



CENTER OF EXCELLENCE

in

Livestock Diseases & Human Health

2023 ANNUAL REPORT



THIS REPORT IS PRODUCED BY

THE UNIVERSITY OF TENNESSEE
College of Veterinary Medicine

Office of Research and Graduate Studies
2407 River Drive, Room A205
Knoxville, Tennessee 37996-4543
865-974-0227

EDITING | Emily Ford

PHOTOGRAPHY | Phil Snow

GRAPHIC DESIGN | Joy Chambers
Emily Ford

WRITING | Dr. David Anderson
Emily Ford

SPECIAL THANKS | Emily Dyke
Kim Fortner
Dr. Maha Krishnamurthy
Sheila McNeil
Dr. Agricola Odoi
Dr. Sree Rajeev
Morgan Tolbert
Marcella Viart

Table of Contents

Production Acknowledgements.....	2
About the Institute.....	5
Letter from the Dean.....	7
Summary of Accomplishments.....	8
Program Report	10
Introduction and Personnel	11
Research Funding.....	12
Research Expenditures	13
Allocation of Funding.....	14
Infrastructure and Supplies.....	15-16
Dissemination of Research.....	17
Popular Press and Media.....	18
Summer Student Research Program.....	19-23
Research Day	25-26
Three-Minute Thesis.....	27
Five-Year Benchmark Data.....	28
Benchmark Summary	29
Future Plans: Looking Forward	30
Startup Faculty Research Overviews.....	31
Drs. Mohamed Abouelkhair and Elizabeth Collar	32
Drs. Michelle Dennis and Cassio Ferrigno	33
Drs. Chiara Hampton and Ashley Hartley.....	34
Drs. Girish Neelakanta and Sreekumari Rajeev.....	35
Drs. Sarah Schmid and Wesley Sheley.....	36
Drs. Joseph Smith and Nora Springer.....	37
Dr. Hameeda Sultana.....	38
Faculty Research Summaries	40
Dr. Richard Gerhold	41
Dr. Luca Giori	42
Dr. Stephanie Kleine.....	43
Dr. Sreekumari Rajeev.....	44
Dr. Joseph Smith.....	45
Research Funded Externally.....	47
Research Funded Internally	48
Actual and Proposed Budget.....	49
Requested Budget	50



About the Institute

Through its colleges, county extension offices, Veterinary Medical Center, Veterinary Diagnostic Laboratories, and research and education centers, the **University of Tennessee Institute of Agriculture (UTIA)** serves the people of Tennessee and beyond through discovery, communication, and application of knowledge. The University of Tennessee, Knoxville, is committed to providing undergraduate, graduate, and professional veterinary education programs in a diverse learning environment that prepares students to be leaders in a global society. UTIA's delivery of education, discovery, and outreach contributes to the economic, social, and environmental well-being of all Tennesseans. The Institute's units focus on developing real life solutions to contemporary, emerging, and forecasted problems faced by Tennessee, the nation, and the world.

The College of Veterinary Medicine (CVM) is one of only 31 fully accredited veterinary colleges in the nation. The central mission of the College is educating Doctor of Veterinary Medicine (DVM) students seeking a career in one of many aspects of the profession ranging from clinical practice to research. The College also serves the public in providing referral medicine services to pet owners, zoos, and the livestock industry through the UTCVM Veterinary Medical Center. In addition, the College protects public health, enhances medical knowledge through research and education of graduate students, and generates economic benefits to the state and nation. Outreach programs engage an array of citizens and their animals in learning programs that explore the human-animal bond and promote wellbeing.

The Herbert College of Agriculture welcomes students from across Tennessee, the nation, and the world. The College offers academic programs in a variety of natural and social science-based disciplines that apply to the food, fiber, and natural resources systems. For students in the College, learning is personal and often hands-on. Student teams provide opportunities for self-directed study, leadership development, and a lot of fun. An honors and creative achievements program challenges students to excel, as do undergraduate research opportunities. International study abroad mini-courses and internships give graduates an edge in the increasingly connected world of global markets.

UT AgResearch UT AgResearch has been the central incubator and economic engine that develops "Real. Life. Solutions." so farmers and agricultural industries can supply affordable and wholesome products to the citizens of Tennessee and the world for more than 140 years. Its dedicated workforce of research faculty, staff members, and graduate students maintains a diverse and balanced program supporting Tennessee's \$81 billion economy built on agriculture and forestry industries. Ten field locations, known as AgResearch and Education Centers, capture the state's diverse environment and serve as outdoor laboratories where scientists can demonstrate innovative developments for stakeholders and clients to see first-hand the research results that can benefit their operations.

UT Extension is often called "every citizen's front door to the University of Tennessee" because it maintains an office and staff of educators in each of the state's 95 counties. UT Extension Agents deliver research-based education designed to improve the lives and livelihoods of each citizen by enhancing agricultural production, building stronger families, and strengthening communities. These educational programs are accomplished by partnering with local, state, and national agencies to conduct hands-on learning events, certification programs, field research, local demonstrations, and assistance in agriculture, natural resources, community economic development, family and consumer sciences, and 4-H youth development. UT Extension agents are continually trained on the most current research-based information by faculty in each of the UTIA departments who specialize in the translation of science into application, inform the work of UT AgResearch faculty, and conduct translational research themselves.

ADMINISTRATION

Dr. David E. Anderson

Associate Dean for Research and Graduate Studies

Dr. Agricola Odoi

Assistant Dean for Research and Graduate Studies

Dr. James P. Thompson

Dean, College of Veterinary Medicine

Dr. Keith S. Carver, Jr.

*Interim Senior Vice President/Senior Vice Chancellor,
University of Tennessee Institute of Agriculture*

OUR MISSION

1. To promote interdisciplinary activities designed to improve the quality of human life through better animal health.
2. To expand livestock disease research capabilities.
3. To identify and characterize animal diseases that are similar to human disease.
4. To develop new strategies for the diagnosis, treatment, and prevention of disease.

Letter from the Dean

As the Dean of the College of Veterinary Medicine, I am pleased to present the 2023 annual report for the Center of Excellence in Livestock Diseases and Human Health (“the Center”). Within this report, you will find a comprehensive overview of faculty and student activities supported by the Center to advance the Center’s missions: 1) Promotion of interdisciplinary activities designed to improve the quality of human life through advances in animal health; 2) Expand livestock disease research capabilities; 3) Identify animal diseases that affect people and which may serve as models for human disease; 4) Develop new strategies for the diagnosis, treatment, and prevention of disease.

The Center of Excellence is based in the College of Veterinary Medicine (the College), in the UT Institute of Agriculture (the Institute) at the University of Tennessee, Knoxville (UTK). The Center was formed for the purpose of advancing human and animal health through promotion of translational and interdisciplinary research. This annual report serves to inform our stakeholders of the important work done by faculty, staff, and students engaged in research and discovery in pursuit of solutions to ever more complicated challenges and for the sustainability of health and wellness throughout the inextricably connected ecosystems of people, animals, and the environment. I am pleased to report that faculty in the College have increased the magnitude of requested funds for research proposals and that the value of successful awards reached the highest level seen in the past five years.

