# OFFICE OF RESEARCH AND GRADUATE STUDIES

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I am pleased to present the 2020 Annual Research report of the Virginia-Maryland College of Veterinary Medicine (VMCVM). This report underscores and recognizes the outstanding achievements of our faculty, graduate students, and research staff. The research conducted in the college encompasses from basic biomedical sciences to translational medicine to public health, with an overall goal of improving animal and human health. The college’s research program focuses on the following five major research areas of emphasis (not in the order of priority).

These include:

- Pathogenic Microbiology (Infectious Diseases).
- Immune-mediated/Inflammatory Diseases.
- Population Health Sciences.
- Neuropathobiology.
- Comparative, Translational, & Veterinary Research

To support research programs, we have unique, specialized support facilities. These include the BSL-3 Infectious Diseases unit (IDU), gnotobiotic pig and mouse facility, Good Laboratory Practice Lab, and several service centers (Flow cytometry, Analytical Chemistry Research laboratory, Study Design and Statistics, Electron Microscopy, and Sterilization and Laboratory Support Services).

Increased Research Productivity Metrics

I take this opportunity to sincerely thank our research personnel (faculty, staff, and graduate students) who persevered and adapted to the challenges of working in a pandemic environment. This past year’s noteworthy research achievement is that our extramural research awards increased by 41% and research expenditures increased 29%. These increases in research metrics are notable despite the challenges associated with the pandemic. It is very gratifying to note the increase in our research productivity trajectory over the last several years, as measured by extramural funding, publications, and presentations, and invited participation at the State and national levels. With the recruitment of new research-oriented faculty, we are optimistic that this positive trend will continue. It is now evident that the ongoing pandemic and potentially new emerging infectious and non-infectious diseases will require multiple strategies and varied expertise to counter these threats. To effectively tackle these disorders, a One Health Medicine approach is required to understand better the intersection of human, animal, and environmental health. The ongoing pandemic has made it vividly clear that to tackle infectious diseases, a multi-prong strategy is essential that will bring together diverse expertise in microbiology, immunology, public health, animal modeling, and epidemiology/predictive modeling, among others. Building interdisciplinary teams with relevant expertise from faculty across other colleges is pivotal for tackling infectious diseases, including emerging infectious diseases. To this end, our faculty are active participants of several university-wide related initiatives. These include the newly created Center for Zoonotic and Arthropod-borne Pathogens (CeZAP led by Dr. XJ Meng as a founding Director), Global Change Center, and Rural Health Initiative. To enhance collaborations and research programs, our faculty are strategically located in diverse research buildings outside the central vet school that include: Fralin Life Sciences Institute buildings at the Integrated Life Sciences Building (ILSB— the home of virologists), Life Sciences 1 (neuropathobiologists), Steger Hall (neuro-epigenetics and infectious disease modeling); and Fralin Biomedical Research Institute at VTC (neurobiologists); and Corporate Research Center (Vet bioinformatics). Our strengths continue to focus on a better understanding of diseases by using relevant animal models, providing early and accurate cutting-edge diagnosis, developing new and improved vaccines, and instituting preventive public health strategies.

in Public Health (MPH). Within the BMVS program, we have MS (regular and combined with residency) and Ph.D. in BMVS. Our program is flexible, serving all four departments. We have 26 students working on a traditional Ph.D. in biomedical sciences, 6 in our combined DVM/Ph.D. dual program, 8 Masters students, 25 Masters/Residency students, and 4 in our Residency/Ph.D. combined program. We have graduated 8 MS and 5 Ph.D. students during 2020. We recently received a highly competitive NIH T32 grant (PI- XJ Meng and Co-PI- Ahmed) to train veterinarians in Ph.D. to fill the critical need for DVM scientists in academia, industry, and government. It is satisfying to note that our graduate students have been productive in publications. All of our graduate students after graduation have found employment, many in top-tier institutions.

I recognize that not all research achievements can be highlighted in this newsletter. We will endeavor to include research updates in future communications.

A special thanks to Dr. Jessica Crawford and Mrs. Andrea Green for collecting data for Research and Graduate programs, respectively. I am immensely grateful to Dr. Jessica Crawford for her invaluable contributions for this report.
OVERVIEW OF FISCAL YEAR 2020

- Increased Extramural Grant Proposals Submitted: 223 proposals totaling $144.5 million submitted in FY20

- Increased Extramural Awards and Expenditures: Increase in awards ($12.3M, 41% increase) and research expenditures ($9.4M, 29% increase). Highest expenditures and award on record for a single fiscal year. About 29% of the new grant announcements in 2020 were from clinical faculty.

- VMCMV had a robust response to COVID-19. To date, faculty have been involved 73 proposal submissions and 9 awards related to COVID. Internal funds were also awarded to support research on the VT campus (page 14).

- New Research-focused Faculty: Critical new hires in our research-focused themes including bacteriology, parasitology, public health, and oncology. We also assisted in providing research support for new faculty hires that include equipment, graduate students, research space, and start up needs.

- New Research Faculty Orientation: We welcomed new faculty by presenting a new faculty orientation hosted by RGS and the Dean’s Office. A recording of the presentation can be found here.


- Investments in Infrastructure and Research Support: Improvements of lab space and/or equipment that includes cutting-edge laboratories at Center for One Health Research (COHR), and a shared lab for clinical faculty to conduct collaborative clinical research, equipment support for the newly created, Animal Cancer Care Research Center (ACCRC), and IDU (page 19).

- Research Proposal Administrative Support: RGS continues to offer assistance with external grant and contract from pre to post-award management. We also provide and manage several internal seed grant programs. Opportunities to participate in training grants and assist in participation in other large-grant proposal initiatives across campus.

