UNIVERSITY of WASHINGTON

APPROVAL OF NEW PROTOCOL SUBMISSION

September 1, 2020

Dear Blake Hannaford,

This email serves as written notice of animal use approval by the Institutional Animal Care and Use Committee (IACUC).

*To help us better serve you, please take this **3 question survey** about your experience with the review process.*

Type of Review:	Designated Member Review
Short Title of Protocol:	4505-01: Smart Grasper
Investigator:	Blake Hannaford
HoverBoard ID:	PROTO202000113

Please note the approval and expiration date listed refer to the assigned protocol number for all animal orders and future correspondence with the IACUC.

Protocol Approval Dates: 9/1/2020 to 8/31/2023

Next Annual Expiration Date: 8/31/2021

Next Triennial Expiration Date: 8/31/2023

If you have any questions, contact OAWRSS at oawrss@uw.edu.

Sincerely,

Office of Animal Welfare

OFFICE OF ANIMAL WELFARE

DO NOT USE FOR GRANT/CONTRACT VERIFICATION

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From: Geena Gallardo <gallardg@uw.edu>
To: Thea L Brabb <thea@uw.edu>, "Nicholas L. Reyes" <nlreyes@uw.edu>
Sent: 5/28/2020 12:17:58 PM
Subject: FW: Estimate for Grant proposal with live animal (porcine) non survival surgery

---

Attach: [EMB4_image001.gif] [EMB4_image002.jpg]

Hi Thea and Nick,

Trying to figure out where to find details about the surgery suite. I unfortunately looked through everything I had regarding vivarium details and I didn't find anything with specific details about the surgery suite. Any help would be appreciated. ☺

Best wishes,

Geena
Assistant to the Chair, Dr. Thea Brabb
Department of Comparative Medicine

Health Sciences Bldg Box 357340
Seattle, WA 98195-7340
206-221-3396
gallardg@uw.edu

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From: Tony Nguyen [mailto:tonytn@uw.edu]
Sent: Thursday, May 28, 2020 11:21 AM
To: Mika N Sinanan <mssurg@uw.edu>; Gary A. Fye <gfye@uw.edu>
Cc: Gary A. Fye <gfye@uw.edu>; Blake Hannaford <blake@uw.edu>; Geena Gallardo <gallardg@uw.edu>
Subject: RE: Estimate for Grant proposal with live animal (porcine) non survival surgery

Hello all,

DCM has standard language describing their vivaria. I've CC'd Geena as she should have the information. Geena, do you have details about the surgery suite? If no, our AAALAC Program Description has some information. OAW does not have pictures, but DCM might or could take some pictures.

Thanks,
Tony

TONY NGUYEN
Program Operations Specialist
Office of Animal Welfare

Health Sciences Building Box 357160
1705 NE Pacific Street / Seattle, WA 98195-7160
206.685.9719 / fax 206.616.1297
tonytn@uw.edu / oaw.washington.edu

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Dare 2 Care... | explore UW's Compassion Fatigue Program

From: Mika N Sinanan [mailto:mssurg@uw.edu]
Sent: Thursday, May 28, 2020 10:21 AM
To: Gary A. Fye <gfye@uw.edu>; Tony Nguyen <tonytn@uw.edu>
Cc: Gary A. Fye <gfye@uw.edu>; Blake Hannaford <blake@uw.edu>
Subject: Re: Estimate for Grant proposal with live animal (porcine) non survival surgery

Thanks!

Mika N. Sinanan, MD, PhD, FACS
Medical Director for Contracting and Value-Based Specialty Care
Professor of Surgery, University of Washington
206-991-3168 Pager
mssurg@uw.edu

From: Gary Fye <gfye@u.washington.edu>
Date: Thursday, May 28, 2020 at 10:15 AM
To: Mika N Sinanan <mssurg@uw.edu>, Tony Nguyen <tonytn@uw.edu>
Cc: "Gary A. Fye" <gfye@uw.edu>, Blake Hannaford <blake@uw.edu>
Subject: Re: Estimate for Grant proposal with live animal (porcine) non survival surgery

Mika...looping in Tony form IACUC.

Tony, please see Mika's question below as I think you may have a description. Do you have a picture?

On Thu, May 28, 2020 at 10:03 AM Mika N Sinanan <mssurg@uw.edu> wrote:

> Gary,
> Do you have a brief description of the Animal Care Research Facility to include in the grant – number of stations, sq footage, et. And do you have a picture that we could safely use – without any animals present, just the room? Thanks.
>
> Mika N. Sinanan, MD, PhD, FACS
> Medical Director for Contracting and Value-Based Specialty Care
> Professor of Surgery, University of Washington
> 206-991-3168 Pager
> mssurg@uw.edu

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From: Gary Fye <gfye@u.washington.edu>
Date: Thursday, May 28, 2020 at 9:18 AM
To: Mika N Sinanan <mssurg@uw.edu>
Cc: "Nicholas L. Reyes" <nlreyes@uw.edu>, DCM Animal Purchasing <animals@uw.edu>
Subject: Re: Estimate for Grant proposal with live animal (porcine) non survival surgery

Morning Mika,

FYI...the pig work moved out of the CVES lab and is now happening at the Animal Research Care Facility which is located on the opposite side of the HSB complex from the hospital.

The hourly rate for 1 pig with a vet tech to run anesthesia is $136.54.

I would estimate an additional $200-300 for drugs and supplies and $250-300 for prep, set up and clean up. There is a processing fee when the pig arrives of ~ $40 for check in and records generation.

The daily per diem charge for pigs is $37.92. I imagine you would bring the pig in only a couple days before the procedure but that may also depend on the delivery schedule for the vendor.

If you have any other questions please let me know.

Gary

On Thu, May 28, 2020 at 7:32 AM Mika N Sinanan <mssurg@uw.edu> wrote:

> Thanks so much, Gary. I'm under a deadline so any numbers you can get me by midmorning today would be very helpful.
>
> Mika N. Sinanan, MD, PhD, FACS
> Medical Director for Contracting and Value-Based Specialty Care
> Professor of Surgery, University of Washington
> 206-991-3168 Pager
> mssurg@uw.edu
>
> ---
>
> **From:** Gary Fye <gfye@u.washington.edu>
> **Date:** Wednesday, May 27, 2020 at 1:47 PM
> **To:** Mika N Sinanan <mssurg@uw.edu>
> **Cc:** Blake Hannaford <blake@uw.edu>, Kris Blow <kasb13@uw.edu>, "Nicholas L. Reyes" <nlreyes@uw.edu>, "Lesley Colby DVM, MS, DACLM" <lacolby@uw.edu>
> **Subject:** Re: Grant proposal with live animal (porcine) non survival surgery
>
> Afternoon Mika,
>
> Great to hear from you. I and the rest of the vet tech have missed the resident training courses these last few years. I'll send a follow up email with an estimate for you.

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Gary

--
Gary Fye, LVT
Program Operations Specialist
Veterinary Services

On Wed, May 27, 2020 at 11:50 AM Lesley A. Colby <lacolby@uw.edu> wrote:

> Good afternoon Dr. Sinanan,
>
> I've added a few people to this email who should be able to provide the information you seek.
>
> Kris Blow is central to our animal ordering group and can help address the issue of acquisition costs.
>
> Dr. Nick Reyes and Gary Fye help to coordinate the department's anesthesia and surgical services and can work with you to estimate those costs.
>
> I hope this is helpful. Best of luck with your grant. Please don't hesitate to reach out again if I can be of further help.
>
> With regards,
> Lesley
>
> **********
> Lesley A. Colby DVM, MS, DACLAM
> Senior Director of Animal Resources and Operations
> Director, UW BSL3/ABSL3 Facility
> Associate Professor
> Department of Comparative Medicine
> University of Washington
> 1705 NE Pacific Street, Box 357340
> Seattle, WA 98195-7190
> 206.685.1020
> 206.685.3006 (fax)
> lacolby@uw.edu
> **********
>
> ---
>
> **From:** Mika N Sinanan <mssurg@uw.edu>
> **Date:** Wednesday, May 27, 2020 at 10:44 AM
> **To:** "Lesley A. Colby" <lacolby@uw.edu>
> **Cc:** Blake Hannaford <blake@uw.edu>
> **Subject:** Grant proposal with live animal (porcine) non survival surgery

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Dear Dr. Colby,

I helped build the CVES surgical lab on the 6th floor vivarium in the Health Sciences Center, 20 years ago now. Currently, I'm helping with a grant proposal regarding a multispectral sensing laparoscopic grasper, an extension of prior work that Blake Hannaford and the Biorobotics Lab in Electrical Engineering have been doing for the same period of time.

We are proposing testing living tissue (pigs under anesthesia) with the grasper, hopefully taking advantage of other nonsurvival surgery but if not, purchasing pigs and setting up the procedures for testing through a IACUC protocol (to be submitted). Previously, we could follow live animal laparoscopic surgical training but that training seems to have been supplanted by Sim Center (WISH) training with synthetic organs and torsos – which will not work for the study.