The 2023 fiscal year represents a time of change for the Center of Excellence. We welcomed new leadership to the Institute with Senior Vice President and Senior Vice Chancellor Keith Carver, who brings great energy and vision to the Institute. We also thanked retiring Professor and Assistant Dean of Research and Graduate Studies, Dr. Stephen Kania, for his leadership over many years. With his retirement, we welcomed the new Assistant Dean for Research and Graduate Studies, Dr. Agricola Odoi, to the Center leadership team. The College also welcomed many new research engaged faculty as we fill open positions and expand successful research programs, including immunology and infectious disease, epidemiology and public health, clinical and anatomic pathology, and regenerative and rehabilitative medicine. Overall, COE faculty published 51 peer-reviewed manuscripts and 11 books or book chapters, resulting in a strong ratio for scientific publications of 3.9 per COE faculty member.

Within this Center report, research and productivity of faculty benefitting from COE funding are highlighted. This includes faculty who received seed grants, new faculty who received start-up funding, new equipment purchases, and details of our student scholar programs during FY23. These faculty members have made significant advancements to grow research across the spectrum of science including molecular diagnostics, infectious disease and immunology, vector borne diseases, regenerative and rehabilitative sciences, and prevention and treatment of livestock diseases that affect agricultural productivity. Metrics used to assess annual return on investment show extramural funding and research expenditures remain strong. In FY23, the ratio of research funding to state appropriation for the Center exceeded 3.2:1 – for every \$1 invested in the COE, faculty were awarded \$3.20 from external funding sources.

I am proud of the dedication and efforts of our extraordinary faculty, staff, and students. The College is actively recruiting new research engaged faculty who will continue to build on the missions of the Center. We hope you enjoy this summary presentation of Center activities and accomplishments.



Dr. James P. Thompson, Dean

UT College of Veterinary Medicine



Summary of Accomplishments

The Center of Excellence plays a vital role in advancing human and animal health by supporting faculty and students, providing resources to maintain research infrastructure, and assisting in the acquisition of state-of-the-art research equipment. Faculty and students receiving support from the Center of Excellence play a vital role in discovering new knowledge regarding the interrelationships among humans, animals, and the environment. The Center of Excellence in Livestock Diseases and Human Health continues to serve its mission to promote interdisciplinary activities designed to:

- Improve the quality of human life through the research for betterment of animal health
- Expand livestock disease research capabilities
- Identify and characterize animal diseases that are similar to human disease
- Develop new strategies for the diagnosis, treatment, and prevention of disease

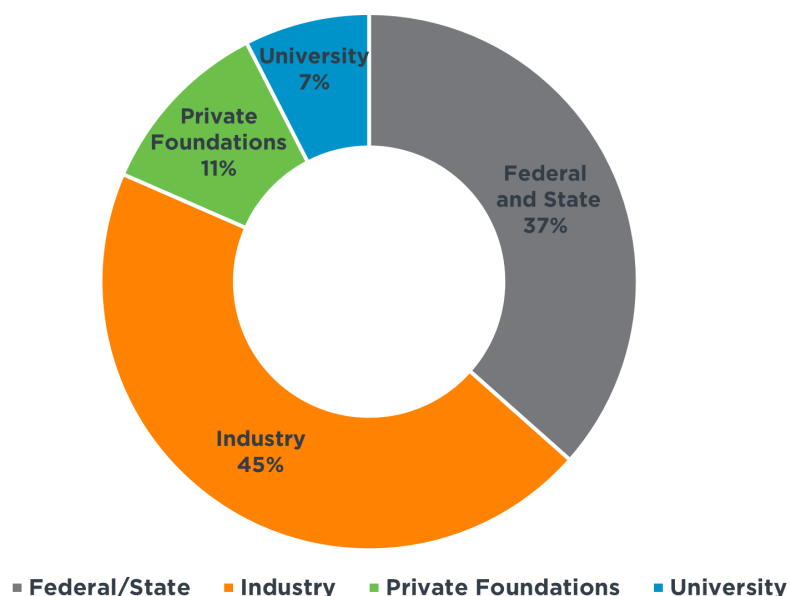
In FY 2023, 16 faculty scientists received support from the Center in areas ranging across a spectrum of science including cancer, immunology, intestinal diseases, musculoskeletal disorders, obesity, pain management, parasitology, pharmacology, vector borne diseases, and virology. Discoveries made by these faculty and their students will drive advances in the understanding of disease pathogenesis, diagnostics, treatment, and prevention that will make life and lives better.

In FY23, the Center provided \$75,000 in research seed grants to five faculty to support research and to develop preliminary data to increase competitiveness for extramural funding. In addition to seed grants, the Center provided \$703,771 in start-up funds to support 12 faculty in establishing their laboratories, purchase equipment, support research staff and graduate students, fund pilot studies, and promote collaboration across UT and the state.

Faculty engaged in Center activities disseminate their research findings through presentations, publications, and scholarly writings. Center faculty presentations included local, national, and international audiences. In 2022, Center of Excellence faculty accounted for 51 peer-reviewed journal articles, 11 book chapters, and 131 presentations. Fifty-nine presentations were presented in national forums, and three presentations were presented in international forums. Scholarly productivity metrics show that COE faculty published an average of 3.2 journal articles per faculty member and an average of 8.2 scientific presentations per faculty in the form of oral, poster, and abstract presentations.

Research expenditures by Center of Excellence faculty significantly increased in FY23 and total research funding increased approximately 20%. Extramural funding increases were driven by marked increases in private foundation grant awards and competitive University grant awards. Total extramural and intramural award funding in FY23 was \$ 1,670,812.00, resulting in a FY23 return on the state COE allocation of 3.2:1.

FY23 Sources of External Funding



Benchmark	2022 (20 Faculty)	2023 (16 Faculty)
	N ¹	N ²
Publications	90	62
Peer-Reviewed Articles	75	51
Book Chapters/Abstracts/Proceedings	15	11
Presentations/Posters/Abstracts	73	131
International	7	3
National	34	59
State or Local	32	69
Invention Disclosures	2	2
Patent Filings	None	None
Research Funding³		
External Funding	\$1,442,277.00	\$1,544,725.00
Internal Funding	\$356,624.00	\$126,087.00
Total Research Expenditures	\$1,692,618.21	\$1,670,812.00
Return on Investment⁴	3.3:1	3.2:1

¹ Publications and presentations for COE faculty during calendar year 2021.

² Publications and presentations for COE faculty during calendar year 2022.

³ Research funding and expenditures for COE faculty during FY23.

⁴ Return on investment based on ratio of extramural funding to COE allocation for FY23..