- New Research Blog: A research-based blog was created for the college. We encourage researchers to share their news of awards, grants, and publication (page 17).
Research Program Overview: Research in my laboratory is centered on RNA viruses that cause acute infections. My group focuses primarily on encephalitic alphaviruses [Venezuelan equine encephalitis virus (VEEV), Eastern equine encephalitis virus (EEEV), and Western equine encephalitis virus (WEEV)] and Rift Valley fever virus (RVFV). Despite being recognized as emerging threats for human and animal health relatively little is known about the virulence mechanisms of these viruses and there are currently no FDA licensed vaccines or therapeutics available. In addition, diagnostic assays are limited for these agents. Specifically, my laboratory is focused on (1) identifying critical host factors that are necessary for viral replication and/or pathogenesis, (2) evaluating small molecule inhibitors that target essential host-based events for their therapeutic potential, and (3) developing novel diagnostic tests to enable the early detection of viral infections. We use cell culture and mouse models of infection in combination with proteomic and transcriptomic analysis tools to identify pathways critical for viral replication. These same systems are used to test potential therapeutics and vaccines.


Research Productivity: Recent Grants: (Only the PI grants are shown.)

Current

NIH/NIAID R01 Mechanistic Role of Probiotic Lactobacillus reuteri in Autoimmune Lupus
2/1/2018 – 1/31/2023

Pendency (under payment)

NIH/NIAID R21 Leaky Gut Drives Autoimmunity via Bacterial Flagellin-Mediated Activation of TR虽
7/1/2021 – 6/30/2023

Impact Score: 24

Recent publications:


Honors or recognitions:

2019 Outstanding Mentor Award
2020 Sigma Xi Full Membership
2021 Fullbright U.S. Scholar

Overview of mentor activities:

Trainees

2020 NIH F31 Ruth L. Kirschstein National Research Service Award Individual Predoctoral Fellowship (Trainee: Brianna Swartwout)
2021 American Association of Immunologists (AAI) Travel for Techniques Award (Trainee: Brianna Swartwout)
2021 Nutrients Travel Award (Trainee: Leila Abdellahmed)
2021 CVM Outstanding Doctoral Student Award (Trainee: Leila Abdellahmed)

Current/ Recent Trainees

Postdoctoral Fellows


Ph.D. Students


M.D. Students


Undergraduate Students/ Visiting Students

Research Productivity:

Active Grants:
P01: R01 NS096281 Mechanisms regulating cerebral arteriogenesis and sex differences in post extension through 2021
P01: R01 NS112541 Novel Cellular and Molecular Regulation of Collateral Remodeling in Ischemic stroke. Ends 2024
Multi-PI: Vascular Injury, Gliosis and Aberrant Neurogenesis as Drivers for Post-traumatic Epilepsy. Ends 2021
Co-I: American Heart Association Transformative Project Award: Ischemic-induced pericyte loss and BBB fragility. Ends 2021
PI: Research Acceleration Program (RAP) Carilion Medical Center- Interrogating Human Serum Expression of EphA4 and Collateral Vessel Function Following Acute Ischemic Stroke. Ends 2022
Co-I: R01 AG071661-01 Interstitial fluid flow in Alzheimer’s disease progression. Ends. 2026

Recent publications:

Kisho Grisham (IMSMD scholar), Ph.D. 2019, Translational Biology, Medicine & Health, (VT) current Postdoctoral Associate at the NIH
Summer DVM students:

Mita Nativopolous, Veterinary summer student program, (VT) 2019
Andrea Oliver, Veterinary summer student program, (VT) 2018

Undergraduate Students:

Lang F, R01 A017661-01 Intestitlal fluid flow in Alzheimer’s disease. Program Evaluation of evidence-based interventions to prevent and manage lifestyle-related chronic diseases such as diabetes, hypertension, heart disease and substance misuse/addiction. Her experience with developing collaborative partnerships at the local and state levels for these projects informs her work as co-lead for the Community and Population Health Sciences track in the integrated Translational Research of Virginia (collaborative NIH-funded Clinical Translational Science Award – CTSA among the University of Virginia, Virginia Tech, Carilion Clinic and Inova Healthcare).

Research Productivity:

Current Grants:

Substance Abuse and Mental Health Services Administration 08/31/2020 – 08/29/2025 Flowthrough subcontract from SAMHSA Strategic Technical Assistance. Expansion of SAMHSA-funded project to disseminate evidence-based substance misuse prevention curricula in public schools and support community coalitions. Role: Project Director

Friedman Regional Community Services $147,980 08/30/2020 – 8/29/2025 Flowthrough subcontract from SAMHSA Strategic Prevention Framework – Partnerships for Success grant via prime award to PRCS. Creating a Resilient Martinsville Henry County. Role: Evaluator.


United States Department of Agriculture $2,250,311 03/01/18 – 02/28/2023 Agricultural Research, Education, and Extension Projects. Project Director: Dr. Hosig.

Recent publications and referenced presentations:


Friedman Regional Community Services $147,980 08/30/2020 – 8/29/2025 Flowthrough subcontract from SAMHSA Strategic Prevention Framework – Partnerships for Success grant via prime award to PRCS. Creating a Resilient Martinsville Henry County. Role: Evaluator.


**Research Program Overview:** The overall goal of my research is to improve treatments and outcomes for oncology patients, especially patients suffering from osteosarcoma. I firmly believe in the strength of a One Health approach to comparative oncology research, which can benefit both veterinary and human cancer patients. My research focuses on evaluating novel tumor ablation techniques in order to improve treatment of the primary tumor as well as advance the development of immunotherapy for the treatment of metastatic disease. Histotripsy, a non-thermal, non-invasive focused ultrasound technique, can successfully ablate osteosarcoma cells. Osteosarcoma, a devastating bone cancer that affects both dogs and humans, has not seen significant strides in survival outcomes for the past 3 decades in both species. Current options for removing the primary tumor in osteosarcoma either require limb amputation or surgical limb salvage techniques, both of which have their limitations and complications. Metastatic disease has been the major hurdle to improvements in osteosarcoma survival, despite the multiple permutations of chemotherapeutics that have been evaluated. Histotripsy, with its strong potential to ablate tumors and upregulate the immune system, is an exciting avenue of comparative oncology investigation to target the primary tumor and metastasis in osteosarcoma. The similarities in biological behavior, histological characteristics, and genetic signatures of human and canine osteosarcoma, coupled with the dog being an outbound species sharing the environment with humans, makes the dog an excellent model for osteosarcoma research.