My question to you is what rates we should quote for acquisition of pigs (f needed), and the hourly rate for the CVES surgical lab with technician and a pig under anesthesia.

If easier to speak by phone, my cell is 206-251-1099. If I should be speaking with someone else, please let me know. Thanks!

Mika N. Sinanan, MD, PhD, FACS
Medical Director for Contracting and Value-Based Specialty Care
Professor of Surgery, University of Washington
206-543-5511 Dept. Surgery Academic Office
206-543-8136 Fax
206-991-3168 Pager
mssurg@uw.edu

The above email may contain patient identifiable or confidential information. Because email is not secure, please be aware of associated risk of email transmission. If you are a patient, communication to a UW Medicine Provider via email implies your agreement to email communication; see http://www.uwmedicine.org/Global/Compliance/EmailRisk.htm.

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Gary Fye, LVT
Program Operations Specialist
Veterinary Services

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Gary Fye, LVT
Program Operations Specialist
Veterinary Services

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Activity	Author	Activity Date
Congruence Letter Attached	Iwamoto, Jennifer Freeling	9/1/2020 2:53 PM
eGC1_A157661_OAW_Approval.pdf		
Letter Sent	Iwamoto, Jennifer Freeling	9/1/2020 2:48 PM
Correspondence_for_PROTO202000113.doc		
Letter Prepared	Iwamoto, Jennifer Freeling	9/1/2020 2:47 PM
Correspondence_for_PROTO202000113.doc		
Approval Period Edited	Iwamoto, Jennifer Freeling	9/1/2020 2:46 PM
Designated Member Review Submitted	Muster, Jeanot	9/1/2020 2:30 PM
Designated Reviewers Assigned	Huang, Stephanie W	9/1/2020 1:34 PM
Assigned to Designated Review	Huang, Stephanie W	9/1/2020 1:33 PM
Agenda Item Removed	Huang, Stephanie W	9/1/2020 1:32 PM
Private Comment Added	Muster, Jeanot	8/25/2020 9:39 PM
no questions		
Ancillary Review Submitted	Cashman, Judy L	8/25/2020 5:03 PM
Ancillary Reviews Managed	Cashman, Judy L	8/25/2020 5:02 PM
Tags Managed	Cashman, Judy L	8/25/2020 5:02 PM
OHRs attached	Cashman, Judy L	8/25/2020 5:02 PM
Meeting Assigned	Iwamoto, Jennifer Freeling	8/25/2020 8:40 AM
Pre-Review Submitted	Iwamoto, Jennifer Freeling	8/25/2020 8:40 AM
Vet Consult Submitted	Stocking, Kim	8/25/2020 8:33 AM
Do you accept the submission? yes		
Vet Consult Sent	Iwamoto, Jennifer Freeling	8/24/2020 2:53 PM
Tags Managed	Kunsman, Robyn	8/24/2020 9:34 AM
Response Submitted	Hannaford, Blake	8/20/2020 10:37 AM
Jennifer, (Back from vacation) You've asked for three clarifications but reviewer notes are not attached. (see screenshot). Thanks! screenshot		
Clarification by Pre-Reviewer Requested	Iwamoto, Jennifer Freeling	8/13/2020 2:13 PM
There are 3 follow-up questions/suggestions. Please see new Reviewer Notes. Thank you, -Jenny Iwamoto		
Vet Consult Submitted	Stocking, Kim	8/13/2020 1:16 PM
Do you accept the submission? no		
Private Comment Added	Stocking, Kim	8/13/2020 1:16 PM
I think it's fine to have the imaging procedure that has been added. I would like to see the response to the non-survival surgery procedure comment before accepting it.		

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	Private Comment Added	Iwamoto, Jennifer Freeling	8/13/2020 9:32 AM

Kim - Since the experiment mentions gathering surgical video and images, I added an imaging procedure and a Reviewer Note about it, but I'm not sure if it's necessary or not. If you think it's unnecessary I can remove it. Could also just clarify in the text of the experiment (Q4) that it's laparoscopic imaging/video.

	Vet Consult Sent	Iwamoto, Jennifer Freeling	8/13/2020 9:31 AM
	Response Submitted	Sinanan, Mika N	8/12/2020 2:41 PM

All responses provided. One FU pending.

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Activity	Author	Activity Date
Clarification by Pre-Reviewer Requested	Iwamoto, Jennifer Freeling	8/12/2020 10:30 AM

Initial OAW and Veterinary pre-review are complete. Please see questions and suggestions in Reviewer Notes. Let me know if you have any questions or would like to discuss. Once you have responded to all Reviewer Notes and made any necessary revisions in the protocol, use the Submit Response button to send it back to pre-review.
Thank you!
-Jenny Iwamoto, jpf2@uw.edu

Vet Consult Submitted	Stocking, Kim	8/12/2020 8:24 AM

Do you accept the submission? no
I would like to review the revisions.

Private Comment Added	Stocking, Kim	8/12/2020 8:24 AM

I think your guidance is correct. I checked with Nick Reyes about the anesthesia and he agreed that inclusion of the SOP was appropriate (gives Vet Services flexibility on the sedation/anesthesia regimen) as long as Vet Services is always doing the anesthesia.

Vet Consult Sent	Stocking, Kim	8/11/2020 11:54 AM
PI Proxy Assigned	Hannaford, Blake	8/10/2020 2:04 PM

PI Proxies Added: Mika Sinanan

Tags Managed	Iwamoto, Jennifer Freeling	8/6/2020 3:03 PM
Tags Managed	Williams, Ashley E	8/5/2020 9:56 AM
Private Comment Added	Iwamoto, Jennifer Freeling	8/4/2020 1:23 PM

To Vet Reviewer: I did add several Reviewer Notes, but mostly organizational things. I wanted your eyes on it before sending my Reviewer Notes to make sure I'm providing accurate guidance, specifically in terms of the anesthesia and non-survival surgery procedures. Thanks!

Vet Consult Sent	Iwamoto, Jennifer Freeling	8/4/2020 1:20 PM
Tags Managed	Williams, Ashley E	8/4/2020 11:45 AM

PI completed L&R

Coordinator Assigned	Iwamoto, Jennifer Freeling	8/4/2020 10:25 AM

Assigned to Jennifer Freeling Iwamoto

Coordinator Assigned	Jimenez, Selesteen	8/3/2020 9:59 AM

Assigned to OAW Green Team

Tags Managed	Jimenez, Selesteen	8/3/2020 9:59 AM

PI missing I&r
Action Required for Training #4505-01.pdf

Assigned Portfolio ID	Jimenez, Selesteen	8/3/2020 9:36 AM
Submitted	Hannaford, Blake	8/3/2020 8:29 AM

We will complete re-training this week but we would appreciate initiation of pre-review in parallel due to NSF's pending award.
NSF-funding-email.docx

Protocol Created	Hannaford, Blake	7/31/2020 2:23 PM

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UNIVERSITY OF WASHINGTON
OFFICE OF ANIMAL WELFARE

September 1, 2020

TO: National Science Foundation (NSF)

SUBJECT: Notice of Institutional Animal Care and Use Committee Approval

The following application has been reviewed and the associated IACUC protocol is approved. The grant/contract and the associated IACUC protocol are concordant in terms of animal use.

Principal Investigator: **Blake Hannaford**

eGC1: **A157661**

Grant Title: **Smart Grasper for Intelligent Surgical Manipulation**

IACUC Protocol Number: 4505-01
Protocol approval dates: 09/01/2020 – 08/31/2023

The project as proposed meets the standards of the Guide for the Care and Use of Laboratory Animals and applicable University policies and procedures. The University of Washington has an approved Animal Welfare Assurance (#A3464-01) on file with the NIH Office of Laboratory Animal Welfare (OLAW), is registered with the United States Department of Agriculture (USDA, certificate #91-R-0001), and is accredited by AAALAC International.

Jennifer F. Iwamoto, DVM, CPIA
Review Scientist, Institutional Animal Care and Use Committee
Office of Animal Welfare
University of Washington, Box 357160
Seattle, WA 98195-7160
Phone: 206-616-7475, Fax: 206-616-5664

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From: Kim Stocking <kstock@uw.edu>
To: "Nicholas L. Reyes" <nlreyes@uw.edu>
Sent: 8/11/2020 4:08:59 PM
Subject: New pig protocol with non-survival surgery

Hi Nick-
There is a new pig protocol (Hannaford 4505-01: Smart Grasper) that involves non-survival surgery with Vet Services to do the anesthesia during the procedure. https://hoverboard.washington.edu/Hoverboard/sd/Rooms/DisplayPages/LayoutInitial?Container=com.webridge.entity.Entity[OID[480540964B228C458CE9EF9C9BD3EEB2]] . The anesthesia procedure includes the attachment MANUAL OF STANDARD OPERATING PROCEDURES.NR edit 12.14.18 and includes a variety of agents that could be used for anesthesia/analgesia. Is this the right document to include here?

