communication amongst all units of Division of Animal Resources at the Main Station.

Colony Management: The Center has a Colony Resources Manager and a team that oversees the colonies at the Field Station and balances colony production needs with research needs and resource availability. This individual works closely with the Assistant Director of Animal Resources at the Field Station, Associate Veterinarians and others at the Field Station. A Colony Director was hired to start in October 2015 who will lead the colony management team.

A Colony Management Committee meets bimonthly to review progress and concerns, and plans for anticipated future research and colony maintenance requirements. The colony management group consists of representative from colony management, veterinary medicine, research staff and animal care. Three members of the Colony Management team participate in the ORIP sponsored NPRC Breeding Colony Management Consortium, which includes representatives from all eight NPRCs. The Consortium hosts monthly teleconferences and meets annually, with the goal of facilitating communication and efficiencies of colony management among the NPRCs.

Regulatory Compliance: The Emory University Institutional Animal Care and Use Committee (IACUC) must approve all research involving animals at Yerkes. The Committee is charged with ensuring proper care, use, and humane treatment of animals used in research, testing and education. Animals are not assigned to any research project until IACUC approval is received. The Emory IACUC is composed of 37 voting members (27 full and 10 alternate) and 20 nonvoting ex officio members divided into two Committees. Each Committee meets twice monthly and evaluates all University research proposals that involve the use of laboratory animals. This results in an IACUC meeting occurring every two weeks to review protocols. The proposals are provided to all IACUC members prior to the scheduled committee meeting. Each proposal receives a veterinary consult prior to review, then is presented by a primary and secondary reviewer at the meeting with discussion and review by the committee members culminating in a motion and a vote at the meeting. The outcome of the proposal will have only one of the following determinations: approval, modifications are necessary to obtain approval, approval withheld, or deferral to the next meeting. All research protocols receive a thorough review, regardless of whether they were submitted to an outside funding agency or are being internally funded. The latter type of proposal is also reviewed for scientific merit. Committee members are not present for review of proposals on which they are involved and have a conflict of interest.

In addition to the approval of research applications involving animals, the Committee also inspects all research and animal facilities semi-annually and compiles a report with results and recommendations from these inspections to the Institutional Official. We have 18 voting members from Yerkes who serve on the IACUC.

Accreditation: The Yerkes NPRC is fully accredited by AAALAC, with the most recent site visit having been in February 2014 and letter of accreditation received in July 2014. The current site visit occurred February 19-21, 2014. Full accreditation was received.

OVERVIEW OF ANIMAL COLONIES

The Division of Animal Resources is comprised of: (1) Veterinary Medicine; (2) Colony Management; (3) Animal Care-Main Station; (4) Animal Care-Field Station; (5) Behavioral Management; and (6) Animal Records. Through these units, the Division provides health care, research support, environmental enrichment, program management and maintenance of animal records for the diverse nonhuman primate population at the YNPRC. Primate breeding, including a specific pathogen free (SPF) colony are overseen, as well as the research colony, the rodent vivaria, and Comparative AIDS Core.

Animal Census Tables

As of 2/14/2014, overall size of the NHP colony is as follows:

1. Nonhuman primates supported partially, or in whole by the P51 base grant[1].
Census date: 9/24/2014

Genus, Species	Breeding Colony[2]				Animals not in breeding colony[3]				Total Colony Census
	M	F	U[4]	Total	M	F	U[4]	Total	
Cercocebus torquatus atys	16	63	2	81	49	29	0	78	159
Macaca fascicularis					14	2	0	16	16
Macaca mulatta (SPF)	330	740	119	1,189	438	537	26	1,001	2,190
Macaca mulatta (Non-SPF)					136	140	3	279	279
Macaca nemestrina					2	1	0	3	3
Saimiri spp.					36	2	0	38	38
Totals	346	803	121	1,270	675	711	29	1,415	2,685

[1] The SPF *Macaca mulatta* Breeding Colony is partially supported by a SPF U24 grant (U24 OD011023).
[2] Total number of animals in breeding colony including adult breeding animals and designated juvenile replacements at time of report.
[3] Animals on protocol or otherwise not in the breeding colony at the time of report.
[4] Sex undetermined.

2. Nonhuman primates not supported by the P51 base grant[1].
Census date: 9/24/2014

Genus, Species	Breeding Colony[2]				Animals not in breeding colony[3]				Total Colony Census
	M	F	U[4]	Total	M	F	U[4]	Total	
Cercocebus torquatus atys					8	0	0	8	8
Macaca mulatta (Non-SPF)					0	36	0	36	36
Macaca mulatta (SPF)	39	70	0	109	14	11	0	25	134
Macaca mulatta (SPF-Transplant)	23	67	31	121					121
Pan troglodytes					31	38	0	69	69
Totals	62	137	31	230	53	85	0	138	368

[1] Animals in these colonies are not supported by a SPF U24 or U42 grant.
[2] Total number of animals in breeding colony including adult breeding animals and designated juvenile replacements at time of report.
[3] Animals on protocol or otherwise not in the breeding colony at the time of report.
[4] Sex undetermined.

RELATIONSHIP OF NEPRC COLONY TO OVERALL FUNCTION OF NPRC

Yerkes will be acquiring and integrating 135 rhesus macaques from the NEPRC colony into the YNPRC breeding colony. Two shipments of NEPRC animals have already arrived and one more shipment of breeding animals is scheduled in October. These animals will enhance the population of our SPF and genetically characterized breeding groups to develop into a sustainable population to meet our research demands. The large research portfolio at Yerkes results in a high demand for rhesus macaques for research assignments. The challenges of providing SPF animals with highly specific genotypes has resulted in a greater demand than supply. The infusion of the NERPC breeding animals will help enhance the Yerkes population to meet future demands.

TABLE OF CORES

Service Cores	**Unit in Which It Resides**
Primate Virology	Microbiology and Immunology
Biomarkers	Developmental and Cognitive Neuroscience
3T MRI Imaging	Neuropharmacology and Neurologic Diseases
PET Imaging	Neuropharmacology and Neurologic Diseases
7.0T MRI Imaging	Neuropharmacology and Neurologic Diseases
Genomics Core	Animal Resources
Comparative AIDS Core	Animal Resources

OVERIEW OF TRAINING AND OUTREACH

TRAINING

Scientific

The Center is actively involved in a number of training and continuing education activities. Students and Postdoctoral Fellows are an integral part of the scientific fabric of Yerkes and participate in all elements of the research mission. In this past year, some 150 undergraduate and graduate students received training and experience in Yerkes laboratories. During this same period, the Center employed 66 Postdoctoral Fellows. Yerkes currently is the focal point for a substantial portion of the Neuroscience Graduate Program at Emory. The Director of the NIH training grant that supports students in the Graduate Neuroscience Program and many members of the Neuroscience Program Executive committee, all reside at Yerkes. Additionally, almost 30% of graduate students in the Neuroscience and Immunology programs are carrying out their dissertation research in Yerkes laboratories, including several MD/PhD students. Essentially all of our Divisions have NRSA or NSF-supported students and we have worked with each Division in facilitating the process for trainees' applications to NIH/NSF or private foundations for financial support. We have two institutional training grants, developed and administered at Yerkes: the NIGMS Training in Systems and Integrative Biology-Neuroscience and the NIH BP/ENDURE training grant that supports under-represented minority undergraduate students in Neuroscience. The Yerkes Center is also the administrator of the NIH-funded UDALL Center of Excellence for Parkinson's disease at Emory University and houses two of the core scientists participating in this Center. In addition to research activities, the Parkinson's Disease Center is very active in education and community outreach for trainees and the general public. It also provides pilot grants to young investigators interested in developing new areas of research for Parkinson's disease.

Since 2009, Excluded by Requester D.V.M., has been the Emory Laboratory Animal Medicine Residency Training Program Assistant Director. In addition, Yerkes veterinary faculty members have taken responsibility as course directors for classes within the Residency Training program in collaboration with the Division of Animal Resources at Emory's School of Medicine. Yerkes also supports two residency positions per year. Our goal is to train and retain laboratory animal veterinarians who will grow with Yerkes, and help develop programs of research around their own specialties. All veterinary faculty continue to be actively involved in the Emory Laboratory Animal Medicine Program and remain closely partnered with the Division of Animal Resources at

the School of Medicine. In 2007, an NCRR R25 training grant enabled Yerkes to include an additional third year of specialized NHP training for three residents (one each year – funding to support years two and three of the training). In 2009 an administrative supplement to the R25 provided support for a fourth resident to enter the program. The three-year YNPRC NHP Residency Program builds upon our successful Emory/YNPRC two-year program and provides extensive nonhuman primate clinical and resource management experience for the residents. We have successfully recruited four trainees, all of them having completed the program between June 2009, and June 2011. In addition, all have obtained their ACLAM Board Certification, the gold standard to measure success of a Laboratory Medicine Training program. In light of the success of this specialized Training Program, YNPRC decided to continue to support a third year Fellowship in Nonhuman Primate Medicine and Management. We have already recruited four trainees for the Fellowship Program. The first one completed her training in June 2013 and obtained her ACLAM Board certification in July 2013. She is now a full time clinical veterinarian at Yerkes. The second trainee finished her fellowship training in July 2014 and took her ACLAM Board exam in July 2014. The remaining fellows will start the program respectively in July 2014 and 2015.

YNPRC has continued to provide opportunities for veterinary internships and externships. These opportunities introduce veterinary students to the field of lab animal medicine and have sometimes led to students applying for lab animal residency positions as offered by the School of Medicine/YNPRC. Two of our current residents have been through our externship program. In 2013, eight externs and one intern came to YNPRC for a period of time which varies between three to ten weeks. Students from veterinary technical schools also have participated in externships and have sometimes been motivated to apply for available technical positions at Yerkes where they could put to good use their new found knowledge of nonhuman primates. We did hire one of the veterinary technician externs in 2013. The various students work closely with veterinary faculty, residents and technicians to gain a working knowledge and appreciation of the specialty of nonhuman primate medicine.

The Yerkes Center is linked with several components of the Emory University Clinical Translational Science Award (CTSA); (here called the Atlanta Clinical and Translational Science Institute – ACTSI – which includes Morehouse School of Medicine and the Georgia Institute of Technology). The key functional areas of the ACTSI that the Yerkes Center is involved with include brain imaging and education.

In the summer of 2013, Yerkes hosted an intern from Drexel University's Master of Laboratory Animal Science Program. This intern completed a three-month assignment of working with various units of Animal Resources, obtaining supervisory and management experience and skills.

Yerkes has collaborated with the Institute on Neuroscience (ION) at Georgia State University to continue to enable high school students and middle and high school teachers to participate in scientific research. Success with this program has led to a five-year NIH grant to continue the ION program.

In addition, the Center regularly hosts scientific seminars and sponsors frequent talks (Lunch and Learn, Frontiers in Neuroscience) by faculty for the staff to promote understanding of the scientific mission.

Employee Training

Prior to beginning employment, all personnel are given a packet that provides information on the Yerkes Center, general information on primate research, the nonhuman primate behavioral management program, laboratory animal zoonoses information, personnel policies, Center security information, standards and procedures for working safely at the Center, training information, and biosafety issues (e.g., B-virus information). Supervisors are responsible for training employees in procedures that specifically relate to their areas of responsibility. Individuals with practical experience are appointed to train new employees/students within their units. All new employees (investigators, animal care personnel, research technicians, etc.) and students/volunteers receive an approximately 1 hour orientation that includes a slideshow related to organization of the Yerkes Center, procedures for handling incidents and potential exposures, and general guidelines for working safely in laboratory and animal research settings. All new employees complete training on Emory's Blackboard site, including a "Yerkes Orientation" module in addition to other modules as are

relevant to the employee's job responsibilities. All personnel who will have animal contact are required to complete Animal User Orientations that cover nonhuman primate and/or rodent biology, U.S. regulations and guidelines for laboratory animals, IACUC policies, identifying and reporting sick animals and reporting animal welfare concerns. Animal Research personnel are required to complete applicable AALAS Learning Library online training modules and be added to an existing IACUC protocol prior to working with animals. A hands-on instructional tour of the nonhuman primate and/or rodent research facility is required for research personnel to gain access to these areas. General information memoranda are circulated providing any new information or reminding personnel of existing standards when necessary.

Training classes are provided as part of Yerkes continuing education efforts. These classes are based on the American Association for Laboratory Animal Science certification program. Although all Animal Care Technicians are encouraged to work toward certification by AALAS, the AALAS certification examination is not mandatory. Regular staff meetings are conducted at which time there is generally a review of some aspects of husbandry and care that relate to certification. Manuals for the Assistant Laboratory Animal Technician, Laboratory Animal Technician and the Laboratory Animal Technologist are made available to Yerkes technicians without charge for use in the in-house training program or for self-study. Additionally, the Emory University IACUC Office subscribes to the AALAS Learning Library for online, individualized training. The Yerkes Center pays the fee for the certification examination at each level. A salary increase is provided to individuals who achieve certification. Currently, the Training Coordinator for the Yerkes Department of Animal Resources coordinates the training requirements for personnel who work with research animals. After completing the Animal User Orientations, trainings offered to animal users at Yerkes include 1) aseptic surgery technique (mandatory for anyone conducting surgery); 2) rodent biomethodology including restraint, blood collection techniques and injection procedures; 3) humane rodent euthanasia methods; and 4) behavioral management of nonhuman primates. Instructional manuals for identifying sick rodents are distributed to animal research and animal care personnel. The Training Coordinator is a member of the IACUC Subcommittee on Training and Continuing Education, which develops the policy on rate, frequency and types of training and continuing education requirements for animal users at Emory University and Yerkes.

Forty percent of the Main Station animal care unit and 45% of the Field Station animal care unit are AALAS certified at some level. Opportunities for additional training are also available when Animal Care Technicians attend National AALAS, SEAALAS and AALAS District IV meetings in 2014. Supervisors and Managers have been attending Webinars sponsored by NABR, OLAW, USDA and AAALAC. Additionally, Continuing Education sessions are available for Veterinary Technicians through the Gwinnett Veterinary Medical Association monthly meetings.

In addition to the initial orientation which includes information on zoonoses (including B-Virus), biosafety, personal protective equipment, and Center policies on safety, the Yerkes Environmental Health and Safety Officer conducts and/or facilitates annual training programs for all personnel. These annual training programs include but are not limited to: (1) B-virus training for all staff who work with nonhuman primates or nonhuman primate blood or tissues; (2) annual updates on the use of personal protective equipment to include a review of current requirements, demonstration on how to use PPE, and information on the storage, limitations of and decontamination and disposal of PPE; (3) information on hazards communications and the chemical hygiene plan, including how to work with hazardous chemicals, how to respond to a spill, labeling and storage requirements, disposal procedures and Material Safety Data Sheets (MSDS); (4) biosafety reviews which includes a review of biosafety level 1-4, blood borne pathogens standards, biological safety cabinets, emergency procedures, disposal practices, and a review of zoonoses; (5) radiation safety which includes discussion of the characteristics of radiation, safe use and storage, disposal, and employee monitoring; (6) ergonomics training for employees in animal care, research, or any other position that involves strenuous or repetitive physical activity; and (7) fire safety training which includes fire prevention strategies, evacuation plans, emergency procedures, and training for the use of fire extinguishers; and (8) respirator program which includes annual fit testing, training, and medical surveillance.

OUTREACH

The Center employs the following mechanisms to disseminate the scientific and technical achievements of the

resource:

1. Publications in peer-reviewed scientific journals.
2. Presentations to the scientific community at local, national and international scientific meetings.
3. Exhibit booth, on behalf of all National Primate Research Centers, at the annual Society for Neuroscience meeting.
4. News releases distributed to media and the resulting articles.
5. A Web site, *www.yerkes.emory.edu*, that provides an overview of the Center, our research programs and news releases about the latest findings. Some scientific cores (e.g., Genomics, Biomarkers and Imaging) have links on the Yerkes Web site to separate Web sites that provide more information on the services available and rates.
6. Talks to groups touring the Yerkes National Primate Research Center's two campuses.
7. Presentations to the public at community meetings and other public fora as well as to junior high and high school students.
8. Literature distributed to presentation and tour participants as well as that provided to other Emory University departments to distribute as appropriate (e.g., Parents' Weekend for the university).
9. Articles in Emory University publications (e.g., Emory Magazine).
10. An internal Lunch and Learn program for Yerkes employees. Outside scientists also present lectures throughout the year.

PROGRESS

Overall Highlights

The Yerkes National Primate Research Center has demonstrated significant progress in meeting each of our key objectives during the reporting period and consequently, has made significant contributions to behavioral, biomedical and translational research and research training at Emory University and via collaborations on a regional and national basis. In particular, the Yerkes Primate Center has maintained outstanding core research programs, extensive collaborative relationships with scientists based in other Emory University departments and provided resources and services to a broad collaborative network of affiliate and collaborative investigators throughout the region and nation. These research programs, which involve the use of a variety of nonhuman primate species, and rodents where appropriate, are directed primarily toward four major research disciplines, representing the research divisions within the Primate Center: 1) Microbiology and Immunology; 2) Developmental and Cognitive Neuroscience, 3) Neuropharmacology and Neurologic Diseases and 4) Behavioral Neuroscience and Psychiatric Disorders. Also, through the Divisions of Animal Resources and Pathology, Yerkes provides support for outside investigators conducting research at the Yerkes Center, consistent with our ORIP mandated role as a regional and national resource.

Supporting components (see also below) provide the following administrative units, activities and services: (1) Associate Director of Animal Resources, (2) Associate Director of Pathology, (3) Research Services unit that provides support for onsite and off-site investigators, (4) Tissue Distribution program that collects and distributes nonhuman primate biological specimens, (5) Occupational Health and Initial Orientation/Training Program, (6) Environmental Health and Safety Program and (7) Regulatory Compliance. There continues to be a strong emphasis on training, both on the job and more formal training, such as AALAS certification classes that are offered at both the Main Station and Field Station. These courses plus regular Lunch and Learn sessions and various staff meetings and training sessions in the Animal Care units contribute to better communication and improved performance. Additionally, last year we provided Animal Resources personnel, including all animal care personnel with courses in leadership, management, and conflict resolution. This year we provided follow-up programs and assessments.