**Research Productivity:**

**Recent Grants:**
- Tuohy JL. (PI) Co-I: Davalos RV, Dervisis NG, Coutermarsh-Ott S, Allen IC. Evaluation of high frequency irreversible electroporation for treatment of canine lung tumors. Direct sponsor: Veterinary Memorial Foundation
- Tuohy JL. (PI) Co-I: Davalos RV, Coutermarsh-Ott S, Dervisis NG. Evaluation of high frequency irreversible electroporation (H-FIRE) for treatment of canine insulinoma. Direct sponsor: American College of Veterinary Surgeons

**Recent publications: 2020 publications**


**SELECTED RECENT PUBLICATIONS FROM RESEARCH AREAS**

- **PATHOGENIC MICROBIOLOGY & INFECTIOUS DISEASES**

- **NEUROPATHOBIOLOGY**

- **IMMUNE-MEDIATED & INFLAMMATORY DISEASES**

- **COMPARATIVE, TRANSLATIONAL, & VETERINARY RESEARCH**
VMCVM COVID RESPONSE

COVID-RELATED PROPOSAL SUBMISSIONS
73 Proposals

EXTERNAL AWARDS

JAMES WEGER, Biomedical Sciences and Pathobiology
"SARS-CoV-2 in apparently healthy care workers and molecular tools to study virus evolution"
NIH Subaward Amount: $45,318

"EAGER: Integrating Genotype, Phenotype, and Environment to Identify Biomarkers of Coronavirus Disease Severity and Transmission" NSF Amount: $297,382

"Experimental evolution of SARS-CoV-2 as a new tool to identify adaptive changes in the viral genomes, with implications for replication, infectivity, and COVID-19 outbreaks" VCOM Amount: $38,201

ANDREA BERTKE (Co-I), Population Health Sciences
"An integrated approach to address COVID-19 concerns in food supply chain" NIFA Amount: $999,059

Julie Gohlke, Population Health Sciences
"Recovery during a Crisis: Identifying recovery challenges and opportunities in Southwest Virginia during the COVID-19 Pandemic" Amount: $47,500

XJ MENG, Biomedical Sciences and Pathobiology
"Identification and Characterization of Mechanically Distinct Novel Anti-Viral Agents" VCOM Amount: $12,161

KYLENE KEHN-HALL, Biomedical Sciences and Pathobiology
"Impact of Silicon Nitride on SARS-CoV-2" SINT X Technologies Corp Amount: $89,731

"SP16 efficacy testing in SARS-CoV-2 infected mice" Serpin Pharma, Inc Amount: $19,756

ANDREA BERTKE, Population Health Sciences
"Specificity of SARS-CoV2-serological assay targets in domestic cats" Co-Is: LeRoith, K. Lahmers NSF Amount: $12,500

BLAISE COSTA, Biomedical Sciences and Pathobiology

TAYNA LEROITH, Biomedical Sciences and Pathobiology
"How do Virginians receive, interpret, and respond to COVID-19 prevention messages’" Co-Is: Coutermarsh-Ott, B. Huckle

TESSA LECUYER, Biomedical Sciences and Pathobiology
"Specificity of SARS-CoV2-serological assay targets in domestic cats” Co-Is: LeRoith, K. Lahmers

NATALIE COOK, Population Health Sciences


VMCVM EMERGENCY COVID RESEARCH FUNDING

JAMES WEGER, Biomedical Sciences and Pathobiology
"Establishment of a SARS-CoV-2 reverse genetics system to facilitate COVID-19 research"
NIH Subaward Amount: $45,318

JULIE GOLBLKE, Population Health Sciences
"Establishment of ACE2 transgenic mice colony for COVID-19 research at Virginia Tech"
NIH Subaward Amount: $47,500

Co-I: Jonathan Auguste, Department of Entomology, College of Agriculture and Life Sciences
"Identification and Characterization of Mechanically Distinct Novel Anti-Viral Agents" VCOM Amount: $12,161

NISHA DUGGAL, Biomedical Sciences and Pathobiology
"A Rapid development of broadly neutralizing antibodies against SARS-CoV-2 for topical lung and intravenous delivery" VCOM Amount: $38,201

"Experimental evolution of SARS-CoV-2 as a new tool to identify adaptive changes in the viral genomes, with implications for replication, infectivity, and COVID-19 outbreaks" VCOM Amount: $38,201

ANDREA BERTKE (Co-I), Population Health Sciences
"Impact of Silicon Nitride on SARS-CoV-2" SINT X Technologies Corp Amount: $89,731

"SP16 efficacy testing in SARS-CoV-2 infected mice" Serpin Pharma, Inc Amount: $19,756

NISHA DUGGAL, Biomedical Sciences and Pathobiology


VMCVM COVID RELATED INFRASTRUCTURE IMPROVEMENT

1 he vision of the center postions Virginia Tech to become a national and international research and training resource that is a leader in advancing transformative science and developing effective countermeasures against emerging infectious diseases.

The new center, led by Dr. XJ Meng, will be administratively established in the Fralin Life Science Institute and will include faculty participants from at least seven colleges and more than 25 departments on campus.

CEZAP FACULTY RESEARCH PILOT GRANT PROGRAM
The Center for Emerging, Zoonotic, and Arthropod-borne Pathogens (CeZAP) at Virginia Tech requests pilot grant applications to build interdisciplinary research teams in the broad area of infectious diseases, leading to collaborative extramural grant submissions. These pilot grants are supported financially by Fralin Life Sciences Institute and Agency 229. Priority will be given to proposals seeking to advance CeZAP's mission to promote and foster interdisciplinary and translational research collaborations across different colleges.