Thanks,
Kim

Kim Stocking, DVM, DACLAM

Attending Veterinarian
Director, Office of Animal Welfare

Health Sciences Building Box 357160
1705 NE Pacific Street Seattle, WA 98195-7160
206.543.2211 fax 206.616.1297
kstock@uw.edu/ oaw.washington.edu

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Blake Hannaford <blake@uw.edu> 6:51 AM (1 hour ago) to Eli, Wendy, Mika, Yana

THanks,

We're doing it as fast as possible. First round will be clicked today.

Blake

On Mon, Aug 3, 2020 at 6:29 AM Nilsen, Wendy <WNILSEN@nsf.gov> wrote:

> Blake,
> Please get it going immediately. I have recommended your project for funding. We are on a tight timeline, because all awards have to be complete by 9/3. Our awards people may hold it up for the IACUC documentation, so the sooner it is hear the better!
> Be safe,
> Wendy
>
> **From:** Blake Hannaford <blake@uw.edu>
> **Sent:** Friday, July 31, 2020 6:52 PM
> **To:** Nilsen, Wendy <WNILSEN@nsf.gov>; Mika N. Sinanan <mssurg@uw.edu>; Yana Sosnovskaya <ysos@uw.edu>; Eli Shlizerman <shlizee@uw.edu>
> **Subject:** Re: [EXTERNAL] - Re: Next step, please!
>
> Wendy,
>
> Regarding your request for a letter from our animal care committee specifying we can start on the non-animal component of the project per the

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year 1 plan. I've just gotten off a zoom with their staff. They claim to not be able to do that type of letter so we have to start the protocol process now (which is quite involved - there's a new computer system and our old protocols didn't survive the transition). Best case is about 4 weeks for that approval. I want to keep you in the loop, if necessary we might be able to push or expedite a bit. Does this cause a serious problem other than delay?

Thanks again for your work on our proposal.

Blake

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Basic Information

1. *** Select research team:**
   Hannaford
2. *** Title of protocol:**
   Smart Grasper for Intelligent Surgical Manipulation
3. *** Short title:**
   4505-01: Smart Grasper
4. *** Summary of research:**
   This project, proposed by a multidisciplinary team at the University of Washington, Seattle, aims to combine advanced machine learning with a novel multimodal sensing system within a surgical instrument to improve surgical outcomes. These sensors will detect in real time the physiological and biomechanical properties of the tissues they manipulate. The benefit will be to support safer and more effective manipulation of delicate tissues in complex surgical situations augmenting normal visual, anatomic, and haptic clues. With this instrumentation, we hope to expand into new tissue assessment dimensions for more efficient surgery, especially when other delicate tissues are in proximity. A novel, highly integrated, multimodal sensing instrument suitable for endoscopic use will generate a continuous stream of sensed data specific to surgical work with tissues. These data will be linked to ground truth from surgical videos, imaging studies, expert evaluations, and post-operative pathological analysis of tissues. This multidimensional information, especially at interfaces between tissues will aid in surgical planning and execution, and potentially supporting new modes of clinical care.
5. *** Principal investigator:**
   Blake Hannaford
6. *** What is the intention of the animal protocol?**
   Experimental Research

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Experimental Research Protocol Addition

1. * **Will the protocol include breeding?**
   ○ Yes ● **No**

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Protocol Team Members

1. Identify each additional person involved in the design, conduct, or reporting of the research:

Name	Role	Involved in Animal Handling	Authorized To Order Animals	E-mail	Phone
Vet Services	Other	yes	no	vsreview@uw.edu	(206) 583-1853
Mika N Sinanan	Co-Investigator	yes	yes	mssurg@uw.edu	+1 206 543-5511

2. If veterinary care will be provided by individuals outside of DCM or WaNPRC, provide the name, credentials and contact information below:

N/A

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Funding Sources

1. Identify each organization supplying funding for the protocol:

	Funding Organization	eGC1 Number(s)
View	National Science Foundation (NSF)	A157661

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Scientific Aims

1. * Scientific aims of the research:

This project will obtain the first ever simultaneous in-vivo measurements of pulse oximetry (blood oxygen saturation, SO2), temperature, electrical impedance (1-100kHz), pressure, and acoustic properties at multiple sites in multiple functioning organs (liver, pancreas, areolar tissue interfaces between organs, small and large bowel, and mesentery). It will demonstrate a novel, highly integrated, multimodal sensing instrument suitable for endoscopic use. The instrument will generate a continuous stream of approximately 823 bytes-per-second of a new type of sensed data specific to surgical work with tissues. This project will generate the first such database of in-vitro and in-vivo data. The new data will be shared openly online with ground truth from surgical videos, imaging studies, expert evaluations, and post-operative pathological analysis of tissues. The new classification and clustering machine learning (ML) systems will correlate measured tissue properties with organ anatomy and physiology, especially at interfaces between tissues, aiding in surgical planning, and potentially new modes of clinical care.

The importance of this research is to provide an innovative device, a novel data set, and ML algorithms, which jointly enable smart tissue manipulation. Smart tissue manipulation improves 1) basic safety (e.g. semi-autonomous robots avoiding tissue damage because they so far lack human surgical skills) and 2) advanced manual surgery (e.g. reducing rare complications in bowel anastomosis arising from surgically re-joining tissues with insufficient blood flow).

2. * Using language understandable to non-scientists, describe the goals and significance of the protocol to humans, animals and science:

Innovations in medical technology promote the health of all Americans. This project will develop a novel innovative smart surgical instrument as a multimodal sensing system to advance surgical health care. Today's electronic revolution provides a remarkable toolbox of sensors (often made tiny and inexpensive by the cell-phone industry). This project starts with adding tiny optical, electrical, thermal, mechanical and ultrasound sensors to old-fashioned surgical instruments. A basic surgical device such as a grasper or scalpel (either hand held or used by an advanced surgical robot), turns into a diagnostic instrument able to measure blood oxygenation (SpO2), physical damage, and potentially other tissue states like cancer. Advances in machine intelligence are required to process this raw, multidimensional, data into information that is clinically useful to the surgeon. This novel system will promote safer and more effective manipulation of tissues in complex surgical situations protecting delicate tissues easily damaged unintentionally or tissues that are hard to visually identify. Modern surgical paradigms including minimally invasive laparoscopic surgery and robotic assisted surgery have deprived surgeons of important tactile information which we hope to partially restore and expand into new dimensions.

The project will support graduate and undergraduate students, including from underrepresented groups. The broader impacts of this proposed research range from improved surgical care to creating concrete project-based learning experiences for diverse graduate and undergraduate students of engineering. This project's multimodal sensor system concept arose from an established collaboration between engineers and clinicians on smart medical devices and algorithms for improved surgical care. This deep

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collaboration ensures significant and valid potential of this forward looking research to impact medicine. Many undergraduate engineering students have gained project experience working on previous versions of the proposed smart instrument technology and will be even more engaged in the proposed project through a Research Experiences for Undergraduates (REU) supplement.

3. * Provide a statement to address the potential harm to the animals on this study (e.g., pain, distress, morbidity, mortality) relative to the benefits to be gained by performing the proposed work:

Animals will be under general anesthesia at all times and will be euthanized at the end of the procedure. Our anesthetic protocol is intended to mimic the physiological state of a human patient undergoing surgery. The design of this novel system is to promote safer and more effective manipulation of tissues in complex surgical situations, allowing the surgeon to protect adjacent or involved tissues while manipulating, dividing, or removing diseased tissues in the course of the procedure.

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Experiments

Note: If you will be administering cells, cell lines, sera or other biologicals to rodents, contact the Rodent Health Monitoring Program (RHMP, rhmp@uw.edu). Testing may be required prior to administration to rodents.

1. * Define the experiments to be used in this protocol:

Name	Species	USDA	Count	Count by Pain Category	Procedures	Husbandry Exception Types
Smart Grasper Tissue Measurements	Pigs - Farm Pig	yes	5	B: 0 C: 0 D: 5 E: 0	▪ Euthanasia: Anesthetic Overdose, Pentobarbital or Pentobarbital Solution (Standard) ▪ Imaging: Hannaford: Laparoscopic camera (Team) ▪ Non-Survival Surgery: Hannaford: Grasper Surgery (Team) ▪ Substance Administration: Hannaford: Anesthesia, Administered by Vet Services (Team)	Pigs - No husbandry or enrichment exceptions.