During the past year, the Center provided support for 185 investigators and 169 projects that were performed at the Center. These projects fall into the following categories: a) 14 Management projects, b) 149 Research projects, and c) 6 Pilot projects. While 29.6% of the projects were AIDS-related using SPID data, approximately 49% of our FY13 awarded funding (excluding the P51) is AIDS-related. These projects resulted in 162 published journal articles. This work was supported via the substantial outside funding garnered by

investigators associated with the YNPRC. Provision of specimens to investigators is another service provided by the Center, with some 2,697 specimens distributed in the most recent reporting period. Students and Postdoctoral Fellows also are an integral part of the scientific fabric of Yerkes and participate in all elements of the research mission.

PROGRESS IN CORE SERVICE UNITS

Division of Animal Resources

The Division of Animal Resources consists of the units of Veterinary Medicine, Animal Care: Main Station, Animal Care: Field Station, Colony Management, Behavioral Management, Research Services, Environmental Health and Safety, and Animal Records. Through these units, the Division is responsible for the husbandry, clinical care, research support, behavioral management, animal record maintenance, and experimental interventions for the diverse nonhuman primate (NHP) population and two Rodent Research Facilities at the YNPRC. Division activities are at the Main Station, which is located on the Emory University campus, and at the Field Station, which is located 30 miles northeast of the Main Station. The Center primate breeding colonies are maintained at the Field Station, including specific pathogen free (SPF) research and production colonies. Oversight is also provided for the NHP research colonies, the Comparative AIDS Core, and the chimpanzee colony.

Division faculty participate in teaching a number of nonhuman primate, laboratory animal medicine, and behavioral management courses at Emory University, and provide mentorship to graduate and technical students enrolled in various programs. Faculty members actively contribute to the Center's experimental and clinical research activities both in supportive and lead roles.

There is a strong emphasis on training, both on-the-job and more formal training, including veterinary residency (detailed below), internship and externship training programs and formal continuing education classes for veterinary technicians in conjunction with Division of Animal Resources at Emory University. AALAS certification classes and continuing education classes are offered at both the Main Station and the Field Station, as are management training courses for personnel in all units. These outlets, plus various staff meetings and training sessions, contribute to better communication and improve safety and animal care procedures within the Division.

The Division of Animal Resources now maintains a position for an animal training coordinator. This individual developed a new centralized training program focused on animal related procedures that is provided for all new staff working with animals. This training captures both investigative staff as well as animal resource staff to ensure uniform distribution of essential information.

Yerkes Animal Resources hosts a monthly Comparative Medicine Seminar series in collaboration with the School of Medicine's Division of Animal Resources (DAR). The seminar series is devoted to discussion of topics pertinent to laboratory animal medicine and is attended by representatives from other institutions such as the CDC, VA Hospital, UGA, Zoo Atlanta, and other local universities. Continuing education credit is given for this series.

The Division, along with DAR, administers the Emory University Laboratory Animal Medicine Residency Program for veterinarians. This two-year ACLAM accredited program provides training for graduate veterinarians in laboratory animal medicine with the option of a third year dedicated to specialized primate training. Two residents are recruited each year; spending one year in the Division of Animal Resources at the School of Medicine and one or two years at Yerkes. The residents participate in formal coursework, a research project, clinical medicine, colony management, IACUC activities, surgery, imaging, behavioral management, facility management and pathology rotations. Yerkes has been a recipient of NIH support (R-25 together with an administrative supplement, concluding in2011) to support a total of four residents to participate in an extended three-year residency focusing on primate health, care, and management. Moving forward, Yerkes will continue to support a third year fellowship for one resident (of the two per year) who is specifically interested in

primate studies.

The Yerkes NPRC is fully accredited by AAALAC. An AAALAC site visit was held on February 19-21, 2014. The letter of accreditation was received July 3, 2014, conferring full accreditation.

Key support units of the Division of Animal Resources include:

- Veterinary Medicine
  The Veterinary Medicine Unit provides clinical veterinary support for nonhuman primates and rodents housed at the Yerkes Center 24 hours per day 7 days per week. The clinical faculty is called upon to provide a wide range of clinical expertise to cover the diverse needs of the research and breeding colonies. In addition, the veterinary faculty provides research support to selected protocols by providing training as well as information to investigators about medical, surgical, and diagnostic procedures used in the research environment. Research support also consists of protocol review and consultation, sample collection, and maintenance of research and clinical data. Four of the twelve Yerkes veterinarians are Emory IACUC members (full or alternate) and participate in various IACUC subcommittees. Two of the veterinarians devote 50-60% of their time to research in imaging and neurobiology and development. The Unit of Veterinary Medicine also supports surgical services, providing for and developing sophisticated surgical procedures used in clinical and research settings. Veterinarians are responsible for all nonhuman primate postoperative care. Particular emphasis has been on the veterinary support for the continuously growing transplant and infectious disease research program. The radiology section provides plain and contrast radiographic studies along with ultrasound and echocardiography as necessary for many research and clinical applications. Digital radiology is in place at both the Main Station and the Field Station. Anesthetic support is provided for multiple imaging studies using CT, MRI, and PET techniques. In collaboration with investigators, the Yerkes veterinarians provide information and expertise for development of new animal models as well as the refinement of existing models.

  The preventive medicine program is administered through the Veterinary Unit, which includes the quarantine program for newly acquired animals and routine surveys of all NHPs. Routine surveys for the chimpanzee colony include tuberculin testing, physical examinations and vaccine administration. Additionally, blood is collected for serum chemistries, hematology, and for evaluations associated with genetic profiling of the colony animals. Routine surveys for other NHP species also include physical examinations, tuberculin testing and anthelmintics administration as well as the collection of blood specimens to characterize the colony in tissue typing and paternity. The sentinel and quarantine programs in the rodent research facilities are likewise overseen by Veterinary Medicine, and include full necropsy and histopathology evaluation, as well as parasitology testing and blood collections for serology every four months.

- Colony Management – Field Station
  The Colony Management Unit is a support service at the Field Station to oversee the management and breeding of the NHP colony in order to meet production and scientific needs for the Center. Responsibilities include evaluation of animal housing allocation for the Field Station and development of a plan to match resources with projected colony and research needs. As with most primate colonies in research facilities, the rhesus macaque (*Macaca mulatta*) accounts for the majority of animals assigned to research projects, and represents about 85% of Yerkes' NHPs. Other NHP species maintained at the Field Station include the sooty mangabeys (*Cercocebus atys*), and chimpanzees (*Pan troglodytes*). Additional support services provided by this unit at the Field Station include: assisting research and veterinary medicine units with the re-introduction of animals removed due to medical treatment or social conflict; accessing animals for specific research and social management needs; providing assistance in yearly group surveys; and conferring with investigators regarding social dynamics and management as they impact research requirements. Colony support services include: participation in animal housing construction planning, developing and maintaining social status hierarchies and genealogies on all breeding groups, census, collection of biological specimens, tracking and documenting new births, and insertion of microchips and infant tattooing for identification purposes.

At the beginning of 2009 a geneticist was recruited to enhance the genetic characterization of all populations housed at Yerkes. To that end, microsatellite based paternity analysis has been performed for the rhesus macaque and sooty mangabey populations, which in turn has allowed for the creation of multigenerational pedigrees for each population. In addition, haplotype analysis of the MHC region of the genome has been completed within both species to better understand how individual variants influence transplantation success, vaccine development, and disease progression. SNP based ancestry analysis has also been completed within the rhesus macaque population, which identified a small number of subjects with Chinese rhesus heritage. These animals were subsequently removed from the breeding population. Finally, we now do all paternity analysis with a SNP based approach using a Fluidigm genotyping system. To date, we have completed SNP based parentage analysis for ~900 animals with no discrepancies between SNP and microsatellite results. This migration to SNP based assays allows us to be both quicker and more cost efficient when compared to our old microsatellite based approaches.

With the renewal of the ORIP supported U24 SPF grant and the completion of an ARRA administrative supplement, the transitioning of the rhesus breeding colonies at the Field Station to full SPF status is complete with all of the compounds in full SPF status.

- Primate Care and Housing – Main Station

The Animal Care Unit at the Yerkes Main Station provides for the routine daily husbandry for research and colony animals located on the Emory Campus. The census of nonhuman primates maintained at the Main Station is approximately 1000, representing 6 different species including chimpanzees. Currently, the YNPRC has 102 animal holding rooms in 14 buildings. Each room has a holding capacity of 4-6 animal racks of four cages apiece. All of these buildings have the capability for social housing, depending on study assignment and clinical status of the animal. Currently, one of the buildings has an NHP nursery [redacted] A new animal facility [redacted] completed construction in 2013 that contains both a BSL 3 animal facility and designated animal housing and support for transplant medicine research. The transplant portion of the building is currently operational, while the ABSL3 is not yet occupied. Chimpanzees are housed in the [redacted] comprised of indoor/outdoor enclosures and one play area. The center has been reorganizing social groups of chimpanzees in order to relocate animals, create larger social groups and increase the number of chimpanzees living in compounds the Field Station.

Specific Animal Location

Specific Animal Location

-

The Animal Care staff work closely with both the Veterinary and Behavior Management units. General husbandry procedures include routine observations and the reporting of any abnormal clinical signs or activity of the animals to the appropriate veterinary medical staff and to a supervisor. A standard workday consists of first verifying the health and well-being of all animals; ensuring that they have water and a cleaned environment prior to feeding. Enrichment takes place in the afternoon, and Animal Care technicians also have the responsibility of cleaning and re-stocking enrichment devices, as well as checking watering devices and a second feeding. Water is available to all animals ad libitum unless restricted water intake is required for health or research reasons. All of this takes place according to approved SOPs.

Oversight and support of animals housed at the Main Station is provided by the Animal Care Unit 24/7, and night staff are on site during the off hours to monitor the animals and administer any medications.

On-going training is a critical function of the Animal Care Unit. Technicians are offered classes to assist them in preparing to take certification tests offered by the American Association for Laboratory Animal Science (AALAS). To facilitate this process, technicians are divided into groups led by a certified technologist. Currently, one employee is certified at the CMAR level, 6 have attained LATG, 7 are certified LAT, and 6 certified at the ALAT level. Rotating members of the Animal Care staff are sponsored to attend regional and national AALAS conferences and upon their return make presentations to their colleagues on the knowledge gained during the meetings. AALAS certification is required for senior level positions and personnel attaining levels of AALAS certification are rewarded

with salary increases.

As part of continuing education, Animal Care personnel meet bimonthly to review Standard Operating Procedures and other topics relevant to work. Research Scientists periodically give presentations on their work to Animal Care technicians to provide a better understanding of the research supported by daily husbandry and care activities. Animal care personnel participate in a behavioral management training program which focuses on identification of species typical as well as abnormal behavior of the primates housed at the center. This fosters positive interaction between Animal Care, Veterinary, and Research staff.

- Primate Care and Housing—Field Station

The Yerkes Field Station is 30 miles northeast of Emory University. It is situated on approximately 117 acres in Gwinnett County. Specific Animal Location Specific Animal Location The Field Station complements the Main Station by providing facilities for nonhuman primate breeding. Additionally a number of programs, including genetic analysis and bio-behavioral research activities, take place at the Field Station.

The Animal Care administrative resources are designed in a similar manner to the Main Station. There is considerable interaction on most levels between the two sites, with direct communication between the Assistant Director of Animal Resources at the Field Station and the Associate Director of Animal Resources.

The Animal Care Unit of the Field Station provides the around the clock daily husbandry and care for research and breeding colony animals housed at the facility. Census totals at the Field Station average 1788 animals and include rhesus macaques, sooty mangabeys and chimpanzees. The major responsibilities of the Animal Care staff are to provide the daily feeding, cleaning, enrichment, care and observation of all animals, as well as to ensure the safety and appropriateness of the animal environment. Other duties of the Animal Care staff include, but are not limited to, recognizing and reporting abnormal clinical signs or behavioral activity by the animals to the appropriate veterinary medical staff, providing support and assistance during routine diagnostic and therapeutic procedures, and assisting with the administration of medicines that are part of the preventive medicine program. Additionally, Animal Care staff are cross trained so that they may assist research staff and veterinary staff with animal accessing and handling or to assist the colony management staff with issues pertaining to animal management. Recently we have instituted a new, in-house, behavioral management certification component to our technician training program. Animal Care Technician IV's provide care after hours, including administering treatment and performing animal observations and facility security rounds. The Animal Care Operations Manager lives on site and is available to assist with after hour emergencies.

All four Managers and Supervisors hold some level of AALAS technician certification. Additionally, one manager holds CMAR certification. Eight eligible animal care technicians are certified at the ALAT and LAT levels and three technicians at the LATg level. Several Colony Management and Veterinary Technicians are also certified at different levels.

A six person Facilities staff assists with maintaining the animal compounds as well as maintaining the facility physical plant. Both Animal Care staff and the Facilities staff work together, along with Veterinary and Behavioral Management staff, to provide safe enrichment structures and to monitor the safety of the animal areas and the security of the facility.

Behavioral Management

The behavioral management/enrichment program at the Yerkes Center aims to promote and maintain primate well-being through collaboration among the Behavioral Management, Veterinary Medicine, Animal Care, and Research Units. The behavioral management program includes daily implementation

of the program, the conduct of scientific investigation to advance knowledge in this realm, and regulatory aspects of primate welfare.

Elements of the program include social contact, animal training and other positive interactions with humans, feeding enrichment, structural enrichment, manipulable objects (durable and destructible), devices permitting foraging/grooming/problem-solving, and sensory enrichment such as music and videotape viewing. Several enrichment techniques are used concurrently for each primate and they are scaled to the species, age class, and individual needs of animals, as well any requirements of research projects. The program is dynamic, permitting modification of techniques in accordance with in-house assessments and findings from the scientific literature. New items are added to the program through an approval system. Behavioral assessments are conducted by Behavioral Management staff to identify normal and abnormal behavior patterns. Animal care personnel receive training on normal and abnormal behavior, and about behavioral management. Animals exhibiting psychological distress are treated through an amplification of enrichment, training, adjustment of social dynamics, and/or pharmacological means. We have a positive reinforcement animal training program with specified goals of facilitating animal care, research and veterinary procedures. Daily enrichment and training are implemented by Animal Care and Behavioral Management personnel. Behavioral research on a variety of topics has been conducted, presented, and published. This research contributes to the development of a firm scientific foundation to underlie improvements in the behavioral management/enrichment of nonhuman primates. Recent research topics include comparing socialization strategies for rhesus monkeys, describing the use of positive reinforcement training for restraint, evaluating factors that influence the expression of abnormal behavior, and using positive reinforcement training for biological sample collection. Another recent publication is a general review of behavioral management for rhesus macaques.

The regulatory responsibilities of the behavioral management unit involve working through the Emory University IACUC and addressing issues related to the USDA oversight and the AAALAC accreditation process. A formal review of enrichment, social housing and animal training issues for each Emory/Yerkes research protocol using primates is performed by Behavioral Management staff as a part of the IACUC review process. Scientific justifications are evaluated for any requested restrictions on social housing or enrichment, animal training techniques are evaluated for appropriateness, and the use of subjects requiring special attention (e.g., infants) as defined by the USDA is scrutinized. This process permits tailoring enrichment implementation to specific research projects.

- Animal Records

The Yerkes animal records system transitioned in September 2013 from the Animal Records System (ARS), an Informix Database software, to a new Animal Research Management System (ARMS) developed on Oracle 11g with Business Objects reporting service. This new system was developed in collaboration with the Washington National Primate Research Center (WaNPRC). All NHP records are maintained by the Animal Records Office. Computerized records were initiated in 1990, and animal record data prior to that time is primarily paper. The minimum data recorded for each animal includes species, sex, date of birth, and location, and annual survey data including body weight, tuberculin test results, immunizations, and project assignment. Clinical and laboratory data that may be generated are also included. With respect to IACUC protocols, computer based records are maintained on the specific IACUC assignment of the animal, the number of animals approved by the study, and number of animals that have been assigned to or used in the study. Information for the rodents is maintained through the Granite system from Topaz Technology with the Emory School of Medicine's (SOM's) Division of Animal Resources.

The Animal Records Unit is responsible for updating the ARMS data and ensuring that the Principal Investigators' accounts are charged the appropriate per diem and animal use fee rates on a monthly basis. Animal Records personnel also consult with grants management personnel to make sure that accounts are legitimate and that the funding for each study is used appropriately as stipulated in the project guidelines.

The Animal Records Supervisor continues to coordinate regularly with the Information Technology Department, Associate Director of Animal Resources and Administration to continue the transition from ARS to ARMS. Modifications and supplements to the ARMS system are ongoing in collaboration with other primate centers.

- Research Services

The Research Services unit is responsible for carrying out a wide range of animal related administrative and technical research support activities for a large number of internal and external investigators and Animal Resources faculty.

Administrative support includes providing consultation to internal and external investigators during the project development stage and after IACUC approval. Support is given to help with finalizing samples collection protocols, tracking blood volume collections and developing budgets for grant submissions. Research Services personnel also assist collaborating investigators in the development of and adherence to IACUC protocols, including new applications, renewals, and modifications.

Research Services provides direct technical research support for both onsite and offsite investigators undertaking experimental studies. Experimental scheduling with investigators and laboratory staff, as well as other support teams, is arranged by Research Services. Research Services personnel are responsible for animal experimental interventions including collecting biological samples, administering infectious agents, experimental and clinical treatments, and immunization and vaccinations, and assisting with minor surgeries and CSF collections. They also perform other necessary animal work; for example, training animals for procedures and developing improved techniques to enhance efficiency.

Research Services is also responsible for the recording and entering of animal access records into the ARMS. These data includes animals' weights, TB test results, and clinical observations at time of access in addition to any experimental interventions.

Finally, Research Services provides support to the Division of Pathology tissue distribution program through the collection of biological samples from colony animals to help meet approved specimen requests from internal and external investigators.

- Environmental Health and Safety Office

The Yerkes Environmental Health and Safety Office is responsible for the overall management of the Environmental Health and Safety Program; Occupational Health Program; Orientation and Training Program; and Compliance and Quality Assurance Programs at Yerkes. The Yerkes Environmental Health and Safety Officer (YEHSO) has a dual reporting structure, reporting to the Associate Director for Animal Resources as well as to the Director of the Emory University Environmental Health and Safety Office, as an Assistant Director. The YEHSO represents the EHSO on the Institutional Animal Care and Use Committee (IACUC). The YEHSO reviews IACUC protocols to address any occupational health and safety concerns. The YEHSO is also a voting member of the Emory University Health and Biosafety Committee.