NISHA DUGGAL, Biomedical Sciences and Pathobiology
"A Rapid development of broadly neutralizing antibodies against SARS-CoV-2 for topical lung and intravenous delivery" VCOM Amount: $38,201

NISHA DUGGAL AND JAMES WEGER, Biomedical Sciences and Pathobiology
"Establishment of a SARS-CoV-2 reverse genetics system to facilitate COVID-19 research"
NIH Subaward Amount: $45,318

Co-I: Jonathan Auguste, Department of Entomology, College of Agriculture and Life Sciences
"Identification and Characterization of Mechanically Distinct Novel Anti-Viral Agents" VCOM Amount: $12,161

NISHA DUGGAL, Biomedical Sciences and Pathobiology
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ANDREA BERTKE (Co-I), Population Health Sciences
"Impact of Silicon Nitride on SARS-CoV-2" SINT X Technologies Corp Amount: $89,731

"SP16 efficacy testing in SARS-CoV-2 infected mice" Serpin Pharma, Inc Amount: $19,756

NISHA DUGGAL, Biomedical Sciences and Pathobiology


VMCVM COVID RELATED INFRASTRUCTURE IMPROVEMENT

• Investments were made to upgrade equipment in the IDU to accommodate the growing needs of increased number of BSL3 researchers including the creation of a new IDU use committee for improving the efficiency of operations of IDU.

• Supported breeding colony of unique ACE2 mouse model for COVID researchers.
The Office of Research and Graduate Studies now has its own blog. The purpose of the blog is to share news and accomplishments of our researchers and graduate students. Please visit the site to see what our researchers and students are working on. We welcome submissions for the college for blog posts. You can submit your news right from the RGS blog site.

**VMCVM SERVICES CENTERS**

**Analytical Chemistry Research Laboratory (Pharmacology and Toxicology)**
The lab provides a variety of enzyme assays, qualitative and quantitative determination of the concentration of drugs, heavy metals, toxins, pesticides, as well as metabolism and pharmacokinetic studies.

Contact: Dr. Jennifer Davis, Analytical Lab Supervisor, 540-231-2192 or jadavis4@vt.edu or McAlistier Council-Troche, Analytical Lab Manager, 540-231-4835 or rmct@vt.edu

**Electron Microscope Lab**
The lab is equipped with instrumentation for ultrastructural analysis of biological and non-biological materials to provide investigators with data concerning specimen morphology.

**Flow Cytometry**
The lab provides the latest technologies in flow cytometry to enhance research.

Contact: Melissa Makris, Flow Cytometry Lab Supervisor, 540-231-4115 or mmakris@vt.edu

**Quality Assurance Unit**
The lab provides oversight to monitor studies conducted in compliance with the federal Good Laboratory Practice (GLP) regulations.

Contact: Sandy Hancock, Good Laboratory Practice Program and Quality Assurance Unit, 540-231-4817 or skperkin@vt.edu

**Sterilization and Laboratory Support Services**
The lab provides a constant supply of washed and sterilized glassware, plastics, and media that is essential for research activities.

Contact: Andrea Renshaw, Laboratory Support Technician, 540-231-4829 andreajr@vt.edu; Debbi Coley dsaville@vt.edu (COHR), or Dean Compton (ILSB)

**Study Design and Statistics**
The lab assists with design, planning, and implementation of research projects, data management and analysis, evaluation, and presentation of data and information.

Contact: Dr. Stephen Werre, Study Design & Statistical Analysis Lab Supervisor, 540-231-3522 or swerre@vt.edu

**TRACSS**
The Teaching and Research Animal Care Support Service (TRACSS) provides policies, guidelines, and support to assist investigators with research projects while ensuring compliance with Federal law and regulatory agency policies.

Find resources on our college intranet or contact Karen Hall, TRACSS Supervisor, at kgetzewi@vt.edu or 540-231-4318.

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**COVID REGULATIONS FOR RESEARCHERS**

In the spring semester, Virginia Tech will continue its research in a manner that recognizes the importance of safety, transitions back to an in-person student-learning experience, and continues to ramp up research programs. Current information for researchers can be found on the VT Ready website.

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**NEW WEBSITE CONTENT**

Don’t forget to periodically check the new BMVS website. We are continuously updating the content.

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**UNDER CONSTRUCTION**

We are working to migrate the research website to the CMS content system.

The new website should be live by April 2021. We have integrated new content during the migrate and will work to continue to build on the site.

Please send suggestions for content!
VETERINARY MEMORIAL FUND (VMF)
DEADLINE: MARCH 12, 2021
VMF funds are to be used to support research in veterinary clinical sciences with the goal of improving health care for animals. Projects with direct clinical relevance were prioritized for funding.

INTERNAL RESEARCH COMPETITION (IRC)
DEADLINE: MARCH 19, 2021
The Internal Research Competition provides small seed grants for basic, interdisciplinary and translational research with the goal of collecting enough data to help procure external funding. The underlying goal of this seed funding mechanism is to enhance our research priority areas that include (but not limited to) infectious disease and immunity, inflammatory diseases, regenerative medicine, comparative oncology, and Destination Area aligned research. 229-related research proposal are also funded through IRC.

EQUINE RESEARCH COMPETITION (ERC)
DEADLINE: MARCH 5, 2021
The Equine Research Competition provides small seed grants for basic, interdisciplinary, and translational clinical research in equines with the goal of collecting enough data to help procure external funding. The underlying goal of this seed funding mechanism is to enhance our equine research priority areas that include (but not limited to) infectious diseases and immunity, inflammatory diseases, regenerative medicine, and musculoskeletal.

229 ANIMAL HEALTH AND DISEASE RESEARCH PROJECTS
Research operational support for projects related to the Animal Health and Disease Research program to study basic and applied studies on infectious and non-infectious agents that impair the normal state of the animal body and/or that affect the performance of vital functions. Includes laboratory studies research on metabolic diseases and other diseases, application of molecular biology to animal health problems. These five-year projects must be submitted to the VAES Experimental Station and require yearly reporting. Projects closely aligned with the 229 mission may also be funded through the IRC mechanism, contingent upon the merit of the proposals and funds’ availability.

ONE HEALTH RESEARCH SEED GRANTS
CALL SEND OUT AROUND APRIL/MAY
One Health program was created to foster collaboration between faculty from VMCVM and VCOM. Each project must have a principal investigator from VT and VCOM.

CENTER FOR ONE HEALTH RESEARCH (COHR)
Lab renovations were recently completed at COHR. These labs will be used by Dr. Mohamed Seleem, our new Tyler J. and Frances F. Young Chair in Bacteriology Professor. His lab is focused on developing new antimicrobials and improving delivery of drugs for the treatment of infection diseases.