2. Will any single animal undergo more than one survival surgery? (include any animal that underwent surgery prior to use on this protocol) ○ Yes ● **No**

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Procedure Personnel Assignment

1. * Select the team members who will be performing each procedure:

Procedure	Species	Is USDA Species	Team Members
Euthanasia: Anesthetic Overdose, Pentobarbital or Pentobarbital Solution, ver. 1 (Standard)	Pigs - Farm Pig	yes	Vet Services
Imaging: Hannaford: Laparoscopic camera, ver. 1 (Team)	Pigs - Farm Pig	yes	Mika N Sinanan Blake Hannaford
Non-Survival Surgery: Hannaford: Grasper Surgery, ver. 1 (Team)	Pigs - Farm Pig	yes	Mika N Sinanan Blake Hannaford
Substance Administration: Hannaford: Anesthesia, Administered by Vet Services, ver. 1 (Team)	Pigs - Farm Pig	yes	Vet Services

2. Team member training:

Blake Hannaford

Course	Category	Source	Stage	Stage Number	Completion Date	Expiration Date
Animal Use Laws & Regulations	General	Online	Basic Course	Stage 1	8/3/2020	8/3/2025
Animal Use Medical Screening	General	Online	Basic Course	Stage 1	7/15/2019	7/31/2022

No experience data to display

Vet Services

No training data to display

No experience data to display

Mika N Sinanan

Course	Category	Source	Stage	Stage Number	Completion Date	Expiration Date
Animal Use Medical Screening	General	Online	Basic Course	Stage 1	8/7/2020	8/31/2023
6th Floor Facility Orientation, Non-Rodent Users	Orientation	In Person	Basic Course	Stage 1	1/1/2001	

No experience data to display

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Course	Category	Source	Stage	Stage Number	Completion Date	Expiration Date
Animal Use Laws & Regulations	General	Online	Basic Course	Stage 1	8/4/2020	8/4/2025
Pig Hands-On Laboratory	Animal Handling	In Person	Basic Course	Stage 1	7/13/1995	

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Animal Details

1. * How are animals acquired?
   Purchased
2. Describe the acquisition for:
   a. **Not purchasing through DCM or WaNPRC:**
      N/A
3. Identification of individual animals (other than cage cards):
   a. **Method(s) (e.g., ear punch/tag, tattoo, tagging/banding, radio collar, etc.) (Note: If method is implantation (e.g. PIT tag), create or select an Implant procedure to describe the details. If method is surgical (e.g., satellite tag), create or select Survival Surgery procedure to describe the details):**
      N/A
   b. **Will external identification be replaced if it falls off/out? If yes, describe the plan for replacement:**
      N/A
   c. **Will external identification be removed as part of the protocol (e.g., radio collars on field animals)? If yes, describe the plan for removal:**
      N/A
4. Identify strain/stock for rodents and genetically modified animals:

Species	Is USDA Species	Strain	Genetically Modified Strain	Phenotype Description
There are no items to display				

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Animal Number Adjustments

"Animals Identified in Experiments" is the total number of animals per pain category listed in all experiments on this protocol. If more or fewer animals will be used on the protocol (see Help Text for examples), click Update to enter this new number in the corresponding "Adjusted Animal Count" column. **Only input numeric values in this field; 0 is acceptable.**
If no adjustment is required, the values in the "Animals Identified in Experiments" and "Adjusted Animal Count" columns must match. Click Update in each Pain Category row to input the matching value.
For questions about adjusting animal numbers, contact OAW.

1. * Click Update to adjust the number of animals to be used or produced for this protocol:

	Species	USDA Covered Species	Pain Category	Animals Identified in Experiments	Adjusted Animal Count
View	Pigs - Farm Pig	yes	Pain Category B	0	0
View	Pigs - Farm Pig	yes	Pain Category C	0	0
View	Pigs - Farm Pig	yes	Pain Category D	5	5
View	Pigs - Farm Pig	yes	Pain Category E	0	0

2. If you adjusted the number of animals for this protocol, explain why:

N/A

3. If you will be using animals to train personnel or to practice procedures included in this protocol, describe below:

N/A

4. Supporting documents:

Document Name	Date Modified
There are no items to display	

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Alternatives and Duplication Searches

Display Procedures that cause pain or distress:

- Non-Survival Surgery: Hannaford: Grasper Surgery, ver. 1 (Team)

1. Record all searches for any previous research that this protocol might duplicate:

	Search Date	Searched Databases	Other
View	8/3/2020	Other PubMed/Medline	Google Scholar

2. Briefly describe the results of your searches and why you can or cannot incorporate the findings. Or, if a literature search was not performed, describe the methods used to determine that alternatives are not available or feasible:

No studies have combined the sensing modalities into an endoscopic instrument as we propose. Very few studies report any in-vivo experiments, describing ex-vivo or simulation driven results instead. Prior in-vivo studies exclusively study one modality such as tactile sensing. No database of in vivo grasping measurements, such as we will acquire, exists.

3. Confirm that you have made every effort to ensure that this protocol is not unnecessary duplication of previous research: ☑

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Housing and Use

Housing and use outside of the vivarium is not allowed without strong scientific justification.

1. Identify each location where animals will be housed:

	Facility	Species	Justification for Housing Outside Vivarium
View	ARCF ABSL1	Pigs - Farm Pig	N/A

2. Identify each location where animals will be used:

	Facility Use	Species	Justification for Use Outside Vivarium
View	ARCF ABSL1 Non-survival surgery will be performed in a dedicated surgery room within the vivarium.	Pigs - Farm Pig	N/A

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Disposition

1. **Disposition plans for the animals when this research is complete:**
   (check all that apply)
   Euthanasia
2. **If other, provide an animal disposition description:**
   N/A
3. **If protocol involves fixing tissues, list agents (e.g., paraformaldehyde, formalin):**
   N/A

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Refinement, Replacement and Reduction

1. Describe below how the three R's (refinement, replacement and reduction) have been employed on this project. Include alternatives that were considered for the procedures above that cause pain or distress:

* Refinement (use of methods to decrease animals' sensitivity to pain)

Animals will be under general anesthesia at all times and will be euthanized at the end of the procedure. Due to our goal of application to human surgery, our intent is to mimic the conditions of a human patient undergoing surgery under successful anesthesia.

* Replacement (include in vitro tests, use of less sentient animals)

We will do extensive preparatory work on butcher shop materials prior to our first animal surgery but there is no alternative to in-vivo experiments to verify a smart surgical instrument having the goal of eliminating surgical complications for humans (or potentially for future animals undergoing veterinary surgery). Our medical focus is general abdominal surgery for which the pig is the established model, with internal organs having the closest match of size, shape, and physiology to humans.

* Reduction (use of fewer animals to attain statistical significance)

We will spend approximately one year prior to the animal work calibrating and perfecting our experimental procedures on butcher shop porcine materials in order to get maximum data out of our proposed animal subjects. The purpose of our work is to collected as much data as possible from each animal to make a robust dataset for advanced machine learning training. As this is not hypothesis testing research, a power analysis is not applicable.

2. Describe the rationale for using animals and the appropriateness of the species proposed:

There is no alternative to in-vivo experiments to verify a smart surgical instrument having the goal of eliminating surgical complications for humans (or potentially for future animals undergoing veterinary surgery). Our medical focus is general abdominal surgery for which the pig is the established model, with internal organs having the closest match of size, shape, and physiology to humans.

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Supporting Documents

1. **Attach supporting files:**

Document Name	Date Modified
There are no items to display	

Procedures Appendix:

View: Custom SF: Procedure Identification

Procedure Identification: Anesthetic Overdose, Pentobarbital or Pentobarbital Solution

1. *** Name of the procedure or surgery:**
   Anesthetic Overdose, Pentobarbital or Pentobarbital Solution
2. *** Select procedure type:**
   Euthanasia
3. *** Species:**
   Pigs - Farm Pig
4. *** Will administering this procedure cause any more than momentary pain or distress?** Yes **No**

If yes,

i. **Identify expected symptoms from administering this procedure:**
   N/A

ii. **Identify criteria under which animals will be removed from research:**
   N/A

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Euthanasia

1. *** Method of euthanasia:**
   Anesthetic Overdose
2. **Describe procedure:**
   Pigs will be injected IV with pentobarbital (Nembutal) or a pentobarbital solution at a dose of at least 87 mg/kg.

   Examples of pentobarbital solutions include Beuthanasia, Euthasol and similar solutions containing a mixture of pentobarbital and phenytoin. Dosing is based on the pentobarbital component of the solution.
3. *** Will anesthesia be used?** **Yes** No
4. **Describe how death will be confirmed:**
   Death will be confirmed by lack of respirations and heartbeat.
5. **Is this method approved by the AVMA Guidelines on Euthanasia (2013)?**
   Yes No

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Procedure Documents

1. **Supporting documents:**

Document Name	Date Modified
There are no items to display	

HoverBoard

Procedure Identification: Hannaford: Grasper Surgery

1. *** Name of the procedure or surgery:**
   Hannaford: Grasper Surgery
2. *** Select procedure type:**
   Non-Survival Surgery
3. *** Species:**
   Pigs - Farm Pig
4. *** Will administering this procedure cause any more than momentary pain or distress?** **Yes** No

If yes,

i. **Identify expected symptoms from administering this procedure:**
This procedure is expected to cause discomfort that should be relieved by anesthesia and/or analgesia. Please see procedure description and/or experimental description for monitoring plan, including specific behavioral and clinical signs to be monitored.

ii. **Identify criteria under which animals will be removed from research:**
This is a terminal surgery.