The Emory EHSO is responsible for conducting a broad-based program for implementing mandated Federal and State laws, regulations, and guidelines, as promulgated by the Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), and the Georgia Department of Natural Resources (GADNR). The Emory EHSO provides oversight and guidelines for activities involving infectious agents, recombinant DNA, radioactive isotopes, hazardous chemicals, asbestos, lead and other occupational hazards.

The Occupational Health Program covers all employees, students, volunteers, and adjunct or visiting faculty working at Yerkes. The initial health assessment includes: 1) tuberculin test, T-spot or surveillance; 2) a baseline blood sample of all individuals working with animals or in a laboratory (serum

is collected and stored in the serum bank); and 3) a health assessment determined by information collected in the employee access memo. The health assessment, which includes a physical examination, medical history and an evaluation of immunizations, is administered by Emory University's Employee Health Services. An Employee Health provider is on-site at the Main Station most Fridays to conduct new employee and annual health assessments, update immunizations, and provide respirator medical clearance. A physical agility assessment is required for Animal Care Technicians working with nonhuman primates. In 2013, 287 individuals were processed through the Center's Occupational Health Program and 98 employees received medical clearance to wear a respirator. Annual health assessments are provided for employees who work in level 3 containment and those who wear a respirator. Allergies and health status are assessed in conjunction with the TB surveillance at least annually for all employees.

A database is maintained to track TB testing and serum bank specimens. Individuals are notified via e-mail when their TB test/Surveillance or blood collection is due. In 2013, a total of 793 TB tests and 30 T-spots were completed and follow-up was provided when needed. This office works closely with Emory University's Employee Health Services and the local health department to report, and refer for follow-up treatment and care, any individual with a TB test that is read as positive. Also in 2013, 183 serum bank specimens were drawn and stored in the Center's serum bank.

- Orientation and Training

The Yerkes Orientation and Training Program currently provides 35 safety-related training programs. Many of these programs are now available as on-line courses. During 2013, 673 individuals completed Lab Safety training and 530 attended B-virus training.

Yerkes Orientation is presented through a live presentation that provides general information concerning the Center; covering the illness and exposure protocol and addressing safe work practices. Altogether, 219 individuals completed Yerkes Orientation in 2013, including orientation for 9 outside contractors.

During Yerkes Orientation, each person receives a packet of material related to the work they will be doing while at the Center. Individuals working with animals or animal specimens receive a copy of the "Laboratory Animal Zoonoses" packet. Individuals working with nonhuman primates receive a packet with information about the Behavioral Management program. All new personnel receive the "Injury/Exposure Protocol" which details steps that should be taken in case of an injury or exposure while working at either the Main Station or the Field Station. New personnel are also asked to complete on- line modules via Blackboard (Emory's on-line classroom) or the Emory Learning Management System (ELMS). These modules are assigned in accordance to a person's job functions. Each person completes the Yerkes Orientation module, which covers the Standard Operating Procedures that apply to everyone working at the Center. Additional modules may include: Lab Safety Training; Biosafety Training; Personal Protective Equipment Training; Working in the Vivarium; ABSL-3 Laboratory Training; Cage washer Safety Training; Radiation Safety Training; Animal Chemical Safety Training, MRI Safety Training, Respiratory Protection Training, and Vivarium ABSL-3 Training.

In addition, all personnel who will have research-related contact with animals are required to complete additional training related to the care and use of research animals. New research personnel attend a species specific didactic orientation with the Yerkes Division of Animal Resources Training Coordinator and complete AALAS (American Association for Laboratory Animal Science) modules on-line following the live orientation sessions. Successful completion of AALAS training is a requirement for IACUC protocol approval.

Individuals working with animals or in a laboratory also receive a form entitled "Understanding of Laboratory Risks". It is a requirement that this form be signed by the supervisor and the new employee and returned to the office of the Occupational Health Program Coordinator before receiving an ID/access card to the Yerkes Center.

In accordance with the University's IACUC policy, all individuals working under an IACUC protocol must be added to that protocol before they can be granted access to the Center. All ID/access cards are held until verification is received that the protocol has been modified.

Individual access to ABSL-3/BSL-3 facilities is granted following completion of required training and mentoring, as well as any occupational health requirements. Personnel working in level 3 containment facilities are required to attend a live training session and update occupational health requirements annually in order to maintain access to the facility. In 2013, 40 individuals attended BSL-3 laboratory training and 41 individuals attended ABSL-3 facility training. Additional ABSL3 Training programs are being developed to prepare for the new NHP BSL3 facility currently under construction.

The Yerkes EHSO also works with the Emory Fire Safety Department to conduct fire drills and provide hands-on training for the use of fire extinguishers. This training is offered at the Main Station and at the Field Station. In 2013, 61 individuals attended Fire Extinguisher training.

- Safety Program
  The Yerkes Environmental Health and Safety Officer (YEHSO) is responsible for implementation and monitoring of the Environmental Health and Safety Program at the Center. The Yerkes Environmental Health and Safety Officer provides guidance and oversight for regulatory compliance, environmental health and safety training, safety inspections, hazard identification, risk assessments, investigations related to employee injuries and exposures, and workers compensation program. This individual also develops and implements policies and procedures to support a safe and healthy work place. The YEHSO reviewed and followed up on 220 incident reports in the last year.

  The Yerkes Environmental Health and Safety Committee is made up of 20 representatives from various departments within the Center. The committee reviews injury and illness trends, Standard Operating Procedures related to safety, and compliance reports. The committee met four times in 2013.

- Compliance Program
  The Yerkes Training and Compliance Coordinator (TCC) is responsible for monitoring and maintaining employee compliance with required training programs.

  Yerkes' Quality Assurance (QA) Program conducted on-going QA monitoring events including weekly inspection of the Vivarium ABSL-3 facility, monitoring, trending and reporting animal escapes, assessment of training compliance, and validation of the Yerkes access system.

  The TCC has also collaborated with members of the Emory Environmental Health and Safety Office to streamline training modules and share training information. As the EHSO continues to work towards an online training system, the TCC will continue to liaise with EHSO to ensure that training guidelines and documentation are equivalent and accessible to employees, students and visitors. The TCC has also begun the process to transition on-line training from Blackboard to the Emory Learning and Management System (ELMS) by meeting with EHSO, ELMS administrators, and Yerkes IT.

Division of Pathology

The Division of Pathology, with oversight and management from the Yerkes Associate Director for Pathology, provides research, service pathology, and diagnostic support to investigators for laboratory animals at Yerkes and the larger Emory community using laboratory animals as well as external investigators from academic institutions and the private sector.

- Service Pathology
  The Service Pathology unit contributes to colony surveillance, provides diagnostic support to the Veterinary unit, and provides tissues and diagnostic services for scientific investigators (i.e., necropsy, histopathology, clinical pathology, etc.). It encompasses all aspects of diagnostic pathology, and is composed of the necropsy laboratory, histopathology laboratory, and molecular pathology and clinical

pathology laboratory, each with a supervisor and staff.

The unit is staffed by three veterinary pathologists, a pathology laboratory supervisor, five medical technologists, one trainee technician, one research technician, a histopathology laboratory supervisor, who is a histology/electron microscopy technologist, one histology technician, two IHC technicians, and three necropsy room technicians.

- Gross and histopathology

The number of nonhuman primate necropsies performed in 2013 totaled 538. In addition, 209 necropsies were performed on other laboratory species (predominantly mice and rats) at the Center. Center pathologists perform necropsy examinations on all nonhuman primates that die or are euthanized, as well as rodent necropsies submitted for clinical reasons, colony management and experimental purposes. In addition, pathologists collaborate with internal and external investigators in their experimental studies and participate in symposia at the national and international level presenting research, clinical and experimental data.

The Yerkes Division of Pathology plays a significant role in providing diagnostic and research support to the SOM's Division of Animal Resources (DAR), and the entire Emory laboratory-animal program. During 2013 over 55 cases were processed, analyzed and finalized for SOM's Division of Animal Resources.

The veterinary pathologists are also involved in training the laboratory animal medicine residents at the DAR in the School of Medicine at Emory and veterinary medicine students that are selected to participate in the McClure Comparative Pathology Externship at the Center. They teach laboratory animal pathology courses, train and supervise students and residents emphasizing gross pathology and histopathological findings relevant to accurately diagnosing clinical and experimental cases.

During 2013, the Histopathology Laboratory processed 1,166 cases including nonhuman primate and rodent necropsies, biopsies, and various cases from investigators at Emory and outside the University. The number of paraffin blocks processed was 9,994 and microscopic slides 6,597. There were 625 special stains prepared as well as 3,197 slides sectioned for other procedures. There were also 20 cases examined by electron microscopy.

During 2013, the Molecular Pathology Core Laboratory processed samples from nonhuman primates and rodents submitted by both Emory and external investigators. The lab processed 1,605 unstained sections, 961 slides for immunohistochemistry and 155 for in situ hybridization.

- Clinical Pathology

During 2013, the Clinical Pathology Laboratory received 35,649 specimens. There were 15,302 hematology examinations. These included CBCs, reticulocytes, differentials and white blood cells and platelet counts as well as coagulation tests and malaria examinations. There were 6,038 microbiology tests done. These included both clinical and experimental cultures, necropsy and sterility specimens.

There were 103 immunology flow cytometry determinations done using a variety of panels designed to accommodate individual researchers and research programs. There were 4,410 chemistry panels done, these included I-stat panels as well as comprehensive chemistry profiles (super chems) which were done in house. Parasitology testing included 4,179 fecal examinations and impression smears. The clinical pathology laboratory also did 407 urine analyses, 206 bone marrow, 16 pregnancy tests and 12 spinal fluid exams as well as processing of 52 samples for virology cultures and the preparation of 3,327 samples sent out for serology testing.

Medical Technologists from the Clinical Pathology Laboratory are also in charge of phlebotomy for the Employee Health Program and for the procurement of volunteer blood samples for research. Technologists drew blood from 188 employees for post-exposure testing as well as 414 employees for biennial serum bank requirements. The Center's serum bank inventory is maintained by Yerkes'

Clinical Pathology Laboratory staff. A total of 162 active human donors are registered to provide blood to 23 different investigators as part of the Research Blood Donor Phlebotomy program. The total amounts drawn in 2013 were 2,821 tubes and 24,668 milliliters of blood.

Clinical Pathology technologists also aid in employee health infection control. Six Pathology employees are certified to administer and read TB tests.

- Tissue Archive and Biological Material Procurement Services

The Center's pathology archives include a collection of microslides and paraffin blocks of nonhuman primates necropsied since July 1966. Formalin fixed tissues from nonhuman primates are maintained for approximately 10 years prior to disposal. Formalin fixed great ape tissues have been retained since 1966. Tissues are collected from all major organ systems during necropsy examination for formalin fixation for subsequent use in the preparation of microslides for histological examination. Following examination, all microslides are filed by year and case number at the Center. In addition, formalin-fixed tissues and paraffin blocks have been maintained on file for each necropsy and biopsy case. Tissues are not routinely collected at necropsy from clinically normal animals that were sacrificed for experimental reasons. The conversion of the Center's pathology archive to an electronic database continues and will be expanded in the coming years to facilitate not only rapid identification of desired samples but also provide the capacity for data mining and better exploitation of this resource in the future. We continue to expand this inventory to years preceding 1988 when the first electronic records were established at Yerkes working from hard copy reports that are also preserved by scanning onto electronic media. Pathologists continue to collect specimens for the novel tissue bank whereby select animals undergo expanded tissue collections followed by even more extensive processing, comprising flash frozen, OCT embedded unfixed and paraformaldehyde fixed/paraffin embedded tissue as well as tissue into RNAlater. In addition, cells are cryopreserved from blood, spleen, lymph nodes, liver and mucosal tissues for the purpose of functional, histological, proteomic and genomic analyses.

An important contribution to biomedical research is the provision of biological specimens to investigators at Yerkes and other regional, national and international institutions. The Senior Program Coordinator within the Division of Pathology manages and provides oversight for biological specimen requests from internal and external investigators through the Yerkes Biological Materials Procurement Program. The collection and distribution of these specimens makes it possible for scientists to take full advantage of the materials available and allows non-Primate Center investigators to work with cells and tissues to which they would otherwise not have access. This allows Yerkes to serve as a national and international resource for biomedical investigators throughout the U.S. and other parts of the world. In 2013, 2,697 samples were provided to 69 investigators located at Yerkes, Emory and at institutions around the U.S. and the world.

- Research Program and Research Project Support

Division of Pathology faculty collaborate with internal and external investigators in development and oversight of new protocols. This includes assistance with scientific expertise, preparation of experimental protocols, budget development, preparation and submission of IACUC and Environmental Health and Safety protocols. Working with Yerkes Division of Animal Resources, the Division of Pathology also provides laboratory and scientific support during the entire performance of an experimental protocol, analysis of data and publication of results.

Division of Pathology faculty members contribute to multiple research programs such as SIV/AIDS infection, TB infection, babesiosis, evaluation of dengue pathogenesis, the optimization of novel malaria models, listeriosis, and causes of diarrhea in infant macaques, the testing of experimental vaccine platforms for HIV, malaria and influenza, cancer and diabetes in aging monkeys, immune activation in transgenic monkeys and cardiovascular diseases.

The Division also provides shipping services for the Center and its investigators, including shipment of clinical samples and hazardous (infectious) samples by IATA-certified shipping/research technicians. In 2013, Yerkes' Shipping Unit packaged and shipped 417 shipments of biological samples shipping to

investigators and laboratories in the United States, France, Germany and Canada.

Finally, this division shares with the Division of Animal Resources the responsibility for oversight, monitoring and preparation of permit applications and periodic reports to various regulatory agencies including Fish and Wildlife Service, Georgia DNR, Drug Enforcement Administration, Centers for Disease Control and Prevention, and United States Department of Agriculture.

As well as responsibility for the aforementioned permit and regulatory agency licenses and registrations, the Senior Program Coordinator within the Division of Pathology assists internal investigators with determination of the permits and registrations necessary to facilitate their research projects. This includes research of proper permit or registrations needed, assistance with preparation and submission of applications, tracking review progress and receipt and dissemination of permits and registrations to the requesting investigator.

CHANGES IN KEY PERSONNEL

In 2013, Excluded by Requester who had served as Director of the Yerkes NPRC since 2001, announced that he Personal Info after the identification of a suitable successor. This announcement prompted the appointment of a search committee co-chaired by Excluded by Requester Professor of Otolaryngology and former Executive Vice President for Health Affairs and Chancellor, and Excluded by Requester Chair of the Department of Pathology and Laboratory Medicine. The search committee had a broad base of membership that included five Department Chairs and other distinguished members from the Emory University School of Medicine, Emory College, and the Rollins School of Public Health. A nationwide search, coordinated by the executive search firm, Korn Ferry, ensued, resulting in the evaluation of scores of applications, and the selection of a slate of 10 candidates for initial in person interviews. followed by two rounds of detailed onsite interviews for the top two candidates. In March of 2014, Excluded by Requester MD, was named as the incoming Director of Yerkes to succeed Excluded by Requester

At the time of his appointment, Excluded by Requester served as director of the New England Primate Research Center (NEPRC), chairman of the NEPRC Division of Immunology and professor of medicine at Harvard Medical School and Massachusetts General Hospital. In addition, he has held various leadership roles at Harvard Medical School, including Director of the Developmental Research Core for the Harvard Center for AIDS Research and Associate Director of the Harvard Committee on Microbiologic Safety. His research interests have focused on AIDS pathogenesis and vaccine development, and he has published over 130 scientific Excluded by Requester assumed the position as Director of Yerkes on August 1, 2014, and worked closely with over a two month transition period.

SUMMARY OF PLANS, CHALLENGES, AND OPPORTUNITIES

Summary of Strategic Issues

In recent years, as work with nonhuman primate models has become increasingly important in a number of realms, the Center has experienced accelerated growth in the scope of its research programs and research-support activities. In this time, the Center has strengthened the quality of its core research program, established an integral role within the Health Sciences Center and Emory University via a broad set of collaborative projects and cross-appointments with the School of Medicine and other campus units, and substantially increased its role as a national resource via the provision of resources and services to investigators nationally. The goals established by the Yerkes Center's previous strategic plan (2006 - 2010) have been largely accomplished. Our continuing overall goal is to ensure that the YNPRC has the expertise, experience, animals, supporting resources and institutional commitment required to successfully contribute significantly to national health priorities. Looking forward, a number of broad goals have been identified on which the Center will focus during the next five years, and these will be clarified during the Fall, 2014, strategic planning sessions. They are:

- Sustain existing and develop new research programs of excellence focused on discovery science and translational medicine, with a priority on realms where nonhuman primates provide valuable or necessary models

- Ensure alignment of research goals and objectives with national and local objectives including the ORIP Strategic Plan, the new NIH themes, as well as emerging priorities including local and national health initiatives

- Modify recruitment, evaluation and retention policies, including training and development, for both faculty and staff that will facilitate attracting and keeping top-quality personnel at all levels of the organization

- Enhance resource management to better provide animals, space, specialized equipment and expertise needed to support the research objectives of the Yerkes Research Center

- Further develop the consortium of the eight National Primate Research Centers and the ORIP to promote the objectives of the NPRC program, and share genomic and other data, information and resources to improve efficiency and enhance the collective value of the resources

- Increase our community outreach, both locally and nationally, including to NIH, to increase knowledge about and pubic approval of the activities of the Center and to develop a base for seeking support in a development campaign

- Lead the development and use of new scientific methods including imaging, genomics and proteomics, and nonhuman primate transgenic models for neurodegenerative diseases

- Develop strategies to enhance recognition of the substantial teaching, mentoring, and scholarly activities that occur at Yerkes

- Ensure sound fiscal management including prudent budgeting, revenue enhancement initiatives and development of a reserve or endowment fund to provide for long-term stability

Strengths and Challenges of Our Program

The internal assessments and planning processes also examined our current strengths and challenges and identified opportunities for the future as well as potential threats that could impede progress. The main points are summarized below:

Strengths

- Vibrant, supportive University/Regional environment (the CDC, Georgia State University, Georgia Institute of Technology, Georgia Research Alliance)

- National reputation, and confluence of associated centers (Emory Vaccine Center, Center For AIDS Research, Emory Institute for Drug Development, Atlanta Clinical Translational Science Institute, Emory Transplant Center)

- Highly skilled/experience support teams

- Participation in consortium of eight National Primate Research Centers and enhanced partnership with NIH/OD

- Valuable research colony, colony management makes it largely self-sustaining

- Front-line technologies – Imaging, Biomarkers, Tetramer Cores, Genetics, Transgenics, and Virology

Challenges

- Need to enhance resource management (do more with less)
- Improve animal resource matching (genetic profile for specific projects; MHC typing)
- Insufficient space to meet some current and projected research, recruitment and animal needs
- Lack of adequate fiscal reserves and endowment funds
- Need new sources of funds (e.g., Development, IP) to expand and continue to modernize and stay competitive

Opportunities

- Reorganization of our Scientific Divisions has better aligned us with national health priorities and the consequent growing value of primate models
- Multidisciplinary, collaborative environment and best place for team science
- Emergent tools and technologies (brain imaging, genomics, transgenics, next generation sequencing of nonhuman primates now possible at Emory)
- Scarcity of primate research facilities that can carry out the breadth and technology-based research possible at the Yerkes Center
- Development efforts and new emphasis on development of Yerkes-originated intellectual property (IP)

Threats

- Failure to modernize and expand infrastructure; many Yerkes facilities are aged and in need of repair and renovation
- Climate of economic uncertainty affects morale, productivity, and sense of job security
- Increased regulatory burden and threats of animal rights activism impair efficiency
- Pressure to trade off short-term thinking for long-range imperatives
- Highly dependent on NIH funding which faces projected leveling (or decline)

The goal for this proposed period (5/1/15 – 4/30/16) is to incorporate a subset of animals from the NEPRC breeding colony in order to manage the breeding colony for maximum animal production to reach appropriate population and age stratification. If achieved, the expanded YNPRC SPF rhesus macaque breeding colony will be recognized as a national research-related resource for readily available rhesus macaques of various ages and known pedigree, ancestry of origin, and MHC genotypes. The integration of this cohort of animals into our breeding program will enable us to continue to meet the needs of our NIH supported scientific projects, thus meeting the national health objectives.