SHARED CLINICAL RESEARCH LAB (PHASE 2)
The College recognized a need for laboratory space dedicated to the clinical faculty that contribute to our research program. Several labs in Phase 2 were renovated based on the concept of a clinical shared lab for multi-departmental clinical research activities. This space provides two large open lab spaces with several individual rooms for prep, cell culture, etc. The space also have a lounge for graduate students.

INPUT ON EQUIPMENT PURCHASES
RGS seeks your input for instrumentation requests. We have several opportunities through the year to request support for purchasing shared VMCVM equipment. RGS maintains a request list in order to be responsive to these calls. Created and improved a college-wide list of major VMCVM equipment, a link to be used in grant applications and to facilitate researchers to identify various equipment in different VMCVM locations. A list of equipment can be found here: VMCVM Equipment List.
The overarching goals of the Biomedical and Veterinary Sciences (BMVS) graduate program is to provide rigorous training experiences for students interested in the fundamentals of life science research and its potential application to improve the health of humans and domestic animal species. The MS program under BMVS has principally been the home of our DVM residents undergoing specialty veterinary medical training, alongside which a thesis-based research project has been an important component. Our PhD program is flexible and offers in-depth training in animal models for diseases, translational research, veterinary clinical research, and population health medicine. There are multiple ways of getting PhD in our BMVS program that include: straight PhD; Combined DVM and PhD; Post-DVM PhD (supported by NIH T32 grant); combined clinical veterinary residency and PhD.

Our doctoral program will have core courses and in-depth subject-based courses in five major overlapping subject areas (tracks) that are based on the research strengths of our existing faculty members (within our college and across the university) and on predicted areas of growth in biomedical and health sciences. PhD students will be trained in the following five interactive tracks. These include:

1. Pathogenic Microbiology (Infectious Diseases includes bacterial, viral, parasitic and fungal diseases) Research themes include: Animal models for human and veterinary infectious diseases, Understanding the pathogenesis of the diseases, Immunity to infectious and its prevention (development of vaccines and drugs); Mechanisms of drug resistance, and translational research.

2. Immune-mediated and Inflammatory Diseases Research themes include: Animal Models for immune-mediated diseases; Understanding the mechanisms of such as autoimmune diseases and inflammatory diseases (e.g., inflammatory bowel disease). Specific interests include role of epigenetics, microbiome and environmental hormonal factors on these diseases; transition of inflammation leading to cancer; induction of immunity in oncologic conditions, and translational research.

3. Neuropathobiology Research themes include: Animal Models for neurodevelopment and traumatic injury, neurovascularization, neuroinflammation, and neurooncology, and translational research.

4. Comparative, Translational, & Veterinary Research Research themes include: cancer biology, genomics and therapeutics; Clinical Veterinary medicine research and translational medicine from laboratory animals to clinical veterinary and human patients; Stem cell biology and its application; Clinical trials management and human-animal bond/interactions.

5. Population Health Science Research themes include: Infectious diseases epidemiology (in humans and animals); and public health education.

The majority of our PhD graduates (including those who also hold the DVM) have been productively employed in medical schools, veterinary colleges, the pharmaceutical and biotech industries, and health science-related federal agencies (CDC, USDA, NIH, FDA). The academic background and preparation during this rigorous PhD program have contributed to their academic, scientific and clinical success in their chosen fields.

bmvs.vetmed.vt.edu
2019 ANNUAL RESEARCH SYMPOSIUM

OUTSTANDING MS POSTER PRESENTATION:
Michelle Greer
Kayla Waler

OUTSTANDING MS ORAL PRESENTATION:
Jamal Blake Everett

OUTSTANDING PHD POSTER PRESENTATION:
Brittanie Partridge
Melissa Mercer

OUTSTANDING PHD ORAL PRESENTATION:
Sarah Kuchinsky
Alessandra Franchini

GRADUATE AWARDS (2020)

Outstanding VMVM Mentor Award: Dr. Coy Allen
Outstanding VMVM nominee for the MS Award: Dr. Giulio Menicotti. (Mentor: Dr. Borgarelli)
Outstanding VMVM nominee for the PhD Award: Dr. Bruno Carvalho Menarim (Mentor: Dr. Dahlgren)

2020 VCOM-VIRGINIA CAMPUS RESEARCH RECOGNITION DAY POSTER WINNERS

MEDICAL RESIDENT BIOMEDICAL RESEARCH
1st place – Vanessa Oakes, DVM – VMVM and VCOM VA

CLINICAL RESEARCH BY FACULTY
1st place – Terry Hrubec, DVM, PhD – VCOM VA and VMVM

VMVM PHI ZETA CHAPTER MANUSCRIPT COMPETITION WINNERS

Basic Science Category: Bruno Menarim

Clinical Science Category: Nadia Saklou

These manuscripts will be sent to the national Phi Zeta Manuscript Competition as the representatives from our college. Congratulations to Drs. Saklou and Menarim!

2020 BMVS ACHIEVEMENTS

2020 BMVS DEFENSES

Catherine “Kathy” Barron
“Effects of Trimethylamine N-Oxide on Mouse Embryonic Stem Cells”
Major Advisor: Dr. Jia-Qiang He
Defense Date: 07/14/2020

Audrey Keebagh
“Evaluation of hemostasis in hyperthyroid cats”
Major Advisor: Stefanie Democanor
Defense Date: 06/12/2020

James Blake Everett
“Bone Marrow Mononuclear Cell for Equine Joint Disease”
Major Advisor: Dr. Julia Gohlke
Defense Date: 05/13/2020

Naree Ketusing
“Assessment of Foot and Mouth Disease (FMD) Control Policies and their Implementation in the Proposed FMD-Free Zone in Thailand”
Major Advisor: Drs. Valerie Ragan & Jennie Hodgson
Defense Date: 02/25/2020

Kayla Waler
“Aqueous humor concentration and prostaglandin E2 suppression efficacy of topically applied ophthalmic ketorolac 0.5% and diclofenac 0.1% solutions in dogs with cataract”
Major Advisor: Dr. Ian Otto
Defense Date: 05/11/2020