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Non-Survival Surgery

1. *** Describe how the animal, surgeon, and instruments will be prepared for surgery:**

   Animals:
   After induction of anesthesia, the animals will be intubated, ventilated, and maintained under anesthesia for the duration of this procedure. They will be secured to operative tables supine, and shaved and draped.

   Surgeons:
   Sterility is not required as this is a non-survival procedure. Team members performing or assisting surgery will wear gloves and gowns.

   Instruments:
   Instruments will be cleaned with alcohol wipes prior to use and after use.

2. *** Describe the surgical procedure:**

   Using standard surgical laparoscopic techniques, the abdomen will be insufflated with CO2 to a pressure of 11–12mmHg, as typical in porcine minimally invasive surgery (MIS) procedures. Three laparoscopic ports (10mm10mm in diameter) will be placed into the abdomen, which allowed access to all the organs to be tested as well as visualization of the tool tip by the endoscopic camera. In some experiments an open incision will substitute for the laparoscopic incisions and there will thus be no insuflation.

   Experiments will consist of grasping abdominal tissues (under conditions mimicking human tissue handling in surgery) and making simultaneous measurements of tissue properties with the novel smart surgical grasper device. In every experimental grasp of the data collection process, the grasper will sense and record all the sensing modalities simultaneously and jaw opening position. The sequence of experimental data collection measurement conditions will be designed according to 1) grasping state, 2) organs tested, 3) physiological state.

   • Grasping state: apply four levels of compression pressure, 0+, 10, 20, 100kPa (P = F/Aj , force/jaw area, Aj ≈ 50mm2). “0+” denotes a nominal contact pressure <= 5kPa sufficient to guarantee tissue contact of both jaws. Grasp force will be closed-loop controlled via the strain gauges and current control of the motor. Porcine systolic blood pressure is about 17kPa (125mmHg). Thus we have pressure targets on both sides of this occluding pressure. In addition, 100kPa can cause moderate level of tissue damage in liver, indicating a further changed physiological state.

   • Organs tested: liver, pancreas, areolar tissue interface between organs, small and large bowel, and mesentery.

   • Physiological states relevant to this in vivo animal work: 1) in-vivo normal blood flow, and 2) (for relevant organs) in-vivo watershed (reduced) blood flow. To reduce blood flow to the selected organs, a wide blunt grasping instrument like a bowel clamp will be

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applied to a margin or segment of the target tissue to determine how reduced blood flow is sensed by the instrument. The purpose of this is to demonstrate how reduced blood flow affects the sensor profile. This is important for detection of potentially ischemic tissues which might not heal and pose a risk to the patient if, in clinical applications, were left in situ or used as part of an anastomosis, for example an ischemic segment of bowel.

Total time from incision to euthanasia will be approximately 2 hrs or less.

3. * **Select associated substance administration procedures, including anesthesia and analgesia procedures to be used:**

Hannaford: Anesthesia, Administered by Vet Services Substance Administration 1 Team

4. **Describe how animals will be monitored during the procedure, including anesthetic monitoring:**

Vet tech on duty will continually monitor vital signs and potential behavioral signs of distress. Anesthesia and ventilation support will be adjusted as necessary to maintain a surgical plane of anesthesia.

5. **Describe how death will be confirmed:**

Death will be confirmed by lack of respirations and heartbeat.

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View: SF: Procedure Documents

Procedure Documents

1. **Supporting documents:**

Document Name	Date Modified
There are no items to display	

View: Custom SF: Procedure Identification

Procedure Identification: Hannaford: Anesthesia, Administered by Vet Services

1. *** Name of the procedure or surgery:**
   Hannaford: Anesthesia, Administered by Vet Services
2. *** Select procedure type:**
   Substance Administration
3. *** Species:**
   Pigs - Farm Pig
4. *** Will administering this procedure cause any more than momentary pain or distress?** Yes **No**

If yes,

i. **Identify expected symptoms from administering this procedure:**
   N/A

ii. **Identify criteria under which animals will be removed from research:**
   N/A

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Administration of Substances

1. * Substances:

	Substance	Substance Scope	Route	Dose	Concentration	Volume	Substance Order for the Procedure
View	Anesthesia/Analgesia of the Pig	Standard	Other	See attached	N/A	N/A	N/A

2. * Describe step-by-step the procedure for administering the substance(s):

Please see attached SOP for comprehensive list of agents that may be used for general anesthesia. Sedation/anesthesia will always be performed by Vet Services.

3. Describe the intended effects of administering the substance(s):

General anesthesia

Analgesia

4. Describe any potential adverse reactions to administering the substance(s):

See attached

5. If working with hazardous agents, protocol personnel will read and follow the Occupational Health Recommendations (OHRs) and Biological Use Authorization letter (BUA), if applicable. The OHRs and the BUA can be found on the protocol workspace.

6. * Does this procedure include the use of a paralytic agent?

Yes **No**

NOTE: Working with biohazardous agents requires a separate approval from the Institutional Biosafety Committee (IBC). Submit the Biological Use Authorization **(BUA) paperwork to initiate this process. If you have questions, contact EH&S Research and Occupational Safety at 206-221-7770 or** ehsbio@uw.edu**.**

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Procedure Documents

1. Supporting documents:

Document Name	Date Modified
Attachment A-MANUAL OF STANDARD OPERATING PROCEDURES.NR edit 12.14.18 (4).docx	8/4/2020 10:24 AM

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View: Custom: Create Substance

1. *** Substance:**
   Anesthesia/Analgesia of the Pig
2. **Route:**
   Other

   If you indicated Other, specify the route:
   See attached
3. **Dose:**
   See attached
4. **Frequency and duration of dosages:**
   See attached
5. **Volume (for rodents or intracranial injections):**
   N/A
6. **Concentration:**
   N/A
7. **Confirm the agents used will be pharmaceutical grade. If you must use non-pharmaceutical grade agents, provide scientific justification for their use and describe how the agent will be prepped and sterilized prior to use:**
   Pharmaceutical grade agents are used
8. **Complication remediation:**
   This procedure is only performed by trained and certified veterinary staff.
9. **Substance order for the procedure:**
   N/A

HoverBoard

View: Custom SF: Procedure Identification

Procedure Identification: Hannaford: Laparoscopic camera

1. *** Name of the procedure or surgery:**
   Hannaford: Laparoscopic camera
2. *** Select procedure type:**
   Imaging
3. *** Species:**
   Pigs - Farm Pig

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4. * Will administering this procedure cause any more than momentary pain or distress? Yes **No**

If yes,

i. **Identify expected symptoms from administering this procedure:**
N/A

ii. **Identify criteria under which animals will be removed from research:**
N/A

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Imaging

1. **Imaging types:**
   Endoscopy
2. **If Other, specify:**
3. **Select the anesthesia and analgesia procedures to be used:**

   Hannaford: Anesthesia, Administered by Vet Services Substance Administration 1 Team
4. **Frequency, including minimum time between imaging sessions and the maximum number of sessions (enter specific, detailed procedure timing in the Experiment):**
   Once during non-survival surgery
5. **Duration of imaging session:**
   Up to 2 hours
6. **Purpose:**
   To obtain surgical images and videos.
7. **Will supportive care of animals be necessary during the imaging session?**
   Yes No
8. **If yes, describe:**
   Anesthesia and supportive care will be provided by veterinary services.