PROGRAM REPORT

Introduction

The Center of Excellence (COE) in Livestock Diseases and Human Health was founded in 1984 in the College of Veterinary Medicine for the purpose of promoting research in livestock diseases and human health. The Center of Excellence serves a critical role in the UT Institute of Agriculture and the University of Tennessee, Knoxville to serve the missions of research, education, and service to the state of Tennessee and promote advances in the health and wellbeing of people and animals nationally and internationally.

Faculty collaborate with research scientists throughout Tennessee, UT system, and with national and global communities to advance science for the betterment of society by prevention, treatment, detection, and prediction of livestock diseases and improvement of human health. Faculty participating in the Center of Excellence programs meet these responsibilities by conducting original research for the purpose of discovering new knowledge and translating that knowledge into practice for the benefit of agriculture and communities. This includes training undergraduate, professional, and graduate students in the conduct of research, interpretation of data, and translation of findings into practice. These students gain knowledge and skills to become valuable members of the workforce and establish themselves as leaders in the next generation of scientists and scholars. Faculty disseminate these discoveries through publications, presentations, and outreach activities with stakeholders including livestock producers, veterinarians, physicians, animal owners, governmental and regulatory agencies, and the community.

Faculty engaged in the COE have research strengths in multiple areas. These scientific programs are enhanced through interdisciplinary and multidisciplinary collaboration in the pursuit of extramurally funded research. Areas of research emphasis by FY23 COE faculty include biology of cancer and obesity, endocrinology, gastrointestinal diseases, infectious vector borne diseases, parasitology, and regenerative and rehabilitative medicine.

The faculty supported by the Center further engage with the mission of the Institute, University, and UT system to amplify the impact of new knowledge and its application for the betterment of livestock and human health. Among others, some of these collaborative programs include the Human Health and Wellness Program, the UTIA Genomics Center for the Advancement of Agriculture, the One Health Initiative, the UT Oak Ridge Innovation Institute, the Center for Precision Health, the Tennessee Institute for Regenerative Medicine, and the UPMC Orthopedic Institute.

These research programs intertwine for the purpose of advancing agriculture and the environment, as well as advancing human and animal health. Resources available to the Center of Excellence are utilized to promote research through startup packages for new faculty, seed grants to support faculty research leading to extramural grant submissions, purchasing of new research equipment to expand research capabilities and improve competitiveness for extramural funding, and to maintain modern laboratory facilities. The COE supports student summer research programs and the annual Research Day symposium during which results of COE activities are presented to faculty, students, and the academic community.

Personnel



Dr. David Anderson
*Director of the
Center of Excellence*



Dr. Agricola Odoi
*Director of Center of
Excellence student
programs*



Dr. Stephanie Kleine
*Chair of Research
Committee*



Morgan Tolbert
*Oversees
submissions of
faculty proposals*



Emily Ford
*Annual report
production*

Research Funding

Research Funding from External and Internal Sources, FY23

Lead Investigator	Federal/State	Industry	Foundation/Private	University	Total
Dr. Mohammed Abouelkhair	-	-	\$7,500.00	\$14,375.00	\$21,875.00
Dr. Elizabeth Collar	-	-	\$20,000.00	\$26,998.00	\$46,998.00
Dr. Michelle Dennis	-	-	-	-	-
Dr. Cassio Ferrigno	-	-	-	-	-
Dr. Richard Gerhold	\$18,000.00	-	\$80,000.00	\$20,000.00	\$118,000.00
Dr. Luca Giori	-	-	\$2,500.00	\$14,764.00	\$17,264.00
Dr. Chiara Hampton	-	\$1,500.00	-	\$5,000.00	\$6,500.00
Dr. Ashley Hartley	-	-	-	-	-
Dr. Stephanie Kleine	-	-	-	\$13,784.00	\$13,784.00
Dr. Girish Neelakanta	-	-	-	-	-
Dr. Sreekumari Rajeev	-	-	\$15,400.00	\$20,000.00	\$35,400.00
Dr. Sarah Schmid	-	-	-	-	-
Dr. Wesley Sheley	-	-	-	-	-
Dr. Joseph Smith	\$8,743.00	-	-	\$6,166.00	\$14,909.00
Dr. Nora Springer	-	\$750,324.00	\$56,758.00	-	\$807,082.00
Dr. Hameeda Sultana	\$584,000.00	-	-	\$5,000.00	\$589,000.00
TOTALS	\$610,743.00	\$751,824.00	\$182,158.00	\$126,087.00	\$1,670,812.00

Research Expenditures

Research Expenditures, FY23

Lead Investigator	Federal/State	Industry	Foundation/Private	Total
Dr. Mohammed Abouelkhair	\$7,729.16	-	-	\$7,729.16
Dr. Elizabeth Collar	\$40,263.89	\$20,679.04	-	\$60,942.93
Dr. Michelle Dennis	\$5,511.55	\$456.20	-	\$5,967.75
Dr. Cassio Ferrigno	-	-	-	-
Dr. Richard Gerhold	\$42,332.74	\$90,153.43	-	\$132,486.17
Dr. Luca Giori	\$9,843.17	\$1,166.72	-	\$11,009.89
Dr. Chiara Hampton	\$1472.78	-	\$2,973.20	\$4,445.98
Dr. Ashley Hartley	-	\$4367.85	-	\$4,367.85
Dr. Stephanie Kleine	\$7,126.85	-	-	\$7,126.85
Dr. Girish Neelakanta	\$273,531.73	-	-	\$273,531.73
Dr. Sreekumari Rajeev	\$76,476.38	\$25,297.84	-	\$101,774.22
Dr. Sarah Schmid	-	-	-	-
Dr. Wesley Sheley	-	-	-	-
Dr. Jpseph Smith	\$2,674.77	-	-	-
Dr. Nora Springer	\$40,361.62	21,443.88	-	\$61,805.50
Dr. Hameeda Sultana	\$386,483.80	-	-	\$386,483.80
TOTALS	\$893,808.44	\$163,564.96	\$2,973.20	\$1,057,671.83

Allocation of Funding

Allocation of funding within the Center of Excellence (COE) in Livestock Diseases and Human Health promotes research for faculty and students to support discovery and advance knowledge. Funding supports a variety of activities including faculty startup packages associated with the recruitment of new faculty and seed grants for faculty to develop necessary data to support extramural grant submissions and foster new collaborative research initiatives. COE funding also works to ensure professional and graduate students are engaged in research with faculty and have the necessary resources to achieve their goals.

Center of Excellence faculty include tenure-track faculty at all stages of career development. Startup funds assigned to newly hired tenure-track faculty ensure these faculty members have sufficient resources to establish a research program and develop data and publications that will contribute to their competitiveness as principal investigators on extramural grant submissions.

Other Center of Excellence funds are used to promote faculty research through the COE seed grant program. Seed grants are awarded annually through the Center's call for research proposals, which occurs each spring. The UTCVM research committee reviews each proposal and makes recommendations to the College's Associate Dean for Research regarding which proposals are best aligned with the objectives of the Center of Excellence and are most likely to contribute to the faculty member's ability to successfully compete for extramural funding.