2011 Yerkes Publications

Excluded by Requester
Rhesus monkeys see who they hear: spontaneous cross-modal memory for familiar conspecifics. PLoS One. 2011;6(8):e23345. PMC3160873

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Influence of chronic dopamine transporter inhibition by RTI-336 on motor behavior, sleep, and hormone levels in Rhesus monkeys. Exp Clin Psychopharmacol. 2011 Oct 24; [Epub ahead of print] PMC3302935

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Excluded by Requester Role of donor genital tract HIV-1 diversity in the transmission bottleneck. Proc Natl Acad Sci U S A. 2011 Nov 15;108(46):E1156-63. PMC3219102

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Excluded by Requester Generalized immune activation and innate immune responses in simian immunodeficiency virus infection. Curr Opin HIV AIDS. 2011 Sep;6(5):411-8. Review. PMC3261611

Excluded by Requester Efficient, graph-based white matter connectivity from orientation distribution functions via multi-directional graph propagation, SPIE Medical Imaging 2011, Proceedings of SPIE: Medical Imaging 2011, Vol. 7962S, pp. 1-8. PMID: 23066452; PMC3468156

Excluded by Requester Immunogenomics and systems biology of vaccines. Immunol. Rev. 239:197-208, 2011. PMC3253346

Excluded by Requester Laminar differences in gamma and alpha coherence in the ventral stream. Proc Natl Acad Sci U S A.2011 Jul 5;108(27):11262-7. PMC3131344

Excluded by Requester Activation of μ-opioid receptors in the dorsal striatum is necessary for adult social attachment inmonogamous prairie voles. Neuropsychopharmacology. 2011 Oct;36(11):2200-10. doi: 10.1038/npp.2011.117. PMC3176565

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Excluded by Requester Ingroup-outgroup bias in contagious yawning by chimpanzees supports link to empathy. PLoS One. 2011 Apr 6;6(4):e18283. PMC3071812

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Excluded by Requester Cortical potentials evoked by deep brain stimulation in the subthalamic area. Front Syst Neurosci. 2011;5:30. PMC3097379

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Excluded by Requester Phenotype, function, and gene expression profiles of programmed death-1(hi) CD8 T cells in healthy human adults. J Immunol. 2011 Apr 1;186(7):4200-12. PMID: 21383243; PMC3723805.

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Neonatal hippocampal lesions in rhesus macaques alter the monitoring, but not maintenance, of information in working memory. Behav Neurosci. 2011 Dec;125(6):859-70. PMC3226899

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Broadly reactive human CD8 T cells that recognize an epitope conserved between VZV, HSV and EBV. PLoS Pathog. 2014 Mar 27;10(3):e1004008. PMID: 24675761; PMC3968128

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VERTEBRATE ANIMALS

1. This proposal will oversee the breeding and management of the NEPRC rhesus macaque colony being integrated with the YNPRC rhesus macaque breeding colony. This includes 135 rhesus macaques from the NEPRC being integrated into the YNPRC rhesus breeding colony of 1716 animals. The SPF rhesus breeding colony will be managed to optimize breeding in order to provide research subjects to NIH-funded research protocols. All such research will have separate independent funding and distinct IACUC approval for the work conducted. This breeding project will employ routine procedures associated with colony management, animal care and husbandry and the provision of appropriate clinical care and enrichment. All such activities are governed by applicable law and regulations and are guided by SOPs in place at the YNPRC

2. The project uses Indian origin rhesus monkeys (*Macaca mulatta*) because that is the primate species in greatest demand for research studies. The number of animals to be used for this project is based on an optimal breeding colony required to produce some 350 progeny annually. Animals are housed in indoor-outdoor environments using either compound caging to house large groups of macaques (25 to120 animals) or run-type caging that accommodates 6 to 15 animals.

3. Colony animals will be inspected daily by the breeding colony staff, animal care staff, and veterinary staff. Any animal in need of medical treatment will be removed from its home housing type and treated by the on-site veterinarian. A well-trained and experienced clinical veterinary staff is responsible for the clinical care of the primate colony and at the Field Station, includes four clinical veterinarians, a veterinary resident, and five veterinary technicians. In addition, the eight clinical veterinarians, a veterinary resident, an animal surgical specialist and eight veterinary technicians located at the Yerkes Main Station supplement the care at the Field Station when needed. All of the animals in the SPF colony have known medical history, which is maintained in the Animal Records database, accessible from any desktop computer with the necessary privileges. Animals, even those housed in social environments, receive daily enrichment (food or objects). The Emory University Institutional Animal Care and Use Committee (IACUC) must approve all research involving animals at Yerkes. The Committee is charged with ensuring proper care, use and humane treatment of animals used in research, testing and education. In addition to reviewing management and research protocols, the Committee also inspects all research and animal facilities semi-annually and produces reports and recommendations from these inspections. The YNPRC is fully accredited by AAALAC, with the most recent site visit in February 2014 and letter of full accreditation issued in July 2014.

4. Procedures employed include routine colony and veterinary management practices and periodic blood sampling to confirm viral status. Routine management practices include daily behavioral and clinical observations of all animals. Animals are examined annually by a veterinarian. During the exam the animals are TB tested, de-wormed, weighed, dental inspection, pregnancy check (if applicable), tetanus vaccine given, and sample collection for virus screening is done. The animals are anesthetized with Ketamine (10mg/kg) or Telazol (3-5 mg/kg) IM. Animals are continually monitored by the veterinary staff until the animals have recovered. Any ill and injured animal is provided with appropriate clinical care as determined by the veterinary staff.

5. Euthanasia is not expected to be needed in the context of this revision application. However, if a clinical situation arises and the clinical veterinary staff deems that euthanasia is warranted, the procedures will be consistent with the recommendations of the AVMA Panel on Euthanasia using a combination of Ketamine (10 mg/kg, IM) and Pentobarbital (100 mg/kg, iv).

Bibliography & References Cited

Please see the Progress Report Publication List under PHS 398 Research Plan section for the Overall Component.

RESOURCE SHARING PLAN

Data sharing: Yerkes NPRC leadership and all Yerkes Core and Affiliated Scientists are committed to making the results of our research rapidly available to others. Results of studies conducted at the YNPRC are presented at national and international conferences and published in peer-reviewed journals in a timely fashion. Upon completion of experiments, data are shared in the form of peer-reviewed publications and the final versions of accepted manuscripts are deposited into the PubMed Central, in compliance with the Public Access Policy. Supplementary material is posted, when permitted, on the journal's website.

Consistent with its long standing involvement with the NPRC specific pathogen free (SPF) program, Yerkes will continue to participate as a member of the SPF Coordinating Committee, previously established by ORIP, and will meet regularly with ORIP representatives and the PIs/leaders of other ORIP-supported SPF programs/projects to exchange information and discuss progress regarding successful breeding and management strategies. In addition, over the past several years, other collaborative approaches to resource sharing have been developed that will continue to be pursued during the proposed funding period. SPF PIs, in close collaboration with NIH/ORIP, have established a Breeding Colony Management Consortium, comprised of the SPF PIs, colony managers and others, which holds monthly teleconferences and annual face-to-face meetings during which progress and challenges are reviewed and, where appropriate, standardized consortia approaches adopted. This has led to the formation of other consortium groups in specialty areas such as genetics, behavioral management and viral analyses, which have greatly strengthened collaborative efforts and information exchange, and these will continue throughout the next phase of the project. Significant new information is shared widely, including presentations at national professional meetings and scientific publications.

Other data may also be shared upon request within 30 days of acceptance for publication of the main findings from the final data set. Requests for data access are typically reviewed by the Principal Investigators and the Yerkes Director. Data and associated documentation are made available to users under a data-sharing agreement that provides for a commitment to: 1) using the data only for research purposes, 2) protection of data using appropriate secure computer technology; 3) restrictions on distributing data to third parties and destroying data upon completion of analysis; and 4) proper acknowledgement of the data resource. Upon completion of the data-sharing agreement, data will be made available through a password-protected website. Additional technical assistance will be made available at cost to the requestor.

Sharing tissues and biological samples: A comprehensive bank of tissues and other biological specimens from research conducted at the YNPRC is made available to collaborators and other investigators throughout the nation. We have routinely shared tissue and biological samples with outside investigators, as long as this does not compromise tissues needed by the Scientific, Animal Service or Core Service Components of Yerkes. Investigators are required to complete a material transfer agreement when requesting tissue or other biological samples.

Sharing sequence data: Sequence data are made available through National Center for Biotechnology Information, and viral clones and isolates are made available through the NIH AIDS Research Program (http://www.aidsreagent.org/) and/or directly through Yerkes Principal Investigators. Reagents developed during the course of research at Yerkes are made available to the NIH AIDS Research Program, or through material transfer agreements, with researchers at other institutions.

Sharing DNA samples: Extracted DNA samples from animals housed at the YNPRC are made available to qualified investigators through the NPRC Biomaterials Distribution Program. The recipient pays the shipping charges and a portion of the costs associated with collecting and processing the tissues. Before a request is filled, the recipient will be advised of the estimated costs. Investigators are required to complete a material transfer agreement when requesting DNA samples.

Sharing model organisms: The Yerkes NPRC will continue to make animals produced under this award available to NIH-funded both at the Yerkes Center and via a formally established mechanism in which animals are first offered to the other participating centers through a web-based animal locator system. Should the animals not be required, their description/information will be forwarded to ORIP representatives and other NPRCs in case they are needed by other NIH-supported investigators.

Genome-Wide Association Studies: N/A.

OMB Number: 4040-0001
Expiration Date: 06/30/2016

APPLICATION FOR FEDERAL ASSISTANCE
SF 424 (R&R)

5. APPLICANT INFORMATION **Organizational DUNS*:** 066469933

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7. TYPE OF APPLICANT* O: Private Institution of Higher Education

Other (Specify):
Small Business Organization Type ❍ Women Owned ❍ Socially and Economically Disadvantaged

11. DESCRIPTIVE TITLE OF APPLICANT'S PROJECT*
Support of Yerkes National Primate Research Center--Year 55 Supplement Support for Colony Resources

12. PROPOSED PROJECT

Start Date*	Ending Date*
05/01/2015	04/30/2016

OMB Number: 4040-0010
Expiration Date: 06/30/2016

Project/Performance Site Location(s)

Project/Performance Site Primary Location

● I am submitting an application as an individual, and not on behalf of a company, state, local or tribal government, academia, or other type of organization.

Organization Name:	Emory University, Yerkes National Primate Research Center
Duns Number:	066469933
Street1*:	2409 Taylor Lane
Street2:	
City*:	Lawrenceville
County:	Gwinnett
State*:	GA: Georgia
Province:	
Country*:	USA: UNITED STATES
Zip / Postal Code*:	300432921
Project/Performance Site Congressional District*:	GA-007

File Name

Additional Location(s)

OMB Number: 4040-0001
Expiration Date: 06/30/2016

RESEARCH & RELATED Other Project Information

1. Are Human Subjects Involved?* ○ **Yes** ● **No**

1.a. If YES to Human Subjects

Is the Project Exempt from Federal regulations? ○ Yes ○ No

If YES, check appropriate exemption number: _ 1 _ 2 _ 3 _ 4 _ 5 _ 6

If NO, is the IRB review Pending? ○ **Yes** ○ **No**

IRB Approval Date:

Human Subject Assurance Number

2. Are Vertebrate Animals Used?* ● **Yes** ○ **No**

2.a. If YES to Vertebrate Animals

Is the IACUC review Pending? ○ Yes ○ No

IACUC Approval Date:

Animal Welfare Assurance Number A3180-01

3. Is proprietary/privileged information included in the application?* ○ **Yes** ● **No**

4.a. Does this project have an actual or potential impact - positive or negative - on the environment?* ○ **Yes** ● **No**

4.b. If yes, please explain:

4.c. If this project has an actual or potential impact on the environment, has an exemption been authorized or an environmental assessment (EA) or environmental impact statement (EIS) been performed? ○ Yes ○ No

4.d. If yes, please explain:

5. Is the research performance site designated, or eligible to be designated, as a historic place?* ○ **Yes** ● **No**

5.a. If yes, please explain:

6. Does this project involve activities outside the United States or partnership with international collaborators?* ○ **Yes** ● **No**

6.a. If yes, identify countries:

6.b. Optional Explanation:

	Filename
7. Project Summary/Abstract*	Proj_Summary__Col_Resource_v2101845106[illegible].pdf
8. Project Narrative*	Proj_Narrative__Col_Resource_v2101845106[illegible].pdf
9. Bibliography & References Cited	Bibliography1018450943.pdf
10.Facilities & Other Resources	Resources1018451118.pdf
11.Equipment	Equipment1018450938.pdf

Project Summary (Animal Resources)

This competing revision application seeks additional support for the Yerkes Base Grant (P51 OD 11132) that will allow expansion of the rhesus macaque specific pathogen free (SPF) colony by the inclusion of SPF animals from the New England Primate Research Center (NEPRC). The continued growth of our research base, coupled with the conversion of the colony to SPF status and the more specialized demands of investigators for genetically well-characterized nonhuman primates, have strained the capacity of our existing rhesus macaque SPF breeding colony, and resulted in the need to obtain significant numbers of animals from outside sources. The NEPRC SPF rhesus macaque breeding colony was established in 1988 and represents one of the oldest and best-characterized SPF rhesus macaque colonies in the United States. The planned closure of the NEPRC puts a risk a valuable resource and necessitates transfer of this valuable resource to other NPRCs. With the support of ORIP leadership, Yerkes has partnered with the NEPRC to facilitate the transfer of approximately 135 SPF breeding animals from the NEPRC SPF colony. A comprehensive plan for the incorporation of the NEPRC breeding colony animals into the YNPRC SPF breeding colony has been established, which includes a three month quarantine, detailed virologic and TB testing, as well as behavioral evaluation and training. The transfer of these rhesus macaques to the YNPRC will be complete by the fall of 2014, and after the conclusion of a standard quarantine period, the small harem groups will be merged into new large breeding groups at the Yerkes Field Station. The incorporation of animals from the NEPRC breeding colony into the Yerkes SPF breeding program will preserve this invaluable resource, as well as enhance the YNPRC's ability to serve as a resource to core investigators and to scientists nationally and internationally.

Project Narrative (Animal Resources)

Yerkes partnered with the NEPRC to transfer 135 rhesus macaques to YNPRC to supplement the breeding colony. YNPRC has a robust research program with increasing demands for SPF, genetically-characterized rhesus macaques for project assignments. The addition of the NEPRC animals to the YNPRC colony will augment the breeding capacity and increase production, resulting in more animals available to meet assignments and pursue research, while maintaining the colony as a valuable resource.

Resources

Laboratory:

The Yerkes Genomics Core, located at the YNPRC Main Station has 850 square feet of laboratory space at the Yerkes main campus. This space houses two full time technicians and one full time bioinformaticist. Equipment within the core includes an Illumina HiSeq1000 genome analyzer, cluster generation PCR system, multiple PCR machines, Affymetrix 3000 7G gene chip scanner, two Affymetrix wash stations, and necessary basic laboratory equipment needed for the operation of this equipment (a complete list is provided in the Equipment section). Each research member has a dedicated Widows machine, but the bioinformaticist has an Illumina-compute workstation for next generation analysis. In addition the Genetics Core has access to the Emory Computing Core for processer or ram intensive next generation sequencing analysis[Excluded by Requester] and the bioinformaticist each has a 120 ft. office adjacent to the lab. Each technician has a cubicle adjacent to the lab.

[Excluded by Requester] has 550 sq feet of genetics laboratory space at the Yerkes Field Station. This space contains bench space for four individuals, Fume hood, and all necessary equipment to perfom relevent genetic analysis, including DNA extraction, PCR, Sanger sequencing and SNP genotyping.

The Yerkes Virology Core, located at the YNPRC Main Station has 983 square feet of laboratory space divided between two rooms. The main laboratory space houses two full time technicians as well as standard equipment for western blotting, PCR, and ELISAs, while the smaller laboratory area is a dedicated PCR clean room. Equipment within the core includes a Bio-rad Bioplex 200 Luminex system, a Perkin Elmer GeneAmp PCR system 9700, an Eppendorf Gradient Thermocycler, a Bio-rad CFX96 Real-time PCR cycler, a GeneQuant RNA/DNA Calculator, a Bio-rad Turboblot, two Apple iMacs, multiple PCR clean hoods, and all the necessary equipment for the performance of PCR, real-time PCR, Western blot analysis, and ELISAs. Both rooms are located on the third floor of the Emory Vaccine Center within the Division of Microbiology and immunology at Yerkes NPRC. Additionally, the Virology Core manages the BSL-3 facilities within the Emory Vaccine Center and has access to these facilities for preparation of viruses and virological products.