Lauren Butting
“Maternal Residential Proximity to Central Appalachian Surface Mining and Adverse Birth Outcomes”
Major Advisor: Dr. Julia Gehike
Defense Date: 05/13/2020

John Sanders
“The anthelmintic effect of Bacillus thuringiensis Cry5B on Haemonchus contortus in sheep”
Major Advisor: Dr. Anne Zajac
Defense Date: 05/28/2020

Giulio Mencotti
“Accuracy of Nominatively Determined Pulmonary Artery Pressure in Dogs with Myxomatous Mitral Valve Disease”
Major Advisor: Dr. Michele Borgarelli
Defense Date: 07/17/2020

Lauren Butting
“Maternal Residential Proximity to Central Appalachian Surface Mining and Adverse Birth Outcomes”
Major Advisor: Dr. Julia Gehike
Defense Date: 05/13/2020

Betsy Schroeder
“Finding Typhoid Mary: Identifying Latent Carriers of Salmonella enterica serovar Typhimurium”
Major Advisor: Dr. Nammalwar Sriramathan
Defense Date: 08/14/2020
31st Annual Research Symposium

Keynote Speakers

CORRIE BROWN
DVM, Ph.D., DAVP
Anatomic Pathology, Josiah Meigs Distinguished Teaching Professor, University Professor
Department of Pathology
College of Veterinary Medicine
University of Georgia

ANNE SCHUCHAT
MD (RADM, USPHS, RET)
Principal Deputy Director
Center of Disease Control and Prevention (CDC)

Our graduate symposium is graduate student-centric, which is strongly supported by the Office of Research and Graduate Studies. Each year to celebrate and recognize our graduate (MS and Ph.D.) students’ progress/achievements, we host an annual Graduate research symposium. Information about previous symposia.

March 25 12:30 to 5 pm
March 26 12:45 to 5 pm

Virtual Symposium hosted on Virginia Tech Canvas

The Research in Progress (RIP) Seminar Series not only serves as a platform for graduate students to share their research but includes presentations from invited content experts. The series is organized with a different research area each month. The schedule includes three VMCVM internal speakers and one invited speaker per month. The series takes place on Wednesdays at 12:00 pm. Monthly schedules are sent out via email. For a full seminar schedule, please visit the BMVS Seminar page. Please contact Andrea Green, BMVS graduate coordinator, for more information about the series.

Invited Speakers

DR. ALICIA COHEN
Director of Diversity Education Programs
Office of Inclusion and Diversity
Virginia Tech
Diversity Workshop
January 29th, 2020

DR. JESSICA AGNEW
PhD Candidate in Planning, Governance and Globalization (Urban Affairs and Planning); Master of Public Health

DR. JULIANNA PIEKNIK
FDA Staff Scientist

RESEARCH IN PROGRESS SEMINAR SERIES

Note: Invited speaker seminars cancelled in March due COVID-19 and the University moving to online instruction for the remainder of the Spring 2020 semester.


Matzinger SR, Opiressing T, Xiao CT, Catanzaro N, Beach NM, Slade DE, Nitzel GP, Meng XJ. A chimeric vector created by DNA shuffling of the capsid genes of different subtypes of porcine circovirus type 2 (PCV2) in the backbone of the non-pathogenic PCV1 induces protective immunity against the predominant PCV2b and the emerging PCV2d in pigs. Virology. 2016 Nov; 498:82-93.