A number of special requests occur during the year with respect to COE faculty needs associated with their laboratories and research. The College's Associate Dean for Research addresses these requests on a case-by-case basis including purchasing new equipment to advance and expand research capabilities of COE faculty. COE funding also is utilized to update laboratories to ensure facilities are modern and sufficient for the recruitment and continued success of COE faculty.



Pictured above is a photo of the newly opened Teaching and Learning Center. The college celebrated the grand opening of the Teaching and Learning Center in January 2023 with a dedication ceremony hosted in the new facility.

Infrastructure and Supplies

Center of Excellence funds support research infrastructure in the UT College of Veterinary Medicine and the UT Institute of Agriculture and include the purchase of equipment, maintenance of shared essential research equipment, and other needs for support in shared laboratories. Requests for funds are evaluated by the research advisory committee. This committee reviews funding requests and recommends supporting or denying requests based on justification. The committee ensures the request being evaluated does not represent a redundant request relative to existing resources. The committee also considers the number of faculty who are likely to benefit from the resources and equipment of the request.

Equipment

During FY23, equipment purchases totaled \$195,047.51. This equipment was associated with a variety of research laboratories, including the immunology, vector borne and zoonotic disease, regenerative medicine, and cell biology laboratories. The new equipment included a BioX 3D bioprinter, Sorvall X4 Pro Centrifuge, QuantStudio 3 machine, Qubit Flex Fluorometer Instrument, and a Macbook Pro bioinformatics computer.

Travel

Faculty and students continued to engage in regional, national, and international conferences.



This BioX 3D printer consists of a three-syringe pneumatic head to create custom 3D scaffolds. The printer also has built-in UV sterilization and a HEPA filter to maintain sterility. This printer is regularly used to train graduate and undergraduate students in addition to fabricating scaffolds for intramurally and extramurally funded research projects.



The Sorvall X4 Pro Centrifuge is used to separate cells from fluid in a temperature-controlled environment. This facilitates purification of cells for subsequent enumeration and use in experiments such as flow cytometry, tissue-engineered model systems, or immunofluorescence microscopy in the fields of regenerative medicine, stem cell biology, and cancer biology.



The Locator Jr. is used to cryopreserve and store primary and immortalized cell lines in liquid nitrogen. Cell lines are subsequently thawed and expanded in tissue culture media for in vitro experiments in the fields of regenerative medicine, stem cell biology, and cancer biology.



The iBright Imaging System captures images and analyzes data from western blots and gels efficiently and effectively. This system supports the main imaging applications of chemiluminescent and colorimetric western blots, in addition to fluorescent stained nucleic acid gels, fluorescent stained protein gels, colorimetric stained protein gels, and colorimetric membrane stains.



The QuantStudio 3 machine detects differences in target quantity as low as 1.5-fold, allows remote controlling, and features optional cloud-based Applied Biosystems analysis modules and data sharing.



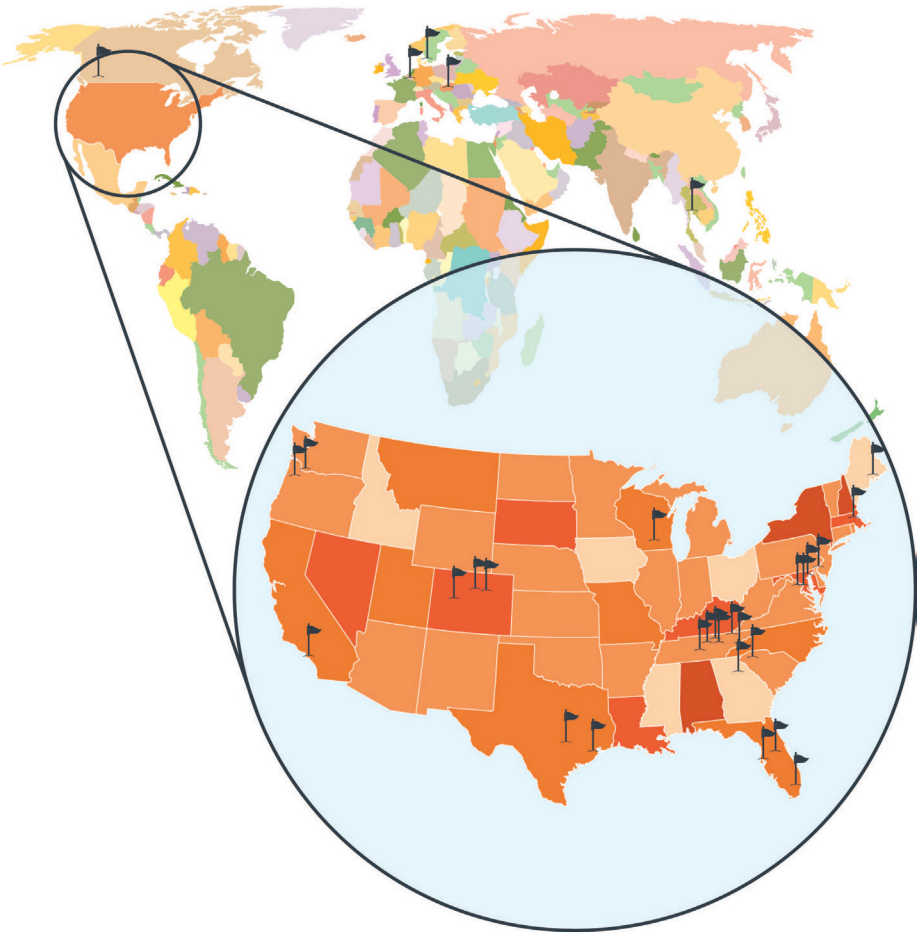
The Qubit Flex Fluorometer Instrument accurately and quickly measures the concentration of DNA, RNA, or protein in up to eight samples simultaneously. The efficiency of this instrument is crucial when working with limited supplies of DNA samples.



The 16-inch MacBook Pro is well-suited for bioinformatics analysis. With its substantial processing power and ample memory, it can handle complex computational tasks such as sequence alignment, variant calling, and high-throughput data analysis with ease. This configuration significantly improves the efficiency and speed of bioinformatics workflows, enabling the user to process and analyze large datasets more quickly and effectively.

Dissemination of Research

Center of Excellence faculty are strongly encouraged to disseminate their research discoveries through publications, presentations at scientific meetings, presentations of posters, and participation in scientific panels. The 16 funded faculty members of the Center of Excellence had a total of 62 publications. Fifty-one of these publications were peer-reviewed scientific articles, and 11 publications included book chapters, abstracts, and proceedings. In addition to these published works, Center of Excellence Faculty participated in 131 presentations including oral presentations, abstract presentations, and poster presentations. To the right, you will see a world map indicating the locations of meetings at which faculty presented their work. In addition to these scholarly works, one invention disclosure was filed by Dr. Sreekumari Rajeev with the University of Tennessee Research Foundation in 2022.