Clinical Pathology Laboratory

The clinical pathology laboratory, located at the Yerkes' Main Center, has the capability of performing hemogram evaluations, blood chemistry evaluations, bacterial cultures, parasite examinations, and the capability for determination of phenotype of peripheral blood mononuclear cells and their subsets (B cells, T cells, CD4 cells, CD8 cells and ratio. A separate isolated laboratory is available for working with blood specimens and retrovirus-infected nonhuman primates.

Necropsy and Pathology Laboratory, located at the Yerkes' Main Center, has the capability for postmortem examinations and tissue collection and processing. The necropsy suite with its down-draft table is well suited for conducting extensive postmortem and examinations. In addition, it contains an anteroom for changing into personal protective equipment, four freezers, walk-in cold room, storage room and fume hood. To augment the necropsy examinations, the necropsy room is equipped with computer access to animal records, a computerized necropsy reporting and record keeping systems and a digital camera. Three pathologists are available on an alternating week basis and one supervisor and a necropsy technician also shares duties. Each pathologist has his/her won microscope as well as the department having a five-heading teaching microscope.

The Histology and Electron Microscopy Laboratory has the capability of performing routine histology services including special stains and procedures as requested. The electron microscope laboratory has full capability of processing tissues for ultrastuctural evaluation of tissues and other specimens. Both laboratories are located at the Yerkes' Main Center.

Daily deliveries from the Field Station to the Main Center permit the transport of samples to the YNPRC the Cores as needed.

Clinical: The Clinical Veterinary Medicine, Administration, and Research building (CVMAR) was completed and occupied in 2009 which includes Specific Animal Location containing the hospital, treatment rooms, and surgical suite. In addition, the building includes office space for the division of veterinary medicine, colony management, research services, and genetics lab. The Field Station has three full time veterinarians, a veterinary resident, and 5 full time veterinary technicians. The Field Station has a dedicated clinical veterinary medicine building for the treatment of sick and injured animals including a digital x-ray machine, a fully equipped surgical suite, including a separate animal prep area and surgeon scrub room, PET scanner, pharmacy two animal treatment rooms, and Specific Animal Location for animal housing.

Animal:
The Field Station consists of Specific Animal Location
Specific Animal Location Within this area are compounds for housing the breeding groups and smaller indoor – outdoor Specific Animal Location
Specific Animal Location
Specific Animal Location See table below. The Field Station located approximately 30 miles northeast of the Main Station on the Emory campus, has a population of 1775 rhesus monkeys, 127 sooty mangabeys, and 27 chimpanzees. Approximately 97% of animals at the Field Station are socially housed.

SPACE SUMMARY TABLE

Overview of Facilities at the YNPRC Field Station

FACILITY	Indoor SQ FT	Outdoor SQ FT	GROSS SQ FT	FUNCTION
Specific Animal Location				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
C-1			560	Office Space
Specific Animal Location				Animal Housing
				Animal Housing/Laboratory
				Animal Housing / Office / Research / Clinical
				Animal Housing
				Animal Housing
				Animal Housing
				Chimp Housing
G-2 Test			600	Chimp Laboratory
G-7			700	Storage

G-8			2,205	Behavioral testing/Kitchen
G-9			660	Office Space
G-10			660	Office Space
G-11			2,520	Office Space
Specific Animal Location				Chimp Housing
G-13			1,640	Shower/Conference
G-14			1,882	Laboratory/Office Space
G-15			1,620	Shower
Specific Animal Location				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
				Animal Housing
Cage Washer Building			570	Cage Wash
Chow Storage			384	Feed Storage
Shed #1			2,500	Storage
Shop			4,000	Shop Facility
Shop Storage			480	Storage
Specific Animal Location				
TOTAL FIELD STATION	**16,923.5**	**190,382**	**282,213**	

The compound areas are constructed of Specific Animal Location
Specific Animal Location
Specific Animal Location These runs have been constructed or modified with pass through panels that allow for varying housing configurations to augment behavioral management and enrichment techniques in addition to providing a way to introduce animals and form new social groupings.

There are Specific Animal Location
Specific Animal Location area has a treatment room and animal housing for SPF clinical cases and animal holding. Specific Animal Location currently has a

treatment room, four rooms for animal holding, and six testing rooms that serve as a behavioral and cognitive testing area for monkeys. There is a chimpanzee cognitive testing area associated with area G2.

Computer:
Each member of the project faculty and staff have desktop computers connected to a University-wide network that provides e-mail and internet access. Computers also provide access to the animal medical research system (ARMS) as well as Vet PACS for review of digital images acquired at the Main Center. Each member of the project faculty and staff have office space and access to network printers, copiers, fax and scanning machines.

Office:
Furnished office space is provided to faculty members at the Field Station Excluded by Requester or main station Excluded by Requester Cubicle space is available at the Field Station for each staff member. Administrative support is provided through the Division of Animal Resources and the Division of Developmental & Cognitive Neuroscience.

Conference room space is also available at both the Main Station and the Field Station for small and large conferences. Conference rooms are all equipped with the capability to project computer presentations and video conferencing.

Other
The onsite facilities maintenance team, staffed by a supervisor and three experienced craftsmen, maintain the buildings, compounds, and caging at the Field Station. On occasion, work is contracted out to provide industry if additional personnel or expertise is needed. The facilities maintenance unit constructs and maintains animal caging, maintains utilities serving animal and people areas, and provides support to ongoing animal management or research programs. The unit has expertise in working with all types of material (metal, plastic, or wood) and in constructing or maintaining primate housing to meet program needs.

Equipment

Veterinary Medicine – Field Station

- 2 Anesthesia machines with isoflurane vaporizers
- 1 Surgivet small animal ventilator
- 2 Anesthesia monitoring devices for ECG, pulse oximeter, indirect blood pressure, respiratory rate and body temperature
- 1 Cardell veterinary monitor for blood pressure and heart rate
- 1 Valleylab Surgistat II electrocautery machine
- 1 Surgivet Convective warming blanket
- Heska Vet/IV 2/2 fluid pump
- 1 New Era syringe pump
- Precision Medical Hi-Flow suction pump
- Digital radiograpy
- Progeny digital dental radiograpy
- Dental unit with high & low speed drills, ultrasonic cleaner
- GE LogiQe Vet ultrasound machine
- 5 digital scales for body weights
- Autoclave
- Gas Sterilizer
- 8 neonatal isolettes
- Olympus BX 41 Microscope with digital camera
- Hand-held refractometer

Field Station Animal Resources

- 60 two-way radios available for communication between all departments at the Field Station
- 1 centrally located three rack cage wash machine
- 1 Bobcat skid steer on premises used to grade compounds, erect enrichment structures and climbers or other maintenance work.
- 1 Dingo mini excavator on premises used to perform compound maintenance and assist with installing enrichment and climbing structures
- 4 gas powered Toro workman utility vehicles on premises used to transport animals, feed or other supplies associated with animal care.
- 3 Electric powered utility vehicles on premises used to transport animals, feed or other supplies associated with animal care.
- 1 transport van utilized to move animals, equipment and supplies. This vehicle is also approved as a back up vehicle to transport animals between facilities. This van is equipped with extra ventilation and the interior is fabricated with surfaces that can be cleaned and sanitized.
- 1 Large capacity trailer mounted pressure washer on premises used to pressure wash compound surfaces and structures
- 1 forklift on premises used to transport cage racks to the cage washer as well as move supplies. An additional Forklift is on site for use by the Facilities crew to move caging, supplies and other equipment.
- 1 walk in cooler centrally located used to store fresh produce.
- 2- 8' x 20' storage containers. These air conditioned units have been sealed and modified to hold dry foods. The temperatures in these units are monitored remotely.
- There are several emergency generators to provide backup power for lights and air handling systems in all animal areas.

Yerkes NPRC Genomics Core

- Beckman refrigerated centrifuge
- Thermo –80 C freezer
- -20 C freezer
- Biological Safety Cabinet
- Laboratory refrigerator

- Illumina HiSeq1000 genome analyzer
- Cluster generation PCR system(C-bot)
- Covaris M220 Focused-ultasonicator
- AB 9700 PCR machines (3)
- Affymetrix 3000 7G gene chip scanner
- Affymetrix wash stations (2)
- Qiagen QIAcube sample prep station
- Qiagen TissueLyser II
- Nanodrop 1000 spectrophotometer
- Qubit Fluorometer
- (3) Widows machines with appropriate software licenses for analysis (Partek, Bioconductor, Golden Helix, Velvet, Bowtie, AceView)
- Illumina-compute workstation for complex analysis
- Access to the Emory Computing Core for processer or ram intensive analysis
- Necessary basic laboratory equipment needed for the operation of this equipment
- Fluidigm C1 Single cell Auto Prep System
- Fluidigme Biomark HD expression assay platform

Excluded by Requester

Genetics Laboratory (Field Station)

- Applied Biosystems 3730 genetic analyzer
- AB 9700 PCR machines (4)
- Software licenses for genetic analysis programs
- Hettich universal 320 centrifuge
- Nanodrop 2000 Spectrophotometer
- Eppendorf 5415 centrifuge
- Sorvall RC5C plus ultra-high speed centrifuge
- Hydra 96 well pooling robot
- Hettich Rotina 420R Bench top refrigerator centrifuge
- Revco Ultra Freezer (-79 C)
- Promega Maxwell Nucleic Acid Extraction system
- -20 freezer
- 4 degree lab refrigerator

Yerkes NPRC Virology Core

- Eppendorf Centrifuge 5417C
- Vortexes (x 4)
- Baker BSC x2
- Thermo Scientific -80C
- Cryofridge -200C
- Precision Waterbath (37oC)
- Corning Stirrer/hotplate
- Beckman Coulter Microfuge R
- Voltage Power Sources (X 4)
- BioRad Turboblot
- ThermoyIne Stirrer/hotplate
- Sartorius Scale
- Mettler PJ 4000 Scale
- GeneQuant RNA/DNA Calculator
- VWR 4oC Fridge
- Precision Waterbath (37oC/57oC)
- Hoefer Orbital Shaker
- Amana Microwave
- BioRad Bioplex 200 Luminex system
- Baker BSC x2

- Kalpana Apple computer
- Amana -20C freezer
- Revco -20oC
- Minicentrifuge
- FIsher Isotemp -20oC
- Eppendorf Gradient Thermocycler
- Applied Biosystems GeneAmp PCR System 9700
- PCR Hood
- BioRadCFX96 Real-time Cycler
- Labnet miniplate spinner MPS1000
- BioRad Power Pac 300

Clinical Pathology Lab

- Sysmex semi-automated hematology analyzers (2)
- Spectrophotometer
- FACS Calibre flow cytometer
- FACScan Flow Cytometer
- Light microscopes (5)
- Incubators (4)
- Nu-Aire biological safety hoods
- Centrifuges (4)
- Abbott i-Stat analyzer

Necropsy and Pathology Facilities

- Ultra-Cold freezers (4)
- Microscopes with cameras (in pathologists' offices) (3)
- Five-headed teaching microscope (in office area)
- Digital camera
- Walk in cold room
- Downdraft table
- Fume Hood

Histology and Electron Microscopy Lab

- Tissue-Tek VIP Tissue Processor
- Tissue-Tek DRS Stainer
- Tissue Embedding Center
- Automatic Microtome
- Dissecting Scope
- Rotary Microtomes (2)
- Microscopes (2)
- Digital Scale
- Waterbaths (4)
  Microwave
- Slide warmers (2)
- Darkfield Scope
- Knife Sharpener
- Zeiss EM 10 Electron Microscope
- Leica Ultracut Ultramicrotome
- Gatan Digital Camera System
- Diamond Knife
- Vacuum Evaporator
- Refrigerator

OMB Number: 4040-0001
Expiration Date: 06/30/2016

RESEARCH & RELATED Senior/Key Person Profile (Expanded)

PROFILE - Project Director/Principal Investigator

Excluded by Requester

PROFILE - Senior/Key Person

Excluded by Requester

OMB Number: 4040-0001
Expiration Date: 06/30/2016

RESEARCH & RELATED BUDGET - SECTION A & B, BUDGET PERIOD 1

ORGANIZATIONAL DUNS*: 066469933

Budget Type*: ● Project ○ Subaward/Consortium

Enter name of Organization: Emory University

Start Date*: 05-01-2015 **End Date*:** 04-30-2016 **Budget Period: 1**

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.		Excluded by Requester				Project Lead	Institutional Base Salary	EFFORT			3,601.00	886.00	4,487.00
2.						Colony Director					4,378.00	1,077.00	5,455.00

~~**Total Funds Requested for all Senior Key Persons in the attached file**~~

Additional Senior Key Persons: File Name:

Total Senior/Key Person **9,942.00**

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						
1	ColonyCoordinator	6			32,703.00	8,045.00	40,748.00
1	Veterinary Technician	9.6			32,000.00	7,872.00	39,872.00
1	Animal Care Technician	12			33,000.00	8,118.00	41,118.00
3	**Total Number Other Personnel**					**Total Other Personnel**	**121,738.00**
						Total Salary, Wages and Fringe Benefits (A+B)	**131,680.00**

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

Funding Opportunity Number: PAR-14-226. Received Date: 2014-09-25T16:38:19.000-04:00

RESEARCH & RELATED BUDGET - SECTION C, D, & E, BUDGET PERIOD 1

ORGANIZATIONAL DUNS*: 066469933

Budget Type*: ● Project ● Subaward/Consortium

Enter name of Organization: Emory University

Start Date*: 05-01-2015 **End Date*:** 04-30-2016 **Budget Period: 1**

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

Total Equipment

Additional Equipment: File Name:

D. Travel **Funds Requested ($)***

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

Total Travel Cost

E. Participant/Trainee Support Costs **Funds Requested ($)***

1. Tuition/Fees/Health Insurance
2. Stipends
3. Travel
4. Subsistence
5. Other:

Number of Participants/Trainees **Total Participant Trainee Support Costs**

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

RESEARCH & RELATED BUDGET - SECTIONS F-K, BUDGET PERIOD 1

ORGANIZATIONAL DUNS*: 066469933
Budget Type*: ● Project ● Subaward/Consortium
Enter name of Organization: Emory University

Start Date*: 05-01-2015 **End Date*:** 04-30-2016 **Budget Period: 1**

F. Other Direct Costs	Funds Requested ($)*
1. Materials and Supplies	
2. Publication Costs	
3. Consultant Services	
4. ADP/Computer Services	
5. Subawards/Consortium/Contractual Costs	
6. Equipment or Facility Rental/User Fees	
7. Alterations and Renovations	
8. Animal Per Diem	339,216.00
9. Virus Screening Costs	28,118.00
Total Other Direct Costs	**367,334.00**

G. Direct Costs	Funds Requested ($)*
Total Direct Costs (A thru F)	**499,014.00**

H. Indirect Costs

Indirect Cost Type	Indirect Cost Rate (%)	Indirect Cost Base ($)	Funds Requested ($)*
1. Yerkes P51	45	499,014.00	224,556.00
		Total Indirect Costs	**224,556.00**

Cognizant Federal Agency (Agency Name, POC Name, and POC Phone Number): DHHS, Steven Zuraf, (301) 492-4855

I. Total Direct and Indirect Costs	Funds Requested ($)*
Total Direct and Indirect Institutional Costs (G + H)	**723,570.00**

J. Fee	Funds Requested ($)*

K. Budget Justification* File Name: Budget_Justification1018451146.pdf
(Only attach one file.)

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

Tracking Number: GRANT11743383
Funding Opportunity Number: PAR-14-226. Received Date: 2014-09-25T16:38:19.000-04:00

P51 OD011132
Support of Yerkes National Primate Research Center
Revision Application—Support for New England Animals
Budget Justification

We request funds to support specific pathogen free (SPF) rhesus monkeys that were transferred from the New England Primate Research Center (NPRC) to the Yerkes National Primate Research Center. This is an expense that was unanticipated at the time of our competitive renewal request, and represents a significant expansion from our scope. The animals are being transferred to YNPRC in two phases; phase 1 animals (40) were transferred to YNPRC on March 18, 2014, phase 2-a animals (49) were transferred on September 23, 2014, and phase 2-b animals (44 anticipated, of which 6 are infants) are scheduled for transfer on October 20, 2014. This revision proposal requests costs to support all animals from the New England NPRC for the upcoming budget period of 5/1/15 – 4/30/16.

Personnel:

Excluded by Requester **MD** EFFORT Months effort) is the Director of the Yerkes National Primate Research Center. As such, this component, as well as everything else at the YNPRC is under his overall direction. EFFORT or salary is requested with this revision application.

Funds are requested for the following personnel. Emory University's current fringe benefit rate is 24.6%.

Excluded by Requester **VMD** EFFORT Months effort) will serve as the Project Lead for the Colony Resources component of this request. She is the Associate Director for Animal Resources and will oversee the management of these animals and the future assignment of offspring to appropriate research studies as they reach assignable age.

Excluded by Requester **PhD** EFFORT Months effort) will serve as the Colony Director. She will work closely with the Project Lead, and will manage our breeding colony which includes the animals transferred from the New England PRC.

Excluded by Requester EFFORT Months effort) will serve as the Colony Coordinator. She currently is at the New England PRC, and will be transitioning to YNPRC starting November 1, 2014. She has extensive knowledge of the animals that are transferred to Yerkes, and will coordinate daily colony management activities for these animals. Her familiarity with this colony with greatly facilitate our ability to access them, conduct behavioral enrichment with them, and transition them to our type of housing and processes.

Veterinary Technician (9.6 Calendar Months effort) effort will be shared among a group of veterinary technicians to ensure there is continued coverage. Although we request per diem for the animals over age 1 below, the animals from the New England NPRC will be part of our breeding colony, and they require additional veterinary and husbandry care not normally required for animals assigned to research protocols. Thus we request salary support for veterinary technician effort.

Animal Care Technician (12.0 Calendar Months effort) will be shared among a group of animal care technicians to ensure there is continued husbandry coverage that are required above and beyond the level covered by the per diem. Similar to the support for veterinary technician effort, additional animal care technician effort is required for these animals because they will be part of our breeding colony.