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Procedure Documents

1. **Supporting documents:**

Document Name	Date Modified
There are no items to display	

Substances Appendix:

Substance Information: Anesthesia/Analgesia of the Pig

1. *** Name:**
   Anesthesia/Analgesia of the Pig
2. *** Substance types:** (select all that apply)
   Analgesic
   Anesthetic
3. *** Is this a hazardous agent:** Yes **No**

   NOTE: Working with biohazardous agents requires a separate approval from the Institutional Biosafety Committee (IBC). Submit the Biological Use Authorization **(BUA) paperwork to initiate this process. If you have questions, contact EH&S Research and Occupational Safety at 206-221-7770 or** ehsbio@uw.edu**.**
4. **Supporting documents:**

Document Name	Date Modified
There are no items to display	

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1. *** Select the funding organization:**
   National Science Foundation (NSF)

   If Other was selected in question 1, provide Funding Organization:

2. *** All animal use projects must be reviewed for scientific merit prior to initiating animal use. Choose the required reviews for this project:**
   Has already been conducted and approved by a funding agency

3. **Provide name of the committee or the department reviewer** (Required if "Has been conducted by my department or school and has been found to be scientifically meritorious" was selected):

4. **eGC1 Number(s):**(assigned internally)
   A157661

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Experiments Appendix:

Smart Grasper Tissue Measurements

1. *** Experiment name:**
   Smart Grasper Tissue Measurements
2. *** Species:**
   Pigs - Farm Pig
3. **If other was selected, provide a species:**
4. **What is the scientific goal of this experiment:**
   This experiment will obtain the first ever simultaneous in-vivo measurements of pulse oximetry (blood oxygen saturation, SO2), temperature, electrical impedance (1-100kHz), pressure, and acoustic properties at multiple sites in multiple functioning organs. It will develop, test, and demonstrate a novel, highly integrated, multimodal sensing surgical grasper suitable for endoscopic use. The instrument will generate a continuous stream of a new type of sensed data specific to surgical work with tissues. This work will generate the first such database of in-vitro and in-vivo data along with ground truth from surgical videos, imaging studies, expert evaluations, and post-operative pathological analysis of tissues. The new data set will be shared openly online via an achieved open repository. The new classification and clustering machine learning systems will correlate measured tissue properties with organ anatomy and physiology, especially at interfaces between tissues, aiding in surgical planning and execution, and potentially supporting new modes of clinical care.
5. *** Describe the animal experience in the experiment, from enrollment in the study to the final endpoint, including all procedures in chronological order and the minimum time between procedures. We encourage using bullet points, timeline, table, or a flow chart as appropriate:**

   After anesthetic induction (see Anesthesia procedure), the animals will be intubated, ventilated, and maintained under anesthesia. They will be secured to operative tables supine, and shaved and draped. Using standard surgical laparoscopic techniques, the abdomen will be insufflated with CO2 to a pressure of 11–12mmHg, as typical in porcine minimally invasive surgery (MIS) procedures. Three laparoscopic ports (10mm diameter) will be placed into the abdomen, which allowed access to all the organs to be tested as well as visualization of the tool tip by the endoscopic camera. In some experiments an open incision will substitute for the laparoscopic incisions (without insuflation). See Non-Survival Surgery procedure for details.

   Animals will be euthanized without recovering from anesthesia. Total time from incision to euthanasia will be approximately 2 hrs or less.

Animal Sex:
Female
Male

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Animal Ages:
2 to 4 months

Animal Size:
20 to 50kg

6. **Select experimental procedures:**

Name	Type	Version	Scope
Anesthetic Overdose, Pentobarbital or Pentobarbital Solution	Euthanasia	1	Standard
Hannaford: Laparoscopic camera	Imaging	1	Team
Hannaford: Grasper Surgery	Non-Survival Surgery	1	Team
Hannaford: Anesthesia, Administered by Vet Services	Substance Administration	1	Team

7. **Monitoring protocol, including frequency and specific behavioral and clinical signs to be monitored. Include humane endpoints (criteria for euthanasia):**
Animal will be continuously monitored during entire experiment by vet services personnel for vital signs or signs of distress. Anesthesia and ventilation support will be adjusted as necessary. All animals will be euthanized immediately upon conclusion of the experiment.

8. **If there is expected mortality (spontaneous death) in this experiment:**

   a. Procedure/condition associated with mortality:
   We do not expect spontaneous mortality. It has not occurred in our previous similar studies.

   b. Estimated mortality rate, i.e. percentage of animals expected to die spontaneously (not via euthanasia) or need to be euthanized as a result of the procedure. (Be sure to account for this in your animal number calculations):
   0%

   c. Explain why euthanasia is not possible or appropriate:
   N/A

9. **Will some animals live out their natural lifespan as part of this experiment? If so, indicate their use and describe the monitoring plan for aged animals (e.g., rodents >18 months of age), including frequency, behavioral and clinical signs to be monitored and criteria for euthanasia.**
N/A

10. *** Total number of animals used in this experiment:**(including all the animals to be produced)
5

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a. Justify total number of animals used in this experiment:

The purpose of the experiments is to collect as much data as possible for training of machine learning algorithms. Since it is not a hypothesis driven study there is no meaningful power analysis, but 5 animals is a reasonable compromise (as used in prior studies) to develop the key preliminary data for instrument refinement and validation. Preliminary testing in the first 2 animals will help determine more accurate measurement rates for the ultrasound and electrical impedance modalities to build an accurate dataset from collected samples. Further studies, beyond the scope of this study, will be needed to explore variation in measured values between individual pigs.

11. Number of animals by pain and distress category:(include each animal only once in the highest pain category)

B: 0
C: 0
D: 5
E: 0

a. Justify the need for any animals in pain category E:

N/A

12. * Identify husbandry exceptions:

	Exception Type	Description and Justification
View	Pigs - No husbandry or enrichment exceptions.	N/A

13. Supporting documents:

Document Name	Date Modified
There are no items to display	

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1. *** Exception type:**

   Pigs - No husbandry or enrichment exceptions.

2. **Description and justification:**

   N/A

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1. * Identify the location where animals will be used:

ARCF ABSL1

a. For locations that are lab managed, provide justification for housing outside of the vivarium:

N/A

2. * What species will be housed in this location?

Common Name	Scientific Name
Pigs - Farm Pig	Sus scrofa

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1. Campus:

Vivarium

2. Vivarium:

ARCF (Animal Research & Care Facility)

3. * BSL Level:

ARCF ABSL1

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1. *** Identify the location where animals will be used:**

   ARCF ABSL1

   a. **For locations that are outside of the vivarium, provide justification for the use of this space:**

      N/A

2. *** What species will be used in this location?**

Common Name	Scientific Name
Pigs - Farm Pig	Sus scrofa

3. **Describe how this location will be used:**

   Non-survival surgery will be performed in a dedicated surgery room within the vivarium.

4. *** If animals are left unattended in this location, provide an explanation and include maximum duration:**

   N/A

5. **Describe how animals will be transported to and from this location, including container and route. (Note: use of private vehicles requires IACUC approval):**

   N/A (within same vivarium)

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1. Campus:

Vivarium

2. Vivarium:

ARCF (Animal Research & Care Facility)

3. * BSL Level:

ARCF ABSL1

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From: Thea L Brabb <thea@uw.edu>
To: Geena Gallardo <gallardg@uw.edu>, "Nicholas L. Reyes" <nlreyes@uw.edu>
CC: "Gary A. Fye" <gfye@uw.edu>
Sent: 5/28/2020 12:31:45 PM
Subject: RE: Estimate for Grant proposal with live animal (porcine) non survival surgery

---

Attach: [EMB4_image001.gif] [EMB4_image002.jpg]

Geena,

Don't know why Tony will not send this stuff to me directly – I'll look quickly. But we can help. Next time don't spend a bunch of time on this.

Nick, what do you want to do about a picture. Don't think we have anything that is canned….

Thea

From: Geena Gallardo <gallardg@uw.edu>
Sent: Thursday, May 28, 2020 12:18 PM
To: Thea L Brabb <thea@uw.edu>; Nicholas L. Reyes <nlreyes@uw.edu>
Subject: FW: Estimate for Grant proposal with live animal (porcine) non survival surgery

Hi Thea and Nick,

Trying to figure out where to find details about the surgery suite. I unfortunately looked through everything I had regarding vivarium details and I didn't find anything with specific details about the surgery suite. Any help would be appreciated. ☺

Best wishes,

Geena
Assistant to the Chair, Dr. Thea Brabb
Department of Comparative Medicine

Health Sciences Bldg Box 357340
Seattle, WA 98195-7340
206-221-3396
gallardg@uw.edu

UNIVERSITY of WASHINGTON

From: Tony Nguyen [mailto:tonytn@uw.edu]
Sent: Thursday, May 28, 2020 11:21 AM
To: Mika N Sinanan <mssurg@uw.edu>; Gary A. Fye <gfye@uw.edu>
Cc: Gary A. Fye <gfye@uw.edu>; Blake Hannaford <blake@uw.edu>; Geena Gallardo <gallardg@uw.edu>
Subject: RE: Estimate for Grant proposal with live animal (porcine) non survival surgery

Hello all,

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DCM has standard language describing their vivaria. I've CC'd Geena as she should have the information. Geena, do you have details about the surgery suite? If no, our AAALAC Program Description has some information. OAW does not have pictures, but DCM might or could take some pictures.

Thanks,
Tony

TONY NGUYEN
Program Operations Specialist
Office of Animal Welfare

Health Sciences Building Box 357160
1705 NE Pacific Street / Seattle, WA 98195-7160
206.685.9719 / fax 206.616.1297
tonytn@uw.edu / oaw.washington.edu

W UNIVERSITY of WASHINGTON

D2C Compassion Fatigue

Dare 2 Care... | explore UW's Compassion Fatigue Program

From: Mika N Sinanan [mailto:mssurg@uw.edu]
Sent: Thursday, May 28, 2020 10:21 AM
To: Gary A. Fye <gfye@uw.edu>; Tony Nguyen <tonytn@uw.edu>
Cc: Gary A. Fye <gfye@uw.edu>; Blake Hannaford <blake@uw.edu>
Subject: Re: Estimate for Grant proposal with live animal (porcine) non survival surgery

Thanks!