FY23 Invention Disclosures		
Inventors	Title	Status
Srreekumari Rajeev	Antigen discovery useful for vaccine and diagnostics in <i>Leptospira</i>	Invention Disclosure

Popular Press and Media

In addition to faculty speaking engagements, the UTCVM issues press releases to state, regional, and national media, resulting in numerous television and print features, many of which relate directly to research conducted through the Center.

UTCVM appeared on the local NBC affiliate WBIR Channel 10's "Live at Five at Four" news show three times over the last year. "Live at Five at Four" has an average of 70,000 viewers each day. The College also manages several Facebook pages: official College page (15,000 likes), alumni page (1,500 likes), Charles and Julie Wharton Large Animal Hospital at UT page (2,500 likes), and the Equine Performance & Rehabilitation Center at UTCVM page (1,500 likes). Page administrators post clinical and research information for users to the Facebook pages, as well as on the College's other social media pages such as Instagram (3,509 followers) and Twitter (4,788 followers). The College's YouTube channel has 1,460 subscribers.

The College produces a bi-monthly VOLVet Connect alumni e-newsletter that contains items of note aimed at DVM alumni, including UTCVM research news and continuing education and network opportunities. Each quarter, referring veterinarians within a 250-mile radius receive a printed copy of VOLVet News which provides updates on the Veterinary Medical Center as well as a "Science Behind the Medicine" piece highlighting a particular area of research at the College. VOLVet Vision is an annual magazine that explores the research, teaching, and outreach services of UTCVM.

In addition, the University has joined The Conversation, an independent source for news articles and informed analysis written by the academic community and edited by journalists for the general public. Our researchers have the opportunity to craft academic research into digestible stories for the public good.

THE CONVERSATION

UTCVM has also launched the VOLVet Voice Podcast that shares the stories of knowledge, compassion, and discovery from the college that create Real. Life. Solutions.



THE STORIES OF
Knowledge. Compassion. Discovery.

Summer Scholar Research

Through the Summer Scholar Research Program, veterinary students were provided an opportunity to explore careers in research through participation in a hypothesis-driven project, group training activities, and attendance at research symposia. Coordinated by Dr. Sreekumari Rajeev, the program was designed to stimulate veterinary students' interest in research through hands-on exposure to the research environment. The objectives of the program were for students to learn about study design, identify specific objectives for their project, receive meaningful research experience, develop an understanding of research careers and opportunities, develop a basic understanding of the scientific method, develop skills in one or more research techniques, learn about data analysis and interpretation, obtain experience creating and delivering a research presentation, learn about ethical issues involved in research, receive an introduction to responsible conduct of research, and develop camaraderie with other student researchers.

Twenty-two students participated in laboratory and field research and attended professional development seminars where speakers addressed topics such as career opportunities in research, compliance issues in laboratory animal care, data visualization, science writing, scientific presentations, and the grant proposal process. Near the end of the ten-week program, the students presented their research findings to their colleagues and to University of Tennessee College of Veterinary Medicine faculty and staff. Six students (Jaclyn Azelby, Kaitlyn Linney, Grace Malla, Frank Rodriguez, Heather Thomasovich, and Jessica Wakeman) presented their work at the 2023 National Veterinary Student Symposium held in San Juan, Puerto Rico.

The summer scholars also receive an opportunity to present their work to a broad audience and earn awards at the College's annual Research Day on September 18, 2023. This year, five summer student researchers (Chessa Brown, Victoria Diaz, Allie Asbury, Megan Kinsella, and Heather Thomasovich) placed within the veterinary student presentation category. More information about the awards these students received can be found on pages 20-23 of this report.

The Center fully funded 15 student stipends and partially funded three student stipends for the Summer Scholar Research Program. A grant from Boehringer Ingelheim funded four students (Kaitlyn Linney, Grace Malla, Frank Rodriguez, and Heather Thomasovich). Twelve UTCVM veterinary students who gained research experience in the summer program are currently enrolled in the College's DVM/PhD program.

To maximize student opportunities, the program is open to both Center and non-Center faculty. During FY23, six Center faculty members (Drs. Mohamed Abouelkhair, Elizabeth Collar, Richard Gerhold, Chiara Hampton, Joseph Smith, and Nora Springer) participated in the program. The Center continues to encourage the participation of its faculty in mentoring DVM students.



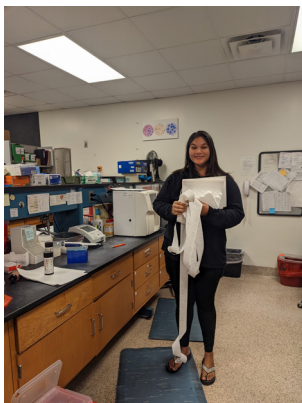
Pictured from left to right: Jessica Lynch, Grace Malla, Frank Rodriguez, Dr. Sreekumari Rajeev, Nicholas Britt, Jessica Wakeman, Heather Thomasovich, Kaitlyn Linney, and Jaclyn Azelby.

The COE Summer Student Research Program travels nationally! Six COE Summer Scholar Research Program students and two veterinary externship students presented at the 2023 National Veterinary Scholars Symposium in San Juan, Puerto Rico!

Amanda Alli

Faculty Mentor: Dr. Sarah Schmid

Summer Project: Evaluating effect of bilirubinuria and hemoglobinuria on urine dipstick results



Allie Asbury

Faculty Mentor: Dr. Liza Koster

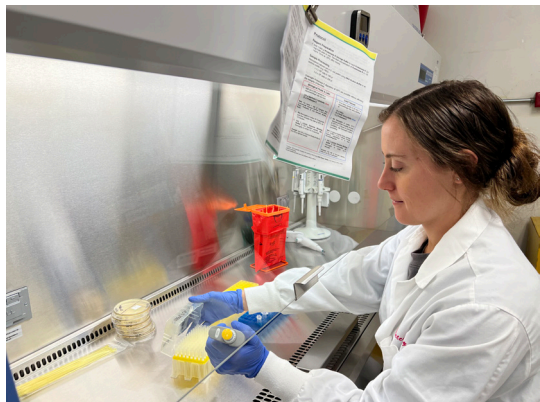
Summer Project: Echocardiographic estimates of shunt volumes in dogs with patent ductus arteriosus and their association with measures of cardiac volume overload and outcome.