<table>
<thead>
<tr>
<th>Name</th>
<th>Department</th>
<th>Project Description</th>
<th>Amount</th>
<th>Source</th>
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<tbody>
<tr>
<td>XIN LUO</td>
<td>Biomedical Sciences and Pathobiology</td>
<td>Selective HDAC6 inhibition decreases B cell activation in systemic lupus erythematosus</td>
<td>$466,545</td>
<td>NIH</td>
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<tr>
<td>ANDREA BERTKE</td>
<td>Population Health Sciences</td>
<td>Viral manipulation of neuronal microRNAs to maintain trophic support and HSV latency</td>
<td>$153,876</td>
<td>NIH Subaward</td>
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<td>CLAYTON CASWELL</td>
<td>Biomedical Sciences and Pathobiology</td>
<td>Characterizing the function and regulation of a conserved virulence-associated genetic pathway of pathogenic Alphaproteobacteria</td>
<td>$9,452</td>
<td>NIH Subaward</td>
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<tr>
<td>LILI JUAN YUAN</td>
<td>Biomedical Sciences and Pathobiology</td>
<td>Preventing norovirus and Clostridium difficile gastroenteritis by engineered probiotic yeast Saccharomyces boulardii secreting multi-specific single-domain antibodies</td>
<td>$1,454,142</td>
<td>NIH Subaward</td>
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<td>KATHY HOSIG (CO-I)</td>
<td>Population Health Sciences</td>
<td>Defining mechanisms regulated by noncanonical NF-kB signaling that modulate eosinophilic esophagitis</td>
<td>$37,880</td>
<td>University of Virginia</td>
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<td>LILI JUAN YUAN</td>
<td>Biomedical Sciences and Pathobiology</td>
<td>Immunogenicity and efficacy of thermostable rotavirus vaccine in gnotobiotic piglet model</td>
<td>$562,250</td>
<td>Universal Stabilization Technologies Inc</td>
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<td>KEVIN LAHMERS</td>
<td>Biomedical Sciences and Pathobiology</td>
<td>Evaluation of automated nucleotide extraction in a lower volume diagnostic laboratory setting</td>
<td>$39,226</td>
<td>USDA</td>
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<tr>
<td>JULIE GREEN</td>
<td>Biomedical Sciences and Pathobiology</td>
<td>VS Terminology Support Work Plan</td>
<td>$250,000</td>
<td>USDA</td>
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<tr>
<td>JENNIFER DAVIS (CO-I)</td>
<td>Biomedical Sciences and Pathobiology</td>
<td>Food Animal Residue Avoidance Databank (FARAD) - VMCVM Component 2019</td>
<td>$150,000</td>
<td>USDA</td>
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<td>JENNIFER DAVIS (CO-I)</td>
<td>Biomedical Sciences and Pathobiology</td>
<td>Proposal to test the effectiveness of a Bcl-6 inhibitor for the treatment of lupus nephritis</td>
<td>$43,500</td>
<td>RILITE Foundation</td>
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<td>JENNIFER DAVIS (CO-I)</td>
<td>Biomedical Sciences and Pathobiology</td>
<td>Fundamental Studies on the Recovery of Rare Earth Elements from Coal and Coal Byproducts (PI Roe-Hoan Yoon, Mining and Minerals Engineering)</td>
<td>$2,046,774</td>
<td>USDA</td>
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<td>JENNY JAMIE STEWART</td>
<td>Large Animal Clinical Sciences</td>
<td>Efficacy of deslorelin acetate on induction of ovulation in does</td>
<td>$6,593</td>
<td>The Theriogenology Foundation</td>
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<td>JAMIE STEWART</td>
<td>Large Animal Clinical Sciences</td>
<td>Developing Predictive Markers of Reproductive Soundness in Peri-pubertal and Mature Rams Throughout the Year</td>
<td>$13,556</td>
<td>Virginia Agricultural Council</td>
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<tr>
<td>KEVIN LAHMERS</td>
<td>Biomedical Sciences and Pathobiology</td>
<td>Development of Novel Porcine Models of Orthotopic Pancreatic Cancer for FUS and Histotripsy Tumor Ablation Applications</td>
<td>$100,000</td>
<td>Focused Ultrasound Foundation</td>
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<tr>
<td>JENNIFER DAVIS (CO-I)</td>
<td>Biomedical Sciences and Pathobiology</td>
<td>Mechanisms of neonatal IgA production by Lactobacillus reuteri</td>
<td>$39,519</td>
<td>NIH</td>
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<tr>
<td>COY ALLEN</td>
<td>Biomedical Sciences and Pathobiology</td>
<td>Employing Novel Porcine Models of Orthotopic Pancreatic Cancer to Evaluate Histotripsy Based Tumor Ablation Strategies</td>
<td>$427,815</td>
<td>NIH Subaward</td>
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<td>COY ALLEN (CO-I)</td>
<td>Biomedical Sciences and Pathobiology</td>
<td>Non-invasive Focused Ultrasound Ablation for the Treatment of Cholangiocarcinoma Liver Tumors (PI Eli Vlaisavljevich, BEAM)</td>
<td>$138,616</td>
<td>Focused Ultrasound Foundation</td>
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<td>JAMIE STEWART</td>
<td>Large Animal Clinical Sciences</td>
<td>Pattern of thyroid function tests during recovery from acute nonthyroidal illness</td>
<td>$3,792</td>
<td>American Kennel Club Canine Health Foundation</td>
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<td>TIMOTHY BOLTON</td>
<td>Small Animal Clinical Sciences</td>
<td>Developing Predictive Markers of Reproductive Soundness in Peri-pubertal and Mature Rams Throughout the Year</td>
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<td>Virginia Agricultural Council</td>
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<tr>
<td>BRIANNA SWARTWOUT (MENTOR XIN LUO)</td>
<td>Biomedical Sciences and Pathobiology</td>
<td>Mechanisms of neonatal IgA production by Lactobacillus reuteri</td>
<td>$39,519</td>
<td>NIH</td>
</tr>
</tbody>
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DOMINIQUE SAWYERE HANSFORD
Small Animal Clinical Sciences
The Effect of a Modified Approach on Early Weight Bearing in Dogs Following a Tibial Plateau Leveling Osteotomy
American Kennel Club Canine Health Foundation Amount: $34,939

DOMINIQUE SAWYERE HANSFORD
Small Animal Clinical Sciences
Use of the Spatiotemporal and Kinetic Gait Variables for Differentiation of Spinal Ataxia and Bilateral Pelvic Limb Orthopedic Disease in Dogs
American Association of Rehabilitation Veterinarians Amount: $2,500

JOANNE TUOHY
Small Animal Clinical Sciences
Histotripsy for treatment of canine appendicular osteosarcoma
American Kennel Club Canine Health Foundation Amount: $35,975

STEFANIE DEMONACO
Department
Evaluation of flash glucose monitoring systems in diabetic cats
The Winn Feline Foundation Amount: $15,333

COY ALLEN (CO-I)
Biomedical Sciences and Pathobiology
Targeting the peptidoglycan cell wall of Borrelia burgdorferi to diagnose and treat Lyme disease
(PI Brandon Jutrus, Biochemistry)
Steven Alexandra Cohen Foundation Amount: $561,216

SHAWNA KLAHN
Small Animal Clinical Sciences
Investigation of the immunostimulatory response to mechanical high intensity focused ultrasound (histotripsy) in dogs with naturally-occurring soft tissue tumors
Focused Ultrasound Foundation Amount: $144,107

DOMINIQUE SAWYERE HANSFORD
Small Animal Clinical Sciences
Evaluating the Immunostimulatory Response to Mechanical High Intensity Focused Ultrasound (Histotripsy) in Dogs with Naturally-Occurring Soft Tissue Tumors
American Kennel Club Canine Health Foundation Amount: $62,460

JOANNE TUOHY
Small Animal Clinical Sciences
Histotripsy for treatment of canine appendicular osteosarcoma
Focused Ultrasound Foundation Amount: $62,460

JOANNE TUOHY
Small Animal Clinical Sciences
Evaluation of High Frequency Irreversible Electroporation (H-FIRE) for treatment of canine insulinoma
ACVS Amount: $8,600

TOM CECERE
Biomedical Sciences and Pathobiology
Supplement to TEM Evaluation of iPSC-Derived Cells
Experimental Pathology Laboratories Inc Amount: $27,461

COY ALLEN
Biomedical Sciences and Pathobiology
Elucidating Mechanisms Modulated by NIK and Non-Canonical NF-κB Signaling In Colorectal Cancer
VCOM Amount: $27,870

DAVID XIE & TERRY HRUBEK
Biomedical Sciences and Pathobiology
Epitranscriptome Dynamics upon Neuronal Activation: Novel Clues for Autism Pathology and Treatment
VCOM Amount: $30,000