Total personnel costs requested: $131,581

Per Diem:

We request funds to cover per diem for the animals transferred from the New England PRC and their offspring. Per Yerkes policy, we do not assess per diem on infants until they are weaned, which we designate to be at the age of one year. Thus we are not requesting per diem support for infants until they reach one year of age. Per diem covers general clinical and husbandry care. Please see the following pages for the breakdown of per diem costs.

Total per diem costs requested: $339,216

Virus Screening Costs:

Per Yerkes policy, we conduct virus screening once a year to establish and confirm their SPF status. This is a required cost for animals regardless of age, and is not covered by the per diem. Please see the following pages for the breakdown.

Total virology screening costs requested: $28,118.

Program Income

During calendar year 2016, we anticipate at least 12, possibly up to 20, animals to reach age 3 and become available for assignment prior to the end of the proposed project period. We estimate the program income for these animals to be at least $80,000.

P51 OD011132-55
Administrative Supplement for New England animals
Budget Detail
5/1/2015 to 4/30/2016

Personnel Fringe Rate 24.60%

Excluded by Requester		Annual Institutional Base Salary	effort % % Effort	CM effort EFFORT	Sal Requested	Fringe	total	
	Component PI				3,601	886	4,487	
	Colony Director				4,378	1,077	5,455	
	Colony Coord				32,703	8,045	40,748	
Vet Tech			80%	9.60	32,000	7,872	39,872	
Animal Care Tech	ACT		100%	12.00	33,000	8,118	41,118	
	Personnel Total				97,703	24,035		**131,680**

Per Diem Animals will be in group housing at the Field Station, except when clinical hospital stay required
Per diem not assessed on infants until weaned (until 1 year old)

Phase 1: Animals transferred to YNPRC 3/18/14 and their infants

	#animals	Start	end	#days	rate	subtotal
Animal Group Housing	39	5/1/15	8/31/15	123	6.14	29,454
Animal Group Housing	39	9/1/15	4/30/16	243	6.32	59,934
2014 Infant Group Housing	1	5/1/15	8/31/15	123	6.14	755
2014 Infant Group Housing	1	9/1/15	4/30/16	243	6.32	1,537
2015 Infant Group Housing	20	5/1/15	8/31/15	123	-	-
2015 Infant Group Housing	20	9/1/15	4/30/16	243	-	-
Phase 1 subtotal						91,680

Phase 2-A: Animals expected to be transferred to YNPRC 9/22/14, and their infants

	#animals	Start	end	#days	rate	subtotal
Animal Group Housing	49	5/1/15	8/31/15	123	6.14	37,006
Animal Group Housing	49	9/1/15	4/30/16	243	6.32	75,302
2014 Infant Group Housing	8	5/1/15	8/31/15	123	6.14	6,042
2014 Infant Group Housing	8	9/1/15	4/30/16	243	6.32	12,294
2015 Infant Group Housing	25	5/1/15	8/31/15	123	-	-
2015 Infant Group Housing	25	9/1/15	4/30/16	243	-	-
Phase 2-A subtotal						130,644

Phase 2-B: Animals expected to be transferred to YNPRC October 2014\, and their infants

	#animals	Start	end	#days	rate	subtotal
Animal Group Housing	38	5/1/15	8/31/15	123	6.14	28,698
Animal Group Housing	38	9/1/15	4/30/16	243	6.32	58,398
2014 Infant Group Housing	13	5/1/15	8/31/15	123	6.14	9,818
2014 Infant Group Housing	13	9/1/15	4/30/16	243	6.32	19,978
2015 Infant Group Housing	20	5/1/15	8/31/15	123	-	-
2015 Infant Group Housing	20	9/1/15	4/30/16	243	-	-
Phase 2-B subtotal						116,892

Per Diem Total **339,216**

Virus Screening Screening done once a year
Initial virus screening for Phase 1 animals completed in April 2014

		#animals	rate	subtotal
Phase 1 Animals (incl. 2014	FY15	40	130.81	5,232
Phase 1 - 2015 Infants	FY16	20	134.73	2,695
Phase 2A Animals (incl. 201	FY15	57	130.81	7,456
Phase 2A - 2015 Infants	FY16	25	134.73	3,368

P51 OD011132-55
Administrative Supplement for New England animals
Budget Detail
5/1/2015 to 4/30/2016

Phase 2B Animals (incl. 201	FY15	51	130.81	6,671
Phase 2B - 2015 Infants	FY16	20	134.73	2,695
Virus Screening Total				**28,118**

SUBTOTAL Direct Costs	(MTDC	499,014)		**499,014**
SUBTOTAL F&A Costs	(	45%)		**224,556**
TOTAL COSTS				**723,570**

RESEARCH & RELATED BUDGET - Cumulative Budget

	Totals ($)	
Section A, Senior/Key Person		**9,942.00**
Section B, Other Personnel		**121,738.00**
Total Number Other Personnel	3	
Total Salary, Wages and Fringe Benefits (A+B)		**131,680.00**
Section C, Equipment		
Section D, Travel		
1. Domestic		
2. Foreign		
Section E, Participant/Trainee Support Costs		
1. Tuition/Fees/Health Insurance		
2. Stipends		
3. Travel		
4. Subsistence		
5. Other		
6. Number of Participants/Trainees		
Section F, Other Direct Costs		**367,334.00**
1. Materials and Supplies		
2. Publication Costs		
3. Consultant Services		
4. ADP/Computer Services		
5. Subawards/Consortium/Contractual Costs		
6. Equipment or Facility Rental/User Fees		
7. Alterations and Renovations		
8. Other 1	339,216.00	
9. Other 2	28,118.00	
10. Other 3		
Section G, Direct Costs (A thru F)		**499,014.00**
Section H, Indirect Costs		**224,556.00**
Section I, Total Direct and Indirect Costs (G + H)		**723,570.00**
Section J, Fee		

PHS 398 Cover Page Supplement

OMB Number: 0925-0001

1. Project Director / Principal Investigator (PD/PI)

Prefix:
First Name*:
Middle Name:
Last Name*:
Suffix:

Excluded by Requester

2. Human Subjects

Clinical Trial? ○ No ○ Yes
Agency-Defined Phase III Clinical Trial?* ○ No ○ Yes

3. Permission Statement*

If this application does not result in an award, is the Government permitted to disclose the title of your proposed project, and the name, address, telephone number and e-mail address of the official signing for the applicant organization, to organizations that may be interested in contacting you for further information (e.g., possible collaborations, investment)?

○ Yes ● No

4. Program Income*

Is program income anticipated during the periods for which the grant support is requested? ● Yes ○ No

If you checked "yes" above (indicating that program income is anticipated), then use the format below to reflect the amount and source(s). Otherwise, leave this section blank.

Budget Period*	Anticipated Amount ($)*	Source(s)*
1	80,000.00	Primate use fees from assignment

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5. Human Embryonic Stem Cells

Does the proposed project involve human embryonic stem cells?* ● No ○ Yes

If the proposed project involves human embryonic stem cells, list below the registration number of the specific cell line(s) from the following list: http://grants.nih.gov/stem_cells/registry/current.htm. Or, if a specific stem cell line cannot be referenced at this time, please check the box indicating that one from the registry will be used:

Cell Line(s): Specific stem cell line cannot be referenced at this time. One from the registry will be used.

6. Inventions and Patents (For renewal applications only)

Inventions and Patents*: ○ Yes ○ No

If the answer is "Yes" then please answer the following:

Previously Reported*: ○ Yes ○ No

7. Change of Investigator / Change of Institution Questions

❑ Change of principal investigator / program director

Name of former principal investigator / program director:

Prefix:

First Name*:

Middle Name:

Last Name*:

Suffix:

❑ Change of Grantee Institution

Name of former institution*:

PHS 398 Research Plan

Please attach applicable sections of the research plan, below. OMB Number: 0925-0001

1. Introduction to Application (for RESUBMISSION or REVISION only)	An_Res_Introduction1018451173.pdf
2. Specific Aims	An_Res_Specific_Aims1018451115.pdf
3. Research Strategy*	An_Res_Research_Strategy1018451151.pdf
4. Progress Report Publication List	Pub_List_Col_Resources1018450957.pdf
Human Subjects Sections	
5. Protection of Human Subjects	
6. Inclusion of Women and Minorities	
7. Inclusion of Children	
Other Research Plan Sections	
8. Vertebrate Animals	Vertebrate_Animals1018450936.pdf
9. Select Agent Research	
10. Multiple PD/PI Leadership Plan	
11. Consortium/Contractual Arrangements	
12. Letters of Support	
13. Resource Sharing Plan(s)	Resource_Sharing_Plan1018450937.pdf
Appendix (if applicable)	
14. Appendix	Employee_Effort_Col_Resources1018450960.pdf

INTRODUCTION

This competing revision application seeks additional support for the Yerkes National Primate Research Center (YNPRC) Base Grant (P51 OD 11132) that will allow expansion of the rhesus macaque specific pathogen free (SPF) colony by the inclusion of SPF animals from the New England Primate Research Center (NEPRC). The YNPRC has recorded remarkable progress in the present reporting period (5/1/2011 – present), as evidenced by numerous high quality publications (over 540, including multiple publications in high profile journals), construction of new animal facilities, including a state-of-the-art transplantation and BL3 facility, and expansion of its research funding base, even in the era of an extremely competitive NIH funding environment, with a 13% increase in research funding in FY 2014.

The continued growth of our research base at Yerkes, coupled with the more specialized demands of investigators for genetically well-characterized nonhuman primates, have strained the capacity of our existing rhesus macaque SPF breeding colony, and resulted in the need to obtain animals from outside sources. With the support of ORIP leadership, Yerkes has partnered with the NEPRC to facilitate the transfer of approximately 135 SPF breeding animals from the NEPRC SPF colony. The NEPRC SPF rhesus macaque breeding colony was established in 1988 and represents one of the oldest and best-characterized SPF rhesus macaque colonies in the United States. Virologic monitoring for B virus, STLV, SIV, and SRV has been conducted using rigorously established protocols with no breaks in SPF status since 1992. Breeding has been carefully managed, and the entire breeding colony has undergone comprehensive MHC class I typing using next generation sequencing techniques. The planned closure of the NEPRC puts at risk a valuable resource that represents an investment of tens of millions of research dollars and necessitates transfer of this valuable resource to other NPRCs.

Initial phases of the transfer of NEPRC SPF breeding colony animals to Yerkes have already been completed, and the third and final phase of transfer will occur in October of 2014. A comprehensive plan for the incorporation of the NEPRC breeding colony animals into the YNPRC SPF breeding colony has been established, which includes a three month quarantine, detailed virologic and TB testing, as well as behavioral evaluation and training. The initial phases of this transfer have been supported by an administrative supplement to the Yerkes P51 Base Grant during the project period of May 1, 2014 to April 30, 2015. The current request provides the appropriate resources for animal care and associated personnel support for the period May 1, 2015 to April 30, 2016, prior to the renewal of the Yerkes Base Grant, which will be submitted in May 2015.

The incorporation of a significant subset of the NEPRC breeding colony animals into the Yerkes SPF breeding program will preserve this invaluable resource, as well as enhance the YNPRC's ability to serve as a resource to core investigators and to scientists nationally and internationally, all for the ultimate goal of advancing human health.

SPECIFIC AIMS

Rhesus macaques are one of the most common nonhuman primate species used in biomedical research, both at the national level and at the Yerkes NPRC. The rhesus macaque is widely acclaimed as the premier preclinical model of HIV infection, as well as a preeminent model for neuroscience, transplant medicine and infectious diseases other than HIV. In recent years, there has been an increase in the demand for specific pathogen free (SPF) rhesus macaques in general, and SPF macaques with specific genetic backgrounds in particular.

The Yerkes NPRC currently supports a portfolio of over $73 million in grants focused on infectious diseases, including SIV/HIV studies, transplant medicine, drug addiction, movement disorders, appetite regulation, developmental disorders, and changes in cognitive function related to neurodegenerative diseases and aging. Total research funding in FY 2014 grew by 13%. Accordingly, we have observed progressive increases over the past four years in the requests for rhesus macaques at Yerkes. However, our ability to meet these increasing demands have been constrained by multiple factors. The YNPRC recently completed a transition of the macaque breeding groups to full SPF status in 2013. This breeding population, however, is currently skewed towards younger animals and requires additional time for expansion to support the continued research demands. The transition of the entire breeding colony to SPF has hampered the availability of animals to meet immediate assignment needs.

The existing portfolio of funded grants, as well as conservative estimates of funding that will be derived from pending grants, dictate that we increase our ability to produce animals of suitable phenotypes for these diverse studies. The central objective of this competing revision application is to provide support for the incorporation of animals from the NEPRC breeding colony to the Yerkes SPF breeding colony.

Specifically, we propose the integration of NEPRC rhesus macaques into the Yerkes breeding colony to augment the supply of SPF rhesus macaques available to support NIH-funded research.

Yerkes will be integrating approximately 135 rhesus macaques from the NEPRC colony into the YNPRC breeding colony. The animals are being transferred in three different groups to YNPRC. The first group of breeding animals arrived in March 2014, the second group in September 2014, and the third set will arrive in October 2014. The additional resources provided by this competing revision application will provide for the care and testing of these animals and their integration into the Yerkes SPF breeding colony.

The integration of animals from the NEPRC breeding colony along with the achievement of multi-generational equilibrium will enable the rhesus macaque breeding colony at YNPRC to reach its full potential in supplying appropriately aged and genetically characterized animals for assignment to researchers at Emory University and elsewhere. The resulting supply of high-quality and well-characterized rhesus macaques will therefore enhance our ability to support our overarching research mission.

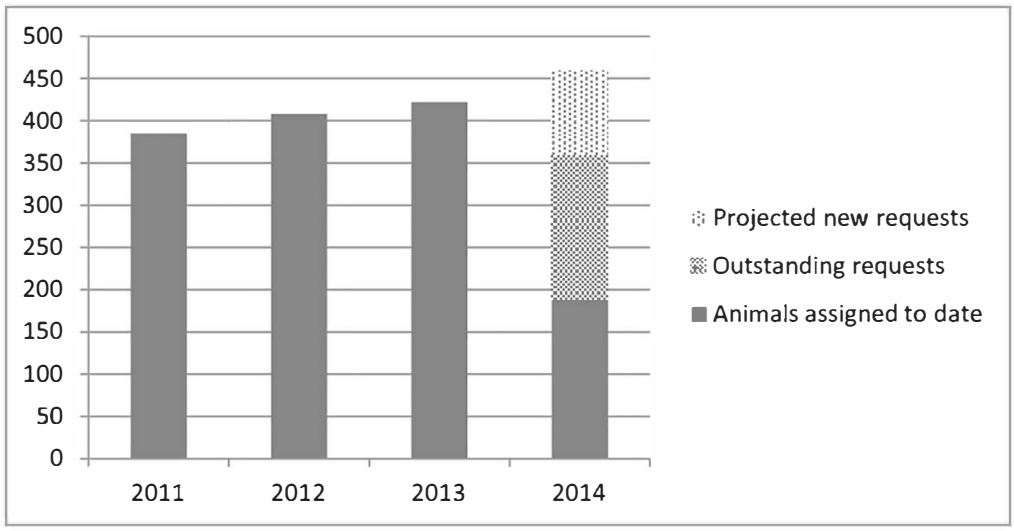
RESEARCH STRATEGY

PROGRESS AND MAJOR ACCOMPLISHMENTS

Yerkes research portfolio has continued to grow over the current reporting period, with $73.4 million dollars in grant support in the past fiscal year, representing an increase of 40% since FY 2010 (excluding ARRA funds) and a 13% increase since FY 2013 Throughout this period, multiple factors have influenced the availability of rhesus macaques to support this research. The process of transitioning to an SPF breeding colony resulted in fewer animals immediately available for assignments as the newly formed groups stabilize and grow. In addition, the expanding specifications for animal requests, such as highly specific MHC types, has limited the pool of available animals that meet the exact criteria to select for individual research project assignments. Furthermore, we anticipate a need for expanding the breeding colonies as grantees address the planned implementation of NIH requirements for inclusion of both sexes in preclinical research. As investigators start requesting more female rhesus macaques, the production rates in colonies will decline as the pool of available breeding females decreases. It will be essential for Yerkes to expand the breeding populations of rhesus macaques if females are incorporated into projects at a higher rate, since traditionally a large percentage of females remained in the breeding groups to serve as future breeders.

This multitude of factors has resulted in limitations in animals available for assignment, especially given the constant demand of animals for projects. In order to meet the requests at the YNPRC in the past year, we have acquired 152 research animals from the NEPRC that are being assigned to projects upon clearing quarantine at Yerkes. This group of 152 research animals did not receive NIH support, as they were obtained to fill standing animals requests. Importantly, an additional 135 breeding animals from the NEPRC will be assigned to the YNPRC SPF breeding colony. Yerkes has experienced progressive increases in the number of animal assignment requests over the past four years, ranging from 4% to 8% increases per year (Figure 1). This graph demonstrates the ever increasing demand for rhesus macaques over the past four years at Yerkes. The 2014 animal requests include requests that have already been filled, requests that are pending assignments and our projection of animals requests that will be submitted throughout the remainder of 2014.

Figure 1 The number of rhesus macaque research assignments over the past four years.
**Projected 2014 assignments based on pending and anticipated requests.



The addition of NEPRC animals to the Yerkes SPF breeding pool will help Yerkes accommodate this growth in animal requests. A list of animal requests that have been completed and requests that are still pending are detailed in Table 1 A&B below. The addition of the 152 (unsupported) research animals from NEPRC was

essential to meet investigator requests in 2014. The addition of the 135 breeding NERPC animals will be essential to ensure an adequate colony size to meet future demands.