Jaclyn Azelby

Faculty Mentors: Drs. Sreekumari Rajeev and Nair Rajeev

Summer Project: Characterizing *mycoplasma* species isolated from dogs and cats with non-respiratory clinical presentations



Cody Brady

Faculty Mentors: Drs. Julia Albright and Kim Anderson

Summer Project: Efficacy of white noise as part of a multimodal anxiolytic and analgesic protocol to treat post-operative pain following hemilaminectomy in dogs with acute intervertebral disc herniation



Chessa Brown

Faculty Mentors: Dr. Elizabeth Collar

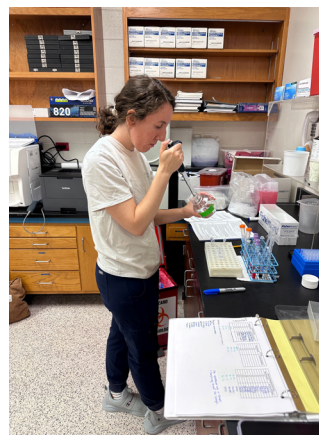
Summer Project: Comparison of firocoxib and t-TUCB alone and in combination for the treatment of osteoarthritis in horses



Victoria Diaz

Faculty Mentors: Drs. Chiara Hampton, Luca Giori, and Deanna Schaefer

Summer Project: In vitro feasibility of canine and bovine blood products for swine



Ryan Flynn

Faculty Mentors: Drs. Pierre-Yves Mulon, Joseph Smith, and Angela Rollins

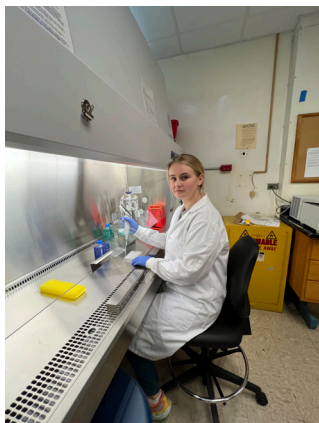
Summer Project: Evaluation of patient nutrition practices in a farm animal referral hospital



Claudia Hines

Faculty Mentors: Drs. Sreekumari Rajeev and Madhu Dhar

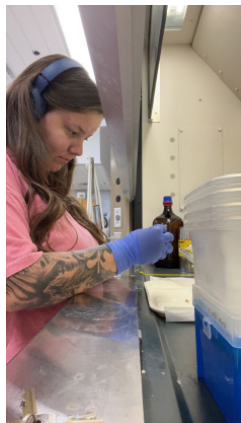
Summer Project: Antigen characterization for serologic diagnosis of *Leptospira* infection



Kyra Hokkanen

Faculty Mentors: Dr. Debra Miller

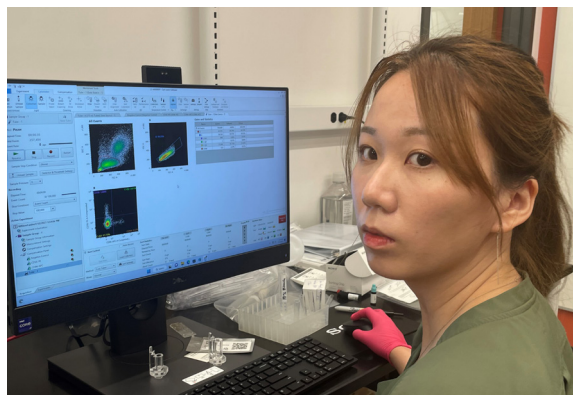
Summer Project: Retrospective histopathological investigation of sea turtle hatchling mortalities



Yuting Huang

Faculty Mentors: Dr. Mohamed Abouelkhair

Summer Project: Evaluation of patient nutrition practices in a farm animal referral hospital



Matthew Katzmarek

Faculty Mentors: Dr. Girish Neelakanta

Summer Project: Prevalence of bacterial pathogens in ticks collected from deer in Tennessee



Megan Kinsella

Faculty Mentors: Dr. Debra Miller

Summer Project: Causes of alopecia in free ranging bats in TN



Josie Levy

Faculty Mentor: Dr. Tena Ursini

Summer Project: Biomechanical research in the horse using high speed motion capture cameras and electromyography to pair muscle activity to the motion being performed



Kaitlyn Linney

Faculty Mentor: Dr. Debra Miller

Summer Project: Using natural remedies to treat fungal (Bsal) infection in salamanders



Grace Malla

Faculty Mentors: Drs. Pierre-Yves Mulon and Joseph Smith

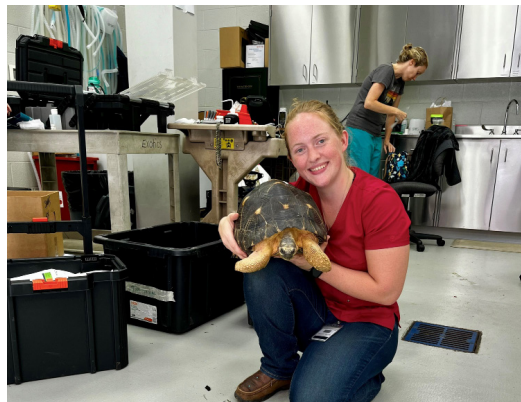
Summer Project: Development of an induced synovitis model for goats



Gabrielle Mould

Faculty Mentors: Dr. Danielle Tarbert

Summer Project: Orthopedic and Neurological Examination in Healthy Radiated Tortoises (*Astrochelys radiata*)



Lindsey Rice

Faculty Mentors: Dr. Richard Gerhold

Summer Project: Parasite and vector borne disease prevalence in samples collected from moose in elk throughout North America



Frank Rodriguez

Faculty Mentors: Dr. Mohamed Abouelkhair

Summer Project: Validation of a PARR assay for detecting clonality in canine lymphoid malignancies



Heather Smith

Faculty Mentors: Dr. Debra Miller

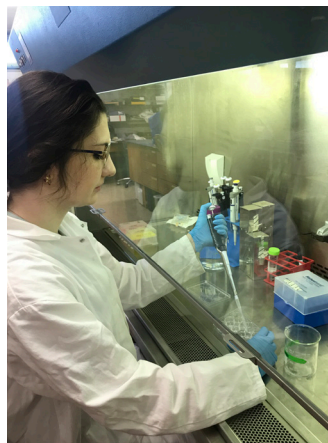
Summer Project: *Fusarium*: The unseen threat to Florida's leatherback population



Jessica Wakeman

Faculty Mentors: Dr. Nora Springer

Summer Project: Evaluation of patient nutrition practices in a farm animal referral hospital



Demi Striligas

Faculty Mentors: Dr. Elizabeth Collar

Summer Project: Retrospective study evaluating partial phallectomies in equid patients



Heather Thomasovich

Faculty Mentors: Dr. Andrea Lear

Summer Project: Biomarker discovery in pregnant cattle infected with bovine viral diarrhea virus





Research Day

The Center was a major sponsor of the University of Tennessee College of Veterinary Medicine Research Day held on September 18, 2023. This event is designed to serve as a venue for students and new investigators to gain experience in showcasing their research while also providing potential collaboration and networking opportunities. Eighteen of the College's comparative and experimental graduate students and 19 of the College's professional veterinary students delivered oral presentations. Four presentations were delivered by College post-docs. Post-doc presenters included Drs. Biswajit Bhowmick, Liana Nunes Barbosa, Prachi Namjoshi, and Mahesh Puthuyotti Poyil. Residents presented six presentations, and presenters included Drs. Skylar Caldwell, Jennifer Goldreich, Elizabeth Pisack, Jake Salzman, and Stephanie Steuri. Student presentations were scored based on their performance. The winners of Research Day awards are highlighted below.