Mika N. Sinanan, MD, PhD, FACS
Medical Director for Contracting and Value-Based Specialty Care
Professor of Surgery, University of Washington
206-991-3168 Pager
mssurg@uw.edu

From: Gary Fye <gfye@u.washington.edu>
Date: Thursday, May 28, 2020 at 10:15 AM
To: Mika N Sinanan <mssurg@uw.edu>, Tony Nguyen <tonytn@uw.edu>
Cc: "Gary A. Fye" <gfye@uw.edu>, Blake Hannaford <blake@uw.edu>
Subject: Re: Estimate for Grant proposal with live animal (porcine) non survival surgery

Mika...looping in Tony form IACUC.

Tony, please see Mika's question below as I think you may have a description. Do you have a picture?

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> Medical Director for Contracting and Value-Based Specialty Care
> Professor of Surgery, University of Washington
> 206-991-3168 Pager
> mssurg@uw.edu

From: Gary Fye <gfye@u.washington.edu>
Date: Thursday, May 28, 2020 at 9:18 AM
To: Mika N Sinanan <mssurg@uw.edu>
Cc: "Nicholas L. Reyes" <nlreyes@uw.edu>, DCM Animal Purchasing <animals@uw.edu>
Subject: Re: Estimate for Grant proposal with live animal (porcine) non survival surgery

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mssurg@uw.edu

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Date: Wednesday, May 27, 2020 at 1:47 PM
To: Mika N Sinanan <mssurg@uw.edu>
Cc: Blake Hannaford <blake@uw.edu>, Kris Blow <kasb13@uw.edu>, "Nicholas L. Reyes" <nlreyes@uw.edu>, "Lesley Colby DVM, MS, DACLM" <lacolby@uw.edu>
Subject: Re: Grant proposal with live animal (porcine) non survival surgery

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Program Operations Specialist
Veterinary Services

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> Lesley
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> **********
> Lesley A. Colby DVM, MS, DACLAM
> Senior Director of Animal Resources and Operations
> Director, UW BSL3/ABSL3 Facility
> Associate Professor
> Department of Comparative Medicine
> University of Washington

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1705 NE Pacific Street, Box 357340
Seattle, WA 98195-7190
206.685.1020
206.685.3006 (fax)
lacolby@uw.edu
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From: Mika N Sinanan <mssurg@uw.edu>
Date: Wednesday, May 27, 2020 at 10:44 AM
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Cc: Blake Hannaford <blake@uw.edu>
Subject: Grant proposal with live animal (porcine) non survival surgery

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206-543-5511 Dept. Surgery Academic Office
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From: Geena Gallardo <gallardg@uw.edu>
To: "Nicholas L. Reyes" <nlreyes@uw.edu>
Sent: 5/28/2020 12:30:04 PM
Subject: RE: Estimate for Grant proposal with live animal (porcine) non survival surgery

---

Attach: [EMB4_image001.gif] [EMB4_image002.jpg]
Nick, thank you!! You are a savior!

Geena
Assistant to the Chair, Dr. Thea Brabb
Department of Comparative Medicine

Health Sciences Bldg Box 357340
Seattle, WA 98195-7340
206-221-3396
gallardg@uw.edu

UNIVERSITY of WASHINGTON

From: Nicholas L. Reyes [mailto:nlreyes@uw.edu]
Sent: Thursday, May 28, 2020 12:28 PM
To: Geena Gallardo <gallardg@uw.edu>; Thea L Brabb <thea@uw.edu>
Subject: Re: Estimate for Grant proposal with live animal (porcine) non survival surgery

Hey Geena,
Attached is our grant descriptions of Vet Services. There is a small description of the VS ARCF sx suited included. Otherwise there are more detailed descriptions in the AAALAC description.
Nick

Nicholas Reyes DVM, MS, DACLAM
Sr. Staff Veterinarian
Co-Director of Animal Facility Operations
Dept. of Comparative Medicine
University of Washington, Seattle
nlreyes@uw.edu
206-543-0267

From: Geena Gallardo <gallardg@uw.edu>
Sent: Thursday, May 28, 2020 12:17 PM
To: Thea L Brabb <thea@uw.edu>; Nicholas L. Reyes <nlreyes@uw.edu>
Subject: FW: Estimate for Grant proposal with live animal (porcine) non survival surgery

Hi Thea and Nick,

Trying to figure out where to find details about the surgery suite. I unfortunately looked through everything I had regarding vivarium details and I didn't find anything with specific details about the surgery suite. Any help would be appreciated. ☺

Best wishes,

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Geena
Assistant to the Chair, Dr. Thea Brabb
Department of Comparative Medicine

Health Sciences Bldg Box 357340
Seattle, WA 98195-7340
206-221-3396
gallardg@uw.edu

UNIVERSITY of WASHINGTON

From: Tony Nguyen [mailto:tonytn@uw.edu]
Sent: Thursday, May 28, 2020 11:21 AM
To: Mika N Sinanan <mssurg@uw.edu>; Gary A. Fye <gfye@uw.edu>
Cc: Gary A. Fye <gfye@uw.edu>; Blake Hannaford <blake@uw.edu>; Geena Gallardo <gallardg@uw.edu>
Subject: RE: Estimate for Grant proposal with live animal (porcine) non survival surgery

Hello all,

DCM has standard language describing their vivaria. I've CC'd Geena as she should have the information. Geena, do you have details about the surgery suite? If no, our AAALAC Program Description has some information. OAW does not have pictures, but DCM might or could take some pictures.

Thanks,
Tony

TONY NGUYEN
Program Operations Specialist
Office of Animal Welfare

Health Sciences Building Box 357160
1705 NE Pacific Street / Seattle, WA 98195-7160
206.685.9719 / fax 206.616.1297
tonytn@uw.edu / oaw.washington.edu

UNIVERSITY of WASHINGTON

Dare 2 Care... | explore UW's Compassion Fatigue Program

From: Mika N Sinanan [mailto:mssurg@uw.edu]
Sent: Thursday, May 28, 2020 10:21 AM
To: Gary A. Fye <gfye@uw.edu>; Tony Nguyen <tonytn@uw.edu>
Cc: Gary A. Fye <gfye@uw.edu>; Blake Hannaford <blake@uw.edu>
Subject: Re: Estimate for Grant proposal with live animal (porcine) non survival surgery

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Thanks!

Mika N. Sinanan, MD, PhD, FACS
Medical Director for Contracting and Value-Based Specialty Care
Professor of Surgery, University of Washington
206-991-3168 Pager
mssurg@uw.edu

From: Gary Fye <gfye@u.washington.edu>
Date: Thursday, May 28, 2020 at 10:15 AM
To: Mika N Sinanan <mssurg@uw.edu>, Tony Nguyen <tonytn@uw.edu>
Cc: "Gary A. Fye" <gfye@uw.edu>, Blake Hannaford <blake@uw.edu>
Subject: Re: Estimate for Grant proposal with live animal (porcine) non survival surgery

Mika...looping in Tony form IACUC.

Tony, please see Mika's question below as I think you may have a description. Do you have a picture?

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If you have any other questions please let me know.

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Sent: 5/27/2020 1:46:24 PM
Subject: Re: Grant proposal with live animal (porcine) non survival surgery

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Sent: 5/27/2020 1:08:56 PM
Subject: RE: Grant proposal with live animal (porcine) non survival surgery

---

Attach: [Progressive 2020.pdf] [SS Domestic Prices 2020.pdf] [SS Yucatan Prices 2020.pdf]

Good afternoon Dr. Sinanan,

If live pigs are required, the price will vary by weight and vendor.
I have attached the current price lists for our two approved vendors.
Progressive farm provides farm pigs. S&S Farms provides either Yucatans or farm pigs.

If you have any further questions regarding pricing, please let me know.

Thank you,

Kris Blow
University of Washington
Department of Comparative Medicine
Animal Purchasing Principle Buyer
animals@uw.edu
206-543-0640
** per UW and the School of Medicine advisement, I am currently working from home. Please email or call for any questions regarding orders or purchasing

---

From: Lesley A. Colby <lacolby@uw.edu>
Sent: Wednesday, May 27, 2020 11:50 AM
To: Mika N Sinanan <mssurg@uw.edu>
Cc: Blake Hannaford <blake@uw.edu>; Kris Blow <kasb13@uw.edu>; Nicholas L. Reyes <nlreyes@uw.edu>; Gary A. Fye <gfye@uw.edu>
Subject: Re: Grant proposal with live animal (porcine) non survival surgery

Good afternoon Dr. Sinanan,

I've added a few people to this email who should be able to provide the information you seek.

Kris Blow is central to our animal ordering group and can help address the issue of acquisition costs.

Dr. Nick Reyes and Gary Fye help to coordinate the department's anesthesia and surgical services and can work with you to estimate those costs.