Table 1A- Pending research requests for rhesus macaques

P.I.	Project Title	Animals Requested	Animals Assigned	Animals Outstanding
Excluded by Requester	Development of a monkey model of dystonia	1	0	1
	Systems biology of malaria as a model for host-pathogen interactions	5	1	4
	Inactivated AT-2 treated SIVmac239 and Lactobacillus plantarum (LP) as candidate AIDS vaccines	54	52	2
	B-cell biology of mucosal immune protection from SIV/SHIV challenge	100	71	29
	Comparative AIDS Core	12	9	3
	Prosocial brain: Evolution of the human capacity for empathy, compassion, and cooperation	10	0	10
	Developing a safe vaccine against group A streptococci	20	0	20
	Evaluation of the therapeutic role of Anti α4β7 antibody in chronic diarrhea in juvenile macaques	4	3	1
	Use of novel automated feeders to control obesity of socially-housed rhesus macaques	24	12	12
	CD40L adjuvanted clade C DNA and MVA HIV vaccines	46	0	46
	Mucosal protection against HIV generated by PIV5	10	0	10
	TLR adjuvanted BG505 HIV-1 SOSIP trimers for HIV immunization	12	0	12
	Impact of early ART on SIV reservoirs	12	0	12
	Targeting cytolytic cells to lymphoid sites of HIV persistence	10	0	10
	Total	320	148	172

Table 1B - Completed research requests for rhesus macaques in the past year

P.I.	Project Title	Animals Requested	Animals Assigned
Excluded by Requester	Drug induced hypothermia in rhesus monkeys	3	3
	Extrastriatal functions of dopamine	1	1
	Establishing quarantine procedures for Emory Transplant Center non-human primates	28	28
	Blood donors for primate transplantation studies	1	1
	Choroidal translocation in a non-human primate model	4	4
	Acute infection T cell dynamics	18	18
	Center for HIV/AIDS Vaccine Immunology and Immunogen Discovery - parent project	3	3
	Programming the magnitude and persistence of protective humoral responses against HIV	36	36
	Development and validation of a primate model of selective modulation of neurobiological functions using designer receptors exclusively activated by designer drugs	2	2
	Evaluation of acute babesiosis in rhesus macaques	5	5
	Thalamic interactions with the striatum	1	1
	Systems biology of malaria as a model for host-pathogen interactions	5	5
	Effect of early life stress on immune activation and susceptibility to SIV infection in rhesus macaques	24	19
	Transcriptome resources for comparative primate models of lentivirus infection	5	5
	Gut homing cells in SIV infection	28	28
	Ontogeny and neural basis of social visual engagement in monkeys	14	14
		14	14
	PET imaging and cocaine neuropharmacology in monkeys	5	5
	Comparative AIDS Core	1	1
	Pedialric HIV cure: A rhesus macaque model	4	4
	Evaluation of acute babesiosis in rhesus macaques	1	1
	GluN2D antagonism in the subthalamic nucleus for the treatment of Parkinsonism	1	1
	Developing a safe vaccine against group A streptococci	2	2
	Thalamic interactions with the striatum	1	1
	Neuroprotection by XPro1595 in a chronic MPTP monkey model of PD	2	2
	Monoclonal antibody-based multipurpose microbicides	4	4
	Activity of a novel FSH receptor modulator in macaque non-luteinizing granulosa cells	6	6
	Hepatitis C replication in macaque monkeys	2	2
	Total	221	216

Currently, there are 1,756 rhesus macaques in the breeding colony at the YNPRC Field Station. In addition, we have expanded the genetic characterization of this SPF colony by developing full pedigree information. The focus of this competing revision application is to expand the Yerkes pedigreed SPF rhesus macaque colony by integration of the NERPC animals to serve the future needs of NIH-supported investigators from YNPRC and elsewhere.

Expansion of the YNPRC SPF Colony

A systematic increase in our SPF population has been accomplished at Yerkes through the screening and subsequent recruitment of recently weaned animals from our non-SPF (conventional) colony, and through births in established SPF breeding groups. As of 2012, with the elimination of the non-SPF rhesus monkeys at the Field Station, we have now stopped screening/recruiting non-SPF animals to augment our SPF numbers. The housing that was formerly occupied by conventional non-SPF rhesus monkeys has been populated with SPF breeding groups. We continue to expand SPF colony numbers through the recruitment of progeny as breeders from our established SPF breeding groups along with the acquisition of the breeding animals from NEPRC. Maximizing production will continue until all of our SPF compounds have reached their carrying capacity, with the appropriate population and age stratification to sustain the population and meet research demands.

In 2011, we designated all of our rhesus groups at the YNPRC Field Station into one of two general categories - "AIDS-designated", which are managed for maximum production to support SIV/HIV research, and "Open-designated", which, in addition to support of SIV/HIV research, are also available for other non-AIDS related research programs at Yerkes. Some of these latter studies require utilizing large social groups, an approach that has been a hallmark of the behavioral neuroscience research activities at the Yerkes Field Station for four decades. To ensure a steady availability of animals for SIV/HIV studies, we have set aside a significant proportion of rhesus breeding groups as "AIDS-designated". Restricting the use of these dedicated animals to SIV/HIV studies allows colony managers to optimize breeding in order to maximize the availability of desired progeny for AIDS studies. Balancing the animal and research needs for AIDS-related and non-AIDS studies has, in the past, been a challenge for the management of large breeding colonies of rhesus monkeys, but our recently initiated plan to have dedicated animals in our AIDS-designated Colony for AIDS research and the Open-designated Colony for both AIDS and non-AIDS research activities, eliminates that challenge, providing an innovative approach to ensure colony growth while at the same time provide animals for AIDS-related and non AIDS related studies.

The broader goal of shifting the entire YNPRC rhesus breeding population to SPF status has been supported by program income, including income derived from non-AIDS studies utilizing animals from the Open-designated breeding groups through animal use fees and per diem. Importantly, the additional cost recovery generated by the assignment of animals in these groups will help contribute to the overall colony financial sustainability. Converting the animals in both the AIDS-designated and Open-designated groups to SPF status is consistent with the basic underlying requirement to enhance both the quality of science and personnel safety with respect to all research programs conducted at the YNPRC.

Incorporation of NEPRC SPF animals into the YNPRC SPF Breeding Colony

In order to best accommodate the quarantine process and group formation of the NERPC animals into the YNPRC colony, the shipments of breeder animals have been divided into three phases. The first phase included a shipment of 39 animals that arrived in March 2014 at the Field Station. The second phase of

animals (52) arrived in September 2014 at the Main Station. The last phase will entail a shipment of 44 animals to the Field Station in October 2014.

Upon arrival at Yerkes the animals were housed in run space at the Field Station (phase 1) and either run space isolated from the rest of the colony or isolated housing rooms with caging at the Main Station (phase 2) to undergo the three month quarantine process. Animals that have already arrived in groups have either completed or are completing quarantine in their existing social groups in run housing. Several phase 2 animals arrived in smaller pairs or single housing and are completing quarantine in pair housed caging or will have pair housing attempted during the quarantine period. The animals scheduled to arrive in October will complete quarantine in run housing social groups at the Field Station. During the quarantine period the animals complete a minimum of 6 TB tests at 2 week intervals along with radiographs at completion of quarantine, receive comprehensive physical examinations and laboratory testing (CBC and serum chemistries) and virology screening (SIV/STLV/SRV/CHV2). Throughout the quarantine period animals are evaluated by colony management and/or behavioral management to assess behavioral profiles and collect information on social structure and dominance hierarchy. Animals are also trained during quarantine to participate in the standard animal access procedures employed at Yerkes (shifting to animal transfer boxes) to facilitate the animal accesses during quarantine.

The phase 1 animals completed quarantine in June 2014 and are currently being evaluated for larger group formations. Once the plan for groups are established, the smaller groups will be strategically combined to form 2 larger groups that will be housed in Specific Animal Location at the Field Station. Phase 2 and 3 animals will ultimately be combined post-quarantine to form four larger social groups. Six of these harems would be housed Specific Animal Location at the Field Station. The J compounds are currently being modified to convert from Specific Animal Location to Specific Animal Location to accommodate the formation of the NEPRC groups. The remaining four harems will be combined to form two additional large breeding groups that will be housed Specific Animal Location (as described above). The Yerkes staff has extensive experience in introducing animals to form social groups. In the event the males of the three harems are not socially compatible, any male who is removed would be placed in another SPF breeding colony to increase genetic diversity in the groups. These newly formed groups would then remain in our SPF breeding colony at the Field Station.

SERVICE PLAN/APPROACH

The maintenance of socially stable macaque breeding groups is critical to meeting supply goals for SPF rhesus macaques. We will continue to utilize our proven management practices to maintain diverse multi-matrilineal and generational populations while incorporating new management methodologies for optimum production of animals. As noted above, the YNPRC SPF breeding colony has expanded substantially over the last 4 years. The growth of the SPF colony has incorporated genetic consultation to maintain population diversity, producing genetically well-characterized experimental models that are tested annually to verify SPF status.

This revision application for supplemental funding seeks support for a targeted number of breeding animals from the NEPRC to augment the breeding colony at YNPRC. Table 2 below provides the current and projected demographic breakdown of this Colony incorporating the animals from NEPRC. The population projection was based on age-dependent mortality and reproductive rates.

Table 2- Past and projected SPF colony demographics incorporating NEPRC animals

	Jul 2013	Jul 2014	Jul 2015	Jul 2016	Jul 2017
Breeding Females	499	569	613	621	636
Breeding Males	78	90	112	99	115
Infants	306	326	376	406	426
One Year Olds	277	314	294	320	316
Two Year Olds	202	259	282	284	312
Three Year Olds	159	157	163	170	181
** Animals Available for Assignment	260	236	250	281	298
Colony Total (w/ NEPRC animals)	**1520**	**1715**	**1840**	**1900**	**1986**
Colony Total (w/o NEPRC animals)	**1520**	**1605**	**1616**	**1662**	**1696**
# Additional SPF Animals w/ NEPRC	**0**	**110**	**224**	**238**	**290**

** 3 year olds not retained as replacement breeders plus others animals that become available for assignment

Use of the SPF rhesus monkey model in AIDS-related research at the YNPRC has expanded significantly since 2008, as exemplified by the recent awarding to Emory and Yerkes of two major multi-million dollar NIH grants focused on HIV/AIDS vaccines, namely the NIH/NIAID U01 AI096187 award "Consortium for AIDS Vaccine Research in Nonhuman Primates" and the NIH/NIAID UM1AI100663 award "Center for HIV/AIDS Vaccine Initiative-Immunogen Design (CHAVI-ID)", in addition to several other smaller Federal and non-Federal awards. Even with this increase, Yerkes has been fortunate to meet the needs of the expanding research programs largely due to support provided over the years from the U24 grant. Figure 1 and Table 1 above provide the current and projected number of animals required annually to support research studies, based on current and anticipated funding over the proposed project period. The progeny from this colony that are not required as replacement animals to serve as future breeders will be available for assignment to research studies.

Currently, animals are assigned to studies via the Yerkes Resource Allocation Advisory Committee. AIDS-designated Colony SPF animals will be allocated to NIH-funded AIDS studies on a first-come, first-served basis. Any AIDS-designated Colony animals that are not required internally for AIDS studies will be initially offered to AIDS investigators from the other NPRCs through the Animal Locator on the NPRC Consortium website. Details of animals not selected through the locator will be forwarded to NIH to be offered to NIH supported AIDS investigators from other institutions before being released for possible non-AIDS study assignments.

The AIDS-designated and Open-designated Colonies at the Yerkes Field Station are managed by the Colony [Excluded by Requester] ement Committee, chaired by [redacted] DVM, Assistant Director of Animal Resources at the Field [redacted]. In addition to the Chair, the Colony Management Committee is comprised [redacted] VM[Excluded by Requester] DACLAM, Associate Director for Animal Resources; scientists, includin[Excluded by Requester] PhD, who provide expertise on rhesus monkey group organization and breeding, and [Excluded by Requester] PhD, who provides expertise in primate genetics; the Field Station Animal Care Operations Manager responsible for animal husbandry; senior staff members of the Colony Management Unit; director of the Behavioral Management Unit; and other Field Station clinical veterinarians. The committee meets twice monthly to review colony

management plans regarding breeding group structure and composition, breeder male and female replacement; and listing of potential animals for assignment to research studies. Colony management staff evaluates breeding output in all breeders annually, and clinical exams and reproductive assessments are performed, as needed, to determine if targeted breeders should be replaced.

Based on paternity and genotyping information, Excluded by Requester makes recommendations on breeder male selection to maximize genetic diversity of the SPF colony. We previously acquired 36 SPF breeder males of Indian origin from the Oregon NPRC and the Specific Private Vendor which, combined with our existing stock of SPF breeder males, helped us meet our long term genetic diversity needs. Furthermore, for AIDS-related projects, investigators often require animals with particular MHC genotype, e.g., lacking MHC class I alleles such as *Mamu-A*01, B*08, and B*17* that are associated with spontaneous control of SIV replication. Therefore, we have competing goals of producing a sufficient number of animals with the desired MHC genotypes, but doing so in a way that protects the inherent genetic diversity of the colony. Through the collaborative efforts of the NIH-supported Nonhuman Primate Genetics/Genomic Consortium as well as the Breeding Colony Managers Consortium, we have developed an innovative target breeding strategy that helps meet both goals. Males selected for breeding in the AIDS-designated colony are negative for the above-mentioned MHC alleles that most AIDS-related investigators wish to avoid including in their studies. However, breeding females are not selected by MHC genotype. Males selected as breeders are unrelated to breeding females in the group, having a kinship coefficient of less than 0.0625. This breeding strategy allows Yerkes to meet its goals of producing the number of offspring necessary for the ongoing AIDS-related projects while maintaining genetic diversity of the colony.

Quarantine

Nonhuman primates (NHPs) received from outside sources are separated from the general colony in a designated quarantine facility at either the Field Station or the Main Station and allowed to acclimate for a few days before they are anesthetized for a tuberculin test and physical examination. During this initial period they are examined and monitored for evidence of clinical abnormalities, diarrhea, etc. Quarantine for Old World monkeys lasts 3 months. During this time, the monkeys are examined and AP and lateral radiographs are taken prior to release. Tuberculin testing is carried out every two weeks using the intradermal eyelid TST as a primary test. No animal is released from quarantine until all animals in the group have had six consecutive negative tuberculin tests. Additional laboratory tests may be done during quarantine, as required. NHPs are pair or group housed whenever feasible during the quarantine period. NHPs received from outside sources are not used actively in research studies until after the quarantine period appropriate for the species. Minor interventions such as blood collections for research purposes may be permitted at the time of routine anesthetic accesses for tuberculin testing at the discretion of the attending veterinarian after the first half of the quarantine procedures have been completed successfully. A detailed description of quarantine procedures is provided in the Yerkes SOP 5.5 entitled Laboratory Animal Quarantine.

Record Keeping

A new animal research management system (ARMS) was developed in collaboration with several other NPRCs and was activated for general use at YNPRC in September 2013. A computer-based and paper-file record is maintained for each NHP in the colony. Computerized records were initiated in 1990, and the animal record data prior to that time is primarily paper. Until September 2013, the computer-based system was in a SUN-microcomputer system. All information from the previous database has been transferred to the new ARMS system. All records are maintained by the staff in the Animal Records Office. The minimum data

recorded for each NHP includes the species, sex, date of birth, location and most recent survey data including body weight, tuberculin test results, immunizations, and project assignment. Clinical and laboratory data that may be generated are also included. With respect to IACUC protocols, computer based records are maintained on the specific IACUC assignment of the animal as well as the number of animals per species approved for the study. IACUC protocols also are available through TOPAZ Technologies, Web P&R, to all clinical veterinarians, the Animal Surgery Specialist, Research Services Supervisor and Animal Records Supervisor.

Virology Testing at Yerkes

Nonhuman primate virus testing is the primary function of the Yerkes Virology Core. The Core annually tests all animals in the Specific Pathogen Free (SPF) colony at Yerkes for the presence of infection by SIV, Simian T Lymphotropic Virus (STLV), Simian type D retroviruses (SRV), and Simian Herpes B virus (Herpes-B). Testing for SIV and STLV is easily achieved as these viruses produce robust and highly detectable humoral responses, and stably integrate into the genome a large number of host cells facilitating polymerase chain reaction (PCR) detection. SRV-infected animals also usually exhibit a robust humoral immune response; however, detection of integrated virus is confounded by a high degree of sequence similarity between SRV and endogenous primate retro-elements. For these three retroviruses, we perform three tiers of tests. First, animals are screened for virus-specific antibodies using cytometric bead array technology, where polystyrene beads are labeled with virus antigens and read on the Bio-rad Luminex platform. Animals with a positive or indeterminate Luminex result are then tested by Western blot for the presence of antigen-specific antibodies. If any of these animals are still indeterminate by Western blot, DNA is extracted from frozen peripheral blood mononuclear cells (PBMC), and a PCR test is performed to detect integrated viral genomes. Currently, all retrovirus tests are performed in-house by the Yerkes Virology Core, except for the detection of SRV by qPCR for which samples are sent to the California National Primate Research Center.

During the current P51 funding cycle, the Virology Core has made significant progress toward transitioning three diagnostic tests to in-house assays. Beginning in early 2013, the Virology Core began development of in-house Cercopithecine Herpes B (B-virus) serological screening and Western blot testing using whole, inactivated B-virus preparations purchased from the National B-virus Laboratory run by Excluded by Requester at Georgia State University. We have conducted a full year of validation for a highly sensitive, CBA serological screen and a highly specific, confirmatory Western blot assay by comparison with results received from the National B-virus Laboratory. With both of these assays fully confirmed to produce reliable results for B-virus detection, we will be transitioning to the performance of most of our B-virus SPF testing in-house, while only sending samples with indeterminate and positive results out to third party facilities (both the National B-virus Laboratory and VRL.) Finally, the Virology Core has begun development and initial validation of a real-time PCR for the confirmation of Simian betaretrovirus (SRV) infection the in the SPF colony at Yerkes. One major impediment for validation of this assay was the identification of SRV positive animals from which DNA could be obtained in order to test the accuracy of the real-time quantitative PCR (qPCR) in discriminating SRV-positive from SRV-negative animals. SRV-positive rhesus macaque samples were obtained earlier this year and preliminary testing of Yerkes SPF animals will begin once the assay standard curve is validated and the sensitivity of the assay is confirmed using the new SRV-positive animals.

Additionally, the Virology Core has continued to provide rapid and reliable serological and molecular testing for SIV, STLV, and SRV while developing these other in-house virological assays. Furthermore, the expertise of the Virology Core has been utilized in revising the standard operating procedures at Yerkes for exposure and

non-negative results, as well as consulting on incidents with the potential to expose SPF animals to non-SPF conditions.