2023 UTCVM Research Day Awards

Resident and Post-Doc Category

Top Resident Presentation - Dr. Jake Salzman, Small Animal Clinical Sciences

"The effect of butorphanol and dexmedetomidine on serum cortisol concentration"

Mentors: Shelly Olin, Alejandro Esteller-Vico, and Luca Giori

Top Post-Doc Presentation - Dr. Liana Nunes Barbosa, Biomedical and Diagnostic Sciences

"Effect of immunization with a recombinant Leptospira chemotaxis protein in C3H/HeJ mice"

Mentor: Sreekumari Rajeev

Graduate Student Category

1st Place - Lichao Liu, Comparative & Experimental Medicine

"Role of Rickettsia parkeri membrane assembly protein in the interactions of this bacterium with mammalian and tick cells"

Mentor: Dr. Girish Neelakanta

Travel award: \$500.00

2nd Place (tied) - Alexandra Carlson, Comparative & Experimental Medicine

"Evaluation of soluble epoxide hydrolase inhibitor in an in vitro osteoarthritis model with equine synovial fluid derived mesenchymal stem cells"

Mentors: Drs. Elizabeth Collar and Madhu Dhar

Travel award: \$300.00

2nd Place (tied) - Nirmalendu Deb Nath, Comparative & Experimental Medicine

"Geographic disparities and temporal changes of diabetes-related mortality risks in Florida: An ecological study"

Mentor: Dr. Agricola Odoi

Travel award: \$300.00

Veterinary Student Category

Phi Zeta Awardee for Excellence in Animal Health Research (1st Place) – Chessa Brown, Class of 2026

“Clinical effect of multidose oral administration of firocoxib and t-TUCB alone and in combination for the treatment of osteoarthritis in horses”

Mentor: Elizabeth Collar

Travel award: \$400.00 and a \$250.00 cash award from Phi Zeta

2nd Place – Victoria Diaz, Class of 2025

“In vitro feasibility of bovine whole blood as a source of xenotransfusion in swine”

Mentors: Chiara Hampton and Deana Schaefer

Travel award: \$300.00



3rd Place (Tied) – Allie Asbury, Class of 2025

“Echocardiographic estimates of shunt volumes in dogs with patent ductus arteriosus and their association with measures of cardiac volume overload and outcome”

Mentor: Liza Koster

Travel award: \$200.00

3rd Place (Tied) – Megan Kinsella, Class of 2025

“Investigation of alopecia lesions in gray bats”

Mentor: Rick Gerhold

Travel award: \$200.00



3rd Place (Tied) – Heather Thomasovich, Class of 2026

“Biomarker discovery in pregnant cattle infected with bovine viral diarrhea virus”

Mentor: Andrea Lear

Travel award: \$200.00

Faculty Awards

In addition to the student awards, two faculty awards were also presented at Research Day. The Boehringer Ingelheim Faculty Research Mentoring Award was awarded to Dr. David Anderson, and the Zoetis Award for Veterinary Research Excellence was awarded to Dr. Andrea Lear.



Dr. David Anderson (left) poses with Dr. Agricola Odoi (right) at the 2023 Research Day awards ceremony.



Dr. Agricola Odoi (left) poses with Dr. Andrea Lear (right) at the 2023 Research Day awards ceremony.

Three Minute Thesis

On February 27, 2023, 30 graduate students presented at the sixth annual University of Tennessee Three Minute Thesis (3MT) competition. The 3MT event is held as a part of the University of Tennessee's Graduate and Professional Student Appreciation Week. This competition challenges master's and doctoral students to communicate their unique thesis or dissertation to an audience unfamiliar with the subject. Competitors have three minutes to explain their research using only one slide or photo. Three students, Tania Dawant, Meaghan Harley-Troxell, and Jessie Richards, from the College of Veterinary Medicine's comparative and experimental medicine graduate program participated in the main heat of the 3MT competition. Meaghan Harley-Troxell and Jessie Richards progressed to the finals competition held on March 29, 2023.

Tania Dawant

Tania Dawant presented her research about the risks associated with *Toxoplasma gondii* (T. gondii), which is a parasite that causes 20% of deaths associated with foodborne pathogens. Tania's research looks further into how marine animals, such as waterfowl, have been contracting a disease that typically is unusual in marine life. Examining the increase of waterfowl infected with T. gondii is important because ultimately, the increased infection of the waterfowl will lead to increased infection among humans due to shared water systems.



Meaghan Harley-Troxell

Meaghan Harley-Troxell presented her research about how regenerative medicine can be used to develop a treatment for neural injuries, which disrupt automatic functions such as breathing and muscle movements. Currently, only one treatment exists for neural injuries, and this treatment involves two surgeries that are successful only 33% of the time. Meaghan is researching treatments that will not only manage symptoms caused by neural injuries but also treat these injuries. To achieve this goal, Meaghan is currently developing a biomaterial scaffold and multicellular spheroids. Both of these inventions will work together to safely regenerate a physical and functional nerve.



Jessie Richards

Jessie Richards presented about the effects of *Parelaphostrongylus tenuis* (P. tenuis) on white-tailed deer and how she is developing a novel test that will work to detect the disease earlier so that treatment can be sought. Currently, no tests exist that are able to detect the disease in a timely manner for treatment. Infection of P. tenuis completely debilitates the neurological function of an animal, which then causes the animal unsafely navigate their environment. The diagnostic test Jessie has created is serologic, which allows for the detection of antibodies associated with P. tenuis within an animal's blood. Jessie has created a system to identify unique markers on parasites that react with the antibodies in animals positive for P. tenuis.





Five-Year Benchmark Data

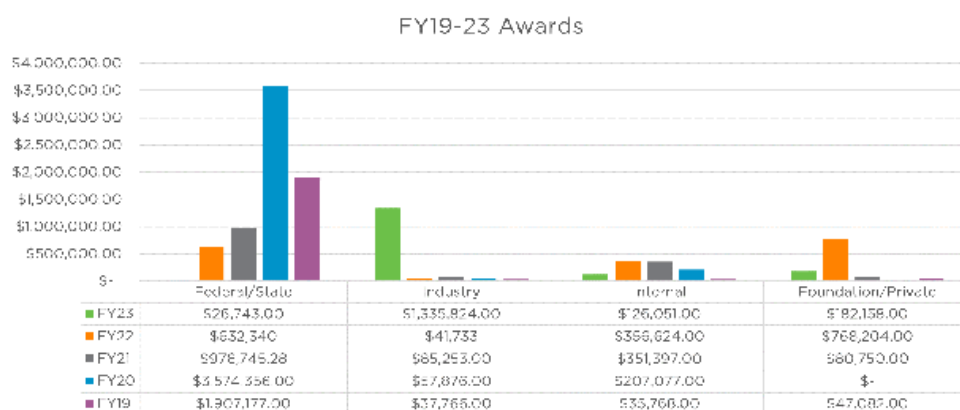
Scholarly productivity among Center of Excellence faculty remains strong, and the impact of the COE is affecting a wider array of research activities. Total publications (62 by 16 COE faculty) and publications per faculty member decreased slightly compared with previous years. However, the number of presentations at conferences (119 presentations), and the number of presentations per faculty member (8.2), were substantially higher than the previous fiscal year.