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Uploaded to Animal Research Laboratory Overview (ARLO) on 05/14/2021

I hope this is helpful. Best of luck with your grant. Please don't hesitate to reach out again if I can be of further help.

With regards,
Lesley

****

Lesley A. Colby DVM, MS, DACLAM
Senior Director of Animal Resources and Operations
Director, UW BSL3/ABSL3 Facility
Associate Professor
Department of Comparative Medicine
University of Washington
1705 NE Pacific Street, Box 357340
Seattle, WA 98195-7190
206.685.1020
206.685.3006 (fax)
lacolby@uw.edu
****

From: Mika N Sinanan <mssurg@uw.edu>
Date: Wednesday, May 27, 2020 at 10:44 AM
To: "Lesley A. Colby" <lacolby@uw.edu>
Cc: Blake Hannaford <blake@uw.edu>
Subject: Grant proposal with live animal (porcine) non survival surgery

Dear Dr. Colby,

I helped build the CVES surgical lab on the 6th floor vivarium in the Health Sciences Center, 20 years ago now. Currently, I'm helping with a grant proposal regarding a multispectral sensing laparoscopic grasper, an extension of prior work that Blake Hannaford and the Biorobotics Lab in Electrical Engineering have been doing for the same period of time.

We are proposing testing living tissue (pigs under anesthesia) with the grasper, hopefully taking advantage of other nonsurvival surgery but if not, purchasing pigs and setting up the procedures for testing through a IACUC protocol (to be submitted). Previously, we could follow live animal laparoscopic surgical training but that training seems to have been supplanted by Sim Center (WISH) training with synthetic organs and torsos – which will not work for the study.

My question to you is what rates we should quote for acquisition of pigs (f needed), and the hourly rate for the CVES surgical lab with technician and a pig under anesthesia.

If easier to speak by phone, my cell is 206-251-1099. If I should be speaking with someone else, please let me know. Thanks!

Mika N. Sinanan, MD, PhD, FACS
Medical Director for Contracting and Value-Based Specialty Care

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Professor of Surgery, University of Washington
206-543-5511 Dept. Surgery Academic Office
206-543-8136 Fax
206-991-3168 Pager
mssurg@uw.edu

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see http://www.uwmedicine.org/Global/Compliance/EmailRisk.htm.

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January 1, 2014 05JAN2020-No changes to price list, per Claudia Ridlon phone call

PRICE LIST FOR PROGRESSIVE SWINE FARMS

Prices may vary depending on availability & transportation

Two weeks notice is normally required for pig orders. Orders placed with short notice or deliveries other than regular scheduled Mondays may be subject to an additional charge.

When one pig only is being delivered there will be an additional fee. Effective JAN2017-Fee=$200

Delivery Fees are based on delivery to the G-Wing loading dock at UW.

Cancellations will be dealt with on an individual basis and may be subject to a cancellation fee.

Pigs

0 to 60 lbs	$205.00
60 to 80 lbs	$215.00
80 to 120 lbs	$230.00
120 to 150 lbs	$250.00

Delivery Fees

Under 60 lbs	$55.00 per animal
60 to 80 lbs	$65.00 per animal
80 to 100 lbs	$75.00 per animal
Over 100 lbs	$85.00 per animal

Additional Freight Charge per animal $35.00

Claudia Ridlon
Progressive Swine Farms
mcridlon@aol.com 425-481-0938

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S&S FARMS

Swine for Biomedical Research

PIG SIZE	TYPE	AGE	WEIGHT RANGE APPROXIMATE*	EITHER GENDER COST EACH	FEMALE GENDER COST EACH
Farm	Yorkshire	0 - 2 wks.	2.0 - 3.0 kg.	$ 270.00	$ 300.00
Pigs	Hybrids	2 - 3	3.0 - 5.0 kg.	$ 270.00	$ 300.00
		3 - 5	5.0 - 12.0 kg.	$ 270.00	$ 300.00
		5 - 7	13.0 - 19.0 kg.	$ 280.00	$ 310.00
		7 - 9	20.0 - 26.0 kg.	$ 300.00	$ 330.00
		9 - 11	27.0 - 34.0 kg.	$ 320.00	$ 350.00
		11 - 13	35.0 - 44.0 kg.	$ 340.00	$ 370.00
		13 - 15	45.0 - 54.0 kg.	$ 360.00	$ 390.00
		15 - 17	55.0 - 64.0 kg.	$ 380.00	$ 410.00
		17 - 19	65.0 - 80.0 kg	$ 400.00	$ 430.00
		>19	>80.0 kg	$5.00/kg	$5.35/kg

*Prices effective January 1, 2020

**Weights stated are guidelines to help judge animal size at a specific age

Email us for a quote on any animal shipped to your area

Email: snsfarms@sbcglobal.net Phone: (760) 788-7007 Fax: (760) 788-7042

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S&S FARMS

Swine for Biomedical Research

PIG SIZE	TYPE	AGE	WEIGHT RANGE APPROXIMATE*	EITHER GENDER COST EACH**
Mini Pig	Yucatan	1 month	3.0 - 6.0 kg.	$ 535
		2	7.0 - 9.0 kg.	$ 580
		3	10.0 - 14.0 kg.	$ 635
		4	15.0 - 19.0 kg.	$ 685
		5	20.0 - 24.0 kg.	$ 745
		6	25.0 - 29.0 kg.	$ 810
		7	30.0 - 34.0 kg.	$ 870
		8	35.0 - 39.0 kg.	$ 925
		9	40.0 - 44.0 kg.	$ 985
		10	45.0 - 49.0 kg.	$ 1,045
		11	50.0 - 54.0 kg.	$ 1,110
		12	55.0 - 59.0 kg.	$ 1,175
		13	60.0 - 64.0 kg.	$ 1,245
		14		$ 1,315
		15		$ 1,385
		16		$ 1,455
		17		$ 1,525
		18		$ 1,595
		Over 18 mos.	(add $70 per month)	
			Retired Breeders	$ 1,450
Micro Mini Pig	Yucatan	1 month	3.0 - 5.0 kg.	$ 550
		2	6.0 - 8.0 kg.	$ 590
		3	9.0 - 11.0 kg.	$ 650
		4	12.0 - 13.0 kg.	$ 730
		5	14.0 - 15.0 kg.	$ 800
		6	16.0 - 19.0 kg.	$ 875
		7	20.0 - 24.0 kg.	$ 960
		8	25.0 - 29.0 kg.	$ 1,035
		Over 8 mos.	(add $75 per month)	

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To: Mika N Sinanan <mssurg@uw.edu>
CC: Blake Hannaford <blake@uw.edu>, Kris Blow <kasb13@uw.edu>, "Nicholas L. Reyes" <nlreyes@uw.edu>, "Gary A. Fye" <gfye@uw.edu>
Sent: 5/27/2020 11:50:21 AM
Subject: Re: Grant proposal with live animal (porcine) non survival surgery

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Senior Director of Animal Resources and Operations
Director, UW BSL3/ABSL3 Facility
Associate Professor
Department of Comparative Medicine
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Date: Wednesday, May 27, 2020 at 10:44 AM
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From: Nicholas L. Reyes <nlreyes@uw.edu>
Sent: Wednesday, August 12, 2020 7:56 AM
To: Kim Stocking
Subject: Re: New pig protocol with non-survival surgery

Morning Kim,
As long as its clear that VS will always be running anesthesia for these procedures I think this is appropriate. I actually really like the flexibility here as these terminal training labs allow us to try new things anesthesia wise. Thanks for checking!
Nick

Nicholas Reyes DVM, MS, DACLAM
Sr. Staff Veterinarian
Co-Director of Animal Facility Operations
Dept. of Comparative Medicine
University of Washington, Seattle
nlreyes@uw.edu
206-543-0267

From: Kim Stocking <kstock@uw.edu>
Sent: Tuesday, August 11, 2020 4:08 PM
To: Nicholas L. Reyes <nlreyes@uw.edu>
Subject: New pig protocol with non-survival surgery

Hi Nick-
There is a new pig protocol (Hannaford 4505-01: Smart Grasper) that involves non-survival surgery with Vet Services to do the anesthesia during the procedure. https://hoverboard.washington.edu/Hoverboard/sd/Rooms/DisplayPages/LayoutInitial?Container=com.webridge.entity.Entity[OID[480540964B228C458CE9EF9C9BD3EEB2]] . The anesthesia procedure includes the attachment MANUAL OF STANDARD OPERATING PROCEDURES.NR edit 12.14.18 and includes a variety of agents that could be used for anesthesia/analgesia. Is this the right document to include here?

Thanks,
Kim

Kim Stocking, DVM, DACLAM

Attending Veterinarian
Director, Office of Animal Welfare

Health Sciences Building Box 357160
1705 NE Pacific Street Seattle, WA 98195-7160
206.543.2211 fax 206.616.1297
kstock@uw.edu/ oaw.washington.edu

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