BLAISE COSTA & BRADLEY KLEIN
Biomedical Sciences and Pathobiology
To Study the Biology of Triheteromeric NMDA Receptor Modulators
VCOM Amount: $49,994

CHRIS REILLY & XIN LUO
Biomedical Sciences and Pathobiology
Microbiotic regulation of lupus nephritis
VCOM Amount: $50,000

KEVIN LAHMERS & PAWEL MICKALAK
Biomedical Sciences and Pathobiology
Genomic characterization of the invasive Longhorned tick and its microbiota including the known pathogen, Theileria orientalis
VCOM Amount: $50,000

BLAISE COSTA & BRADLEY KLEIN
Biomedical Sciences and Pathobiology
Clearance of Brain Metabolic Waste in a Natural Animal Model of Alzheimer’s Disease by Cranial Osteopathic Manipulation
VCOM Amount: $89,202

COY ALLEN
Biomedical Sciences and Pathobiology
Task Order #17: Defining The Electrical Properties And Biological Impact Of Tumor Ablation Modalities For Use In The Prostate To Maximize Therapeutic Impact
AngioDynamics Amount: $50,844

LLJUAN YUAN
Biomedical Sciences and Pathobiology
A nanoparticle-based dual vaccine against norovirus and rotavirus
Cincinnati Childrens Hospital Medical Center Amount: $50,000

TOM CECERE
Biomedical Sciences and Pathobiology
TEM Evaluation of CNS from SN 1202-020
Experimental Pathology Laboratories Inc Amount: $62,685

VIRGINIA CORRIGAN
Small Animal Clinical Sciences
Effect of Pulsed Electromagnetic Field Therapy on Feline Osteoarthritic Pain: A Double-Blind, Randomized, Placebo-Controlled, Crossover Clinical Trial
Assisi Animal Health Amount: $67,972

KEVIN LAHMERS
Biomedical Sciences and Pathobiology
Field evaluation of a rapid, mobile, novel sequencing technology for the detection of Equine Herpesvirus-1 in equine nasal secretions
American Quarter Horse Association Amount: $80,036
TOM CECERE
Biomedical Sciences and Pathobiology
Peripheral nerve practice samples for SN T05200
Experimental Pathology Laboratories Inc  Amount: $3,935

RICHARD SHINN (MENTOR JOHN ROSSMEISL)
Small Animal Clinical Sciences
ACVIM Clinical Fellowship

TOM CECERE
Biomedical Sciences and Pathobiology
Peripheral Nerve Preparations for Study T05200
Experimental Pathology Laboratories Inc  Amount: $139,292

S. A. AHMED
Office of Research and Graduate Studies
2020 Boehringer Ingelheim Scholars Program
Boehringer Ingelheim Vetmedica, Inc.  Amount: $10,000

JAMES BROWN
Large Animal Clinical Sciences
Development of interactive three-dimensional models for the study of horse head vascular anatomy
Virginia Horse Industry Board  Amount: $18,800

REBECCA FUNK
Large Animal Clinical Sciences
Seroprevalence of Anaplasma phagocytophilum in the equine population of Southwest Virginia
Virginia Horse Industry Board  Amount: $12,050

SHARON WITONSKY
Large Animal Clinical Sciences
Identifying the role for IL-17-a in EPM affected horses
Virginia Horse Industry Board  Amount: $6,700

ROBERT PLEASANT
Biomedical Sciences and Pathobiology
Genetic characterization of latent equine herpes virus-1 isolates in Virginia horses
Virginia Horse Industry Board  Amount: $6,720

TOM CECERE
Biomedical Sciences and Pathobiology
TEM of mouse liver tissues from Study TB19-30
Experimental Pathology Laboratories Inc  Amount: $8,085

PAWEL MICHALAK
Biomedical Sciences and Pathobiology
Development and testing of environmental DNA protocols for detection of Yellowfin Madtom in Virginia
Virginia Department of Wildlife Resources  Amount: $20,000

JAMES WEGE
Biomedical Sciences and Pathobiology
EAGER: Integrating Genotype, Phenotype, and Environment to Identify Biomarkers of Coronavirus Disease Severity and Transmission
NSF  Amount: $297,382

SOPHIE WENZEL
Population Health Sciences
Region III East Suicide Prevention Plan
Blue Ridge Behavioral Healthcare  Amount: $5,000

KATHY HOSIG
Population Health Sciences
High Obesity Program: Empowering Healthy Lifestyles to Reduce Obesity in Petersburg, Virginia (EHLROP)
CDC  Amount: $1,555,000

KATHY HOSIG (CO-I)
Population Health Sciences
Crisis Response and Harm Reduction: Combating Opioid Overdose through Community-level Intervention
(PI Mary Dunkenberger, Institute for Policy and Governance)
University of Baltimore  Amount: $299,456

SOPHIE WENZEL
Population Health Sciences
Roanoke Prevention Alliance resiliency collective evaluation and health disparities statement
Blue Ridge Behavioral Healthcare  Amount: $2,000

KATHY HOSIG (CO-I)
Population Health Science
Regional Detox Messaging and Planning
(PI Mary Dunkenberger, Institute for Policy and Governance)
University of Virginia  Amount: $32,417

KATHY HOSIG (CO-I)
Population Health Sciences
Crisis Response and Harm Reduction: Combating Opioid Overdose through Community-level Intervention
(PI Mary Dunkenberger, Institute for Policy and Governance)
University of Baltimore  Amount: $299,456

SOPHIE WENZEL
Population Health Sciences
Roanoke Prevention Alliance resiliency collective evaluation and health disparities statement
Blue Ridge Behavioral Healthcare  Amount: $2,000

KATHY HOSIG (CO-I)
Population Health Science
Regional Detox Messaging and Planning
(PI Mary Dunkenberger, Institute for Policy and Governance)
University of Virginia  Amount: $32,417
OFFICE OF RESEARCH AND GRADUATE STUDIES

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P: 540-231-5649 | vetmed.vt.edu/research/bmvs.vetmed.vt.edu