Extramural funding was \$1,544,725 during FY23 as compared with FY22 when extramural awards totaled \$1,442,277. FY23 COE faculty submitted a total of 32 research grants to federal, state, industry, and foundation sponsors, which is an 18.7% increase from FY22. In addition, a total of 14 external grant proposals were funded compared to 10 funded external proposals in FY22. External funding totaled to \$1,544,725 in FY23, which is a 7% positive growth compared to FY22, where extramural funding totaled to \$1,442,277.

Grant proposals were most often submitted to foundations (15) and federal agencies (13), with a smaller number of proposals being submitted to industry partners (4). Awards most often were secured from private foundations (7) and state and federal agencies (4), followed by industry partners (3).

Overall, research funding and research expenditures increased from the previous year. Increased expenditures were attributable to on-going research from several large research grants awarded in FY21. In addition, COE faculty received a total of \$126,087 in internal grants (CVM, UTIA, UTK) to seed exploratory research. This resulted in a combined research funding award value of \$1,670,812 and a return-on-investment ratio of 3.2:1, meaning that for every \$1 invested in the COE, faculty generated \$3.20 from extramural funding sources.

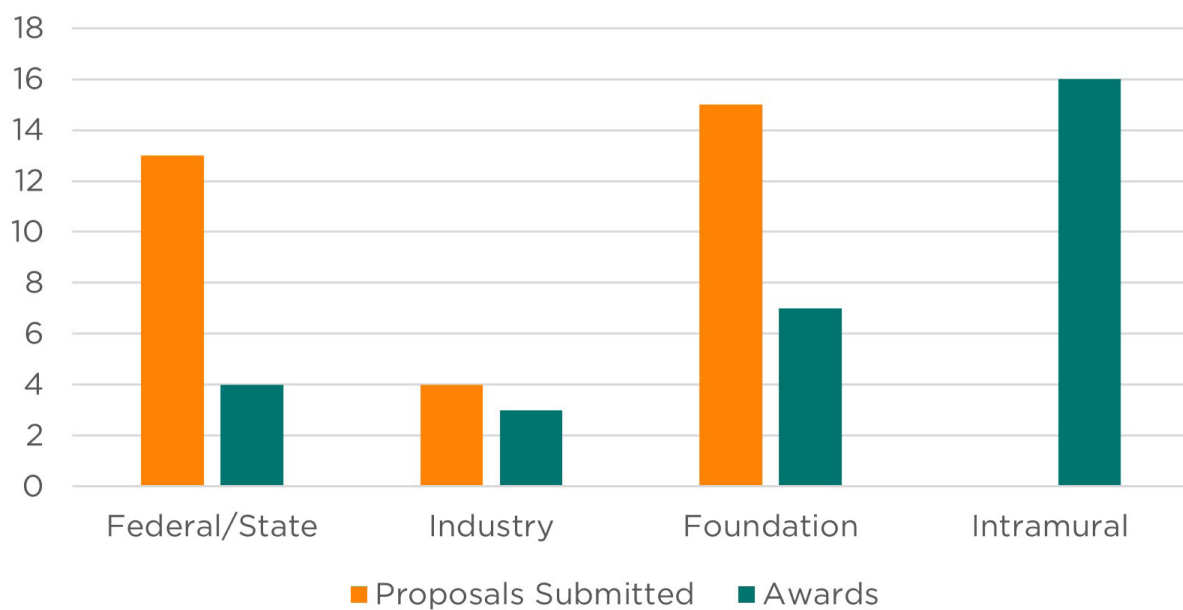
Center of Excellence funds continue to support the mentoring of graduate and professional students in research. Currently, FY23 COE faculty are graduate advisors to PhD students, MS students, and professional students participating in the Summer Scholar Research Program.



Benchmark Summary

Extramural funding in FY23 (\$1,544,725) was greater compared to FY22 (\$1,442,277). Center of Excellence faculty submitted a total of 46 grant proposals, and 14 of those grant proposals were extramural grant submissions leading to a total of \$1,670,812 in external and internal awards. The extramural grant award success rate was 44%.

FY23 Proposals and Awards



Future Plans: Looking Forward

The Center of Excellence in Livestock Diseases and Human Health (COE) is dedicated to continued development of interdisciplinary and multidisciplinary activities designed to promote the advancement of human and animal health, expand research capacities for livestock research, explore commonalities between animal diseases and human diseases that have mutual benefit for the advancement of both, and develop new strategies for the diagnosis, treatment, and prevention of disease. The Center continues to invest in faculty, students, research, and infrastructure to support its mission.

Faculty supported by the Center continue to be productive in submitting proposals and successfully competing for grant awards. Grant award successes speak to the resilience of the faculty, renewed research culture for discovery, and advancing science for the benefit of livestock and human health. During FY23, several new faculty hires have significant research appointments and start-up support from the Center of Excellence. These faculties represent an important investment in the future of research. Infrastructure enhancements have been necessary to support the research programs of these faculty. These faculty will have key roles in dissemination of new knowledge to stakeholders including scientists, practitioners, producers, and the public.

During the next five years, we will work toward renovation of additional laboratories in CVM and will continue to develop collaborations with UTIA AgResearch, UTK, UTORII and UTHSC to expand translational and human health research. Additional collaborations among institutions will be important, including ORNL and UTORII. This will include continuing discussions for strategic planning for future biomedical research facilities and multispecies vivaria aimed to expand translational and animal-intensive research activities.

START-UP FACULTY RESEARCH SUMMARIES

Dr. Mohamed Abouelkhair

ASSISTANT PROFESSOR OF IMMUNOLOGY
UTCVM BIOMEDICAL AND DIAGNOSTIC SCIENCES

About Dr. Abouelkhair

PhD
University of Tennessee

MS
University of Sadat City

*Peer-Reviewed
Publications:*
1 in 2022

Book Chapters:
3 in 2022

Presentations:
14 in 2022



RESEARCH INTERESTS

Microbial bioinformatics; development of new molecular assays for direction of existing and emerging infectious diseases; and immunology.

Dr. Elizabeth Collar

ASSISTANT PROFESSOR OF EQUINE SURGERY
UTCVM LARGE ANIMAL CLINICAL SCIENCES