The Virology Core will continue to provide high quality, reliable virology testing and consulting services for the SPF breeding colony at Yerkes. Additionally, the Virology Core will continue its plan for the validation and implementation of new SRV quantitative PCR detection assay. Similarly to the validation performed for B-virus serological assays, a year long validation of the SRV qPCR detection assay will begin shortly wherein, animals exhibiting indeterminate or positive reactivity on SRV Western blots will be tested by comparing the results of the in-house real-time PCR with those obtained from testing at the California National Primate Research Center. When test results disagree between facilities, a third party will be contracted to help validate results. All Yerkes virology testing policies are consistent with the position papers developed in the National Primate Research Center consortium group evaluating SPF testing programs.

Genetic Characterization

The YNPRC SPF colony, consisting of both the AIDS-designated and Open-designated colonies, is a large, phenotypically diverse colony of Indian origin rhesus macaques that provides animals for a wide variety of basic science and pre-clinical research programs including studies of HIV pathogenicity, prevention, and therapy, as well as other infectious diseases, transplant medicine, and neuroscience. As a result, genetic characterization of the colony is vital, both to maximize production of suitable research subjects and facilitate effective management strategies critical to the long-term health of the colony. As such, the Yerkes colony is 1) comprised of a fully pedigreed population consisting of over 5000 subjects (cumulative) in which relationships can tracked backward though multiple generations extending over many years; 2) confirmed to have animals of Indian origin; and 3) possesses characterization of the MHC locus within the colony, including genotyping of three specific loci (*Mamu-A*01, B*08, and B*17*) that are of critical importance in SIV/HIV studies.

Currently, the pedigree of the Yerkes population is derived from genotypes of 96 highly polymorphic single nucleotides (SNPs) that were developed and tested through the NPRCs' Genetics and Genomics Working Group (GGWG). This approach offers three significant advantages. First, it is significantly less expensive on a per animal basis than the more conventional microsatellite genotyping. Second, because the genotypic assay designed for these SNPs can be multiplexed to a much higher degree than microsatellites, data can be obtained more efficiently. Finally, because these particular SNPs have been developed collaboratively, the same panel of SNPs will be genotyped for rhesus macaques at each NPRC, thereby allowing direct comparison of these data across centers. Indeed, the animals acquired from the NEPRC have already been genotyped for the same loci. Thus, newly acquired animals can immediately be integrated into our existing pedigrees.

Given that the majority of animals within the colony will be used for HIV/SIV or transplant studies, genetic characterization must also include MHC analysis. MHC class I alleles play a critical role in determining the pace of disease progression in HIV-infected people and SIV-infected macaques. Accurate MHC class I typing is therefore essential to the outcome of vaccine and pathogenesis experiments in the SIV/macaque model, and it has become increasingly important to characterize the MHC class I haplotypes of rhesus macaques used in SIV/SHIV research studies. Specific MHC types may be desirable or undesirable for AIDS-related studies, and investigators are increasingly using MHC typing as selection criteria for animal allocation to specific studies. In some cases, this may place a great demand for animals with specific MHC types. For example, since several immunodominant A*01-specific immune responses have been identified and abundant A*01-specific immune

reagents are available, Mamu-A*01+ animals may be requested when experimental designs require careful evaluation of immune responses. In contrast, since certain MHC alleles such as *Mamu A*01, B*08* and *B*17*, are associated with improved control and outcome from SIV infection, animals with these MHC types are often specifically excluded by investigators evaluating vaccine efficacy, since over representation of these alleles may confound interpretation of potential vaccine efficacy.

In light of the clear need to obtain more comprehensive MHC class I typing to guide the management and assignment of rhesus macaque breeding colonies, Yerkes has collaborated with Excluded by Requester in the University of Wisconsin Immunogenetics Lab to obtain sequencing based haplotype analysis of expressed alleles of the MHC IA and IB regions, the current gold standard of MHC analysis. Until recently this was only performed using massively multiplexed pyrosequencing techniques, making it cost prohibitive on a population wide level. With the advancement of sequencing technology however, it is now possible to perform this same analysis using short (150 bp) sequencing reads, thus greatly reducing the associated costs. These advancements, combined with the recent establishment of the Yerkes Genomics Core, have resulted in Yerkes developing the capacity to perform full expression sequencing and haplotype analysis of the MHC of each SPF animal. Importantly, the animals obtained from NEPRC have also had this analysis performed (Figure 2) and thus will serve as ideal additions to the SPF colony.

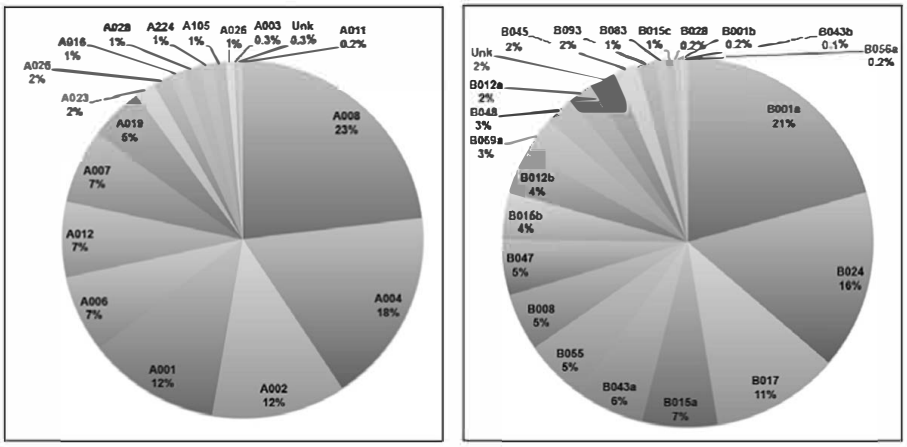


Figure 2. MHC class I A and B haplotypes identified in the NEPRC SPF breeding colony. MHC typing was performed using 454 pyrosequencing of MHC class I amplicons, and MHC A and B haplotypes were assigned based on the resulting groupings of alleles. Data represent the aggregate of over 400,000 identified amplicon reads, resulting in an average of 1500 reads per animal on a total of 329 animals.

Standard Operating Procedures (SOPs)

Yerkes National Primate Research Center has a robust process to initiate, implement, review and revise Standard Operating Procedures (SOP). Formalized, written SOPs are initiated or revised when a need is identified for consistent, safe, and effective performance of a recurring activity. The SOP committee serves as the final review committee and includes representation from Animal Care, Veterinary Medicine, Center Administration, Research and Safety. Introduction of a new or revised SOP consists of a broadcast memo and/or e-mail. A formal training session is held if the content of the SOP warrants. SOPs are available to all employees on the Yerkes internal web site and in designated SOP manuals. SOPs are reviewed and revised as needed at least every 3 years. The Center Director, Associate Directors, Principal Investigators, and others who manage and supervise Yerkes employees are responsible for ensuring compliance with SOPs among their employees. The Yerkes Safety Office Training Coordinator is the SOP Chairperson and is responsible for supporting the SOP committee, providing or coordinating training, maintaining the SOP central data base and assuring that current SOPs are posted on the web site.

Training of Animal Care Personnel

Prior to beginning employment, all personnel are given a packet that provides information on the Yerkes Center, general information on primate research, the nonhuman primate behavioral management program,

laboratory animal zoonoses, personnel policies, Center security, standards and procedures for working safely at the Center, training policies, and biosafety issues (e.g., B-virus). Supervisors are responsible for training employees in procedures that specifically relate to their areas of responsibility. Individuals with practical experience are appointed to train new employees/students within their units. All new employees (investigators, animal care personnel, research technicians, etc.) and students/volunteers receive an approximately 1 hour orientation that includes a slideshow related to the organization of the Yerkes Center, procedures for handling incidents and potential exposures, and general guidelines for working safely in laboratory and animal research settings. All new employees complete training on Emory's Blackboard site, including a "Yerkes Orientation" module in addition to other modules as are relevant to the employee's job responsibilities. All personnel who will have animal contact are required to complete Animal User Orientations that cover nonhuman primate and/or rodent biology, U.S. regulations and guidelines for laboratory animals, IACUC policies, identifying and reporting sick animals and reporting animal welfare concerns. Animal Research personnel are required to complete applicable AALAS Learning Library online training modules and be added to an existing IACUC protocol prior to working with animals. A hands-on instructional tour of the nonhuman primate and/or rodent research facility is required for research personnel to gain access to these areas. General information memoranda are circulated providing any new information or reminding personnel of existing standards when necessary.

Training classes are provided as part of Yerkes continuing education efforts. These classes are based on the American Association for Laboratory Animal Science certification program. Although all Animal Care Technicians are encouraged to work toward certification by AALAS, the AALAS certification examination is not mandatory. Regular staff meetings are conducted at which time there is generally a review of some aspects of husbandry and care that relate to certification. Manuals for the Assistant Laboratory Animal Technician, Laboratory Animal Technician and the Laboratory Animal Technologist are made available to Yerkes technicians without charge for use in the in-house training program or for self-study. Additionally, the Emory University IACUC Office subscribes to the AALAS Learning Library for online, individualized training. The Yerkes Center pays the fee for the certification examination at each level. A salary increase is provided to individuals who achieve certification. Currently, the Training Coordinator for the Yerkes Department of Animal Resources coordinates the training requirements for personnel who work with research animals. After completing the Animal User Orientations, trainings offered to animal users at Yerkes include 1) aseptic surgery technique (mandatory for anyone conducting surgery); 2) rodent biomethodology including restraint, blood collection techniques and injection procedures; 3) humane rodent euthanasia methods; and 4) behavioral management of nonhuman primates. Instructional manuals for identifying sick rodents are distributed to animal research and animal care personnel. The Training Coordinator is a member of the IACUC Subcommittee on Training and Continuing Education, which develops the policy on rate, frequency and types of training and continuing education requirements for animal users at Emory University and Yerkes.

Forty percent of the Main Station animal care unit and 45% of the Field Station animal care unit are AALAS certified at some level. Opportunities for additional training are also available when Animal Care Technicians attend National AALAS, SEAALAS and AALAS District IV meetings. Supervisors and Managers have been attending webinars sponsored by NABR, OLAW, USDA and AAALAC. Additionally, Continuing Education sessions are available for Veterinary Technicians through the Gwinnett Veterinary Medical Association monthly meetings.

In addition to the initial orientation which includes information on zoonoses (including B-Virus), biosafety, personal protective equipment, and Center policies on safety, the Yerkes Environmental Health and Safety

Officer conducts and/or facilitates annual training programs for all personnel. These annual training programs include but are not limited to: (1) B-virus training for all staff who work with nonhuman primates or nonhuman primate blood or tissues; (2) annual updates on the use of personal protective equipment to include a review of current requirements, demonstration on how to use PPE, and information on the storage, limitations of and decontamination and disposal of PPE; (3) information on hazards communications and the chemical hygiene plan, including how to work with hazardous chemicals, how to respond to a spill, labeling and storage requirements, disposal procedures and Material Safety Data Sheets (MSDS); (4) biosafety reviews which includes a review of biosafety level 1-4, blood borne pathogens standards, biological safety cabinets, emergency procedures, disposal practices, and a review of zoonoses; (5) radiation safety which includes discussion of the characteristics of radiation, safe use and storage, disposal, and employee monitoring; (6) ergonomics training for employees in animal care, research, or any other position that involves strenuous or repetitive physical activity; and (7) fire safety training which includes fire prevention strategies, evacuation plans, emergency procedures, and training for the use of fire extinguishers; and (8) respirator program which includes annual fit testing, training, and medical surveillance.

Summary

The integration of the NEPRC rhesus macaques to the YNPRC colony will help support the research demands at YNPRC, as well as preserving a valuable national resource that represents a substantial investment by the NPRC system. The growth of the fully pedigreed, SPF colony at the YNPRC will provide a supply of high-quality and well-characterized rhesus macaques for investigators, both at Emory University and at our partner institutions.

Progress Report Publication List

Please see the Progress Report Publication List under PHS 398 Research Plan section for the Overall Component.

VERTEBRATE ANIMALS

1. This proposal will oversee the breeding and management of the NEPRC rhesus macaque colony being integrated with the YNPRC rhesus macaque breeding colony. This includes 135 rhesus macaques from the NEPRC being integrated into the YNPRC rhesus breeding colony of 1716 animals. The SPF rhesus breeding colony will be managed to optimize breeding in order to provide research subjects to NIH-funded research protocols. All such research will have separate independent funding and distinct IACUC approval for the work conducted. This breeding project will employ routine procedures associated with colony management, animal care and husbandry and the provision of appropriate clinical care and enrichment. All such activities are governed by applicable law and regulations and are guided by SOPs in place at the YNPRC

2. The project uses Indian origin rhesus monkeys (*Macaca mulatta*) because that is the primate species in greatest demand for research studies. The number of animals to be used for this project is based on an optimal breeding colony required to produce some 350 progeny annually. Animals are housed in indoor-outdoor environments using either compound caging to house large groups of macaques (25 to120 animals) or run-type caging that accommodates 6 to 15 animals.

3. Colony animals will be inspected daily by the breeding colony staff, animal care staff, and veterinary staff. Any animal in need of medical treatment will be removed from its home housing type and treated by the on-site veterinarian. A well-trained and experienced clinical veterinary staff is responsible for the clinical care of the primate colony and at the Field Station, includes four clinical veterinarians, a veterinary resident, and five veterinary technicians. In addition, the eight clinical veterinarians, a veterinary resident, an animal surgical specialist and eight veterinary technicians located at the Yerkes Main Station supplement the care at the Field Station when needed. All of the animals in the SPF colony have known medical history, which is maintained in the Animal Records database, accessible from any desktop computer with the necessary privileges. Animals, even those housed in social environments, receive daily enrichment (food or objects). The Emory University Institutional Animal Care and Use Committee (IACUC) must approve all research involving animals at Yerkes. The Committee is charged with ensuring proper care, use and humane treatment of animals used in research, testing and education. In addition to reviewing management and research protocols, the Committee also inspects all research and animal facilities semi-annually and produces reports and recommendations from these inspections. The YNPRC is fully accredited by AAALAC, with the most recent site visit in February 2014 and letter of full accreditation issued in July 2014.

4. Procedures employed include routine colony and veterinary management practices and periodic blood sampling to confirm viral status. Routine management practices include daily behavioral and clinical observations of all animals. Animals are examined annually by a veterinarian. During the exam the animals are TB tested, de-wormed, weighed, dental inspection, pregnancy check (if applicable), tetanus vaccine given, and sample collection for virus screening is done. The animals are anesthetized with Ketamine (10mg/kg) or Telazol (3-5 mg/kg) IM. Animals are continually monitored by the veterinary staff until the animals have recovered. Any ill and injured animal is provided with appropriate clinical care as determined by the veterinary staff.

5. Euthanasia is not expected to be needed in the context of this revision application. However, if a clinical situation arises and the clinical veterinary staff deems that euthanasia is warranted, the procedures will be consistent with the recommendations of the AVMA Panel on Euthanasia using a combination of Ketamine (10 mg/kg, IM) and Pentobarbital (100 mg/kg, iv).

Bibliography & References Cited

Please see the Progress Report Publication List under PHS 398 Research Plan section for the Overall Component.

RESOURCE SHARING PLAN

Data sharing: Yerkes NPRC leadership and all Yerkes Core and Affiliated Scientists are committed to making the results of our research rapidly available to others. Results of studies conducted at the YNPRC are presented at national and international conferences and published in peer-reviewed journals in a timely fashion. Upon completion of experiments, data are shared in the form of peer-reviewed publications and the final versions of accepted manuscripts are deposited into the PubMed Central, in compliance with the Public Access Policy. Supplementary material is posted, when permitted, on the journal's website.

Consistent with its long standing involvement with the NPRC specific pathogen free (SPF) program, Yerkes will continue to participate as a member of the SPF Coordinating Committee, previously established by ORIP, and will meet regularly with ORIP representatives and the PIs/leaders of other ORIP-supported SPF programs/projects to exchange information and discuss progress regarding successful breeding and management strategies. In addition, over the past several years, other collaborative approaches to resource sharing have been developed that will continue to be pursued during the proposed funding period. SPF PIs, in close collaboration with NIH/ORIP, have established a Breeding Colony Management Consortium, comprised of the SPF PIs, colony managers and others, which holds monthly teleconferences and annual face-to-face meetings during which progress and challenges are reviewed and, where appropriate, standardized consortia approaches adopted. This has led to the formation of other consortium groups in specialty areas such as genetics, behavioral management and viral analyses, which have greatly strengthened collaborative efforts and information exchange, and these will continue throughout the next phase of the project. Significant new information is shared widely, including presentations at national professional meetings and scientific publications.

Other data may also be shared upon request within 30 days of acceptance for publication of the main findings from the final data set. Requests for data access are typically reviewed by the Principal Investigators and the Yerkes Director. Data and associated documentation are made available to users under a data-sharing agreement that provides for a commitment to: 1) using the data only for research purposes, 2) protection of data using appropriate secure computer technology; 3) restrictions on distributing data to third parties and destroying data upon completion of analysis; and 4) proper acknowledgement of the data resource. Upon completion of the data-sharing agreement, data will be made available through a password-protected website. Additional technical assistance will be made available at cost to the requestor.

Sharing tissues and biological samples: A comprehensive bank of tissues and other biological specimens from research conducted at the YNPRC is made available to collaborators and other investigators throughout the nation. We have routinely shared tissue and biological samples with outside investigators, as long as this does not compromise tissues needed by the Scientific, Animal Service or Core Service Components of Yerkes. Investigators are required to complete a material transfer agreement when requesting tissue or other biological samples.

Sharing sequence data: Sequence data are made available through National Center for Biotechnology Information, and viral clones and isolates are made available through the NIH AIDS Research Program (http://www.aidsreagent.org/) and/or directly through Yerkes Principal Investigators. Reagents developed during the course of research at Yerkes are made available to the NIH AIDS Research Program, or through material transfer agreements, with researchers at other institutions.

Sharing DNA samples: Extracted DNA samples from animals housed at the YNPRC are made available to qualified investigators through the NPRC Biomaterials Distribution Program. The recipient pays the shipping charges and a portion of the costs associated with collecting and processing the tissues. Before a request is filled, the recipient will be advised of the estimated costs. Investigators are required to complete a material transfer agreement when requesting DNA samples.

Sharing model organisms: The Yerkes NPRC will continue to make animals produced under this award available to NIH-funded both at the Yerkes Center and via a formally established mechanism in which animals are first offered to the other participating centers through a web-based animal locator system. Should the animals not be required, their description/information will be forwarded to ORIP representatives and other NPRCs in case they are needed by other NIH-supported investigators.

Genome-Wide Association Studies: N/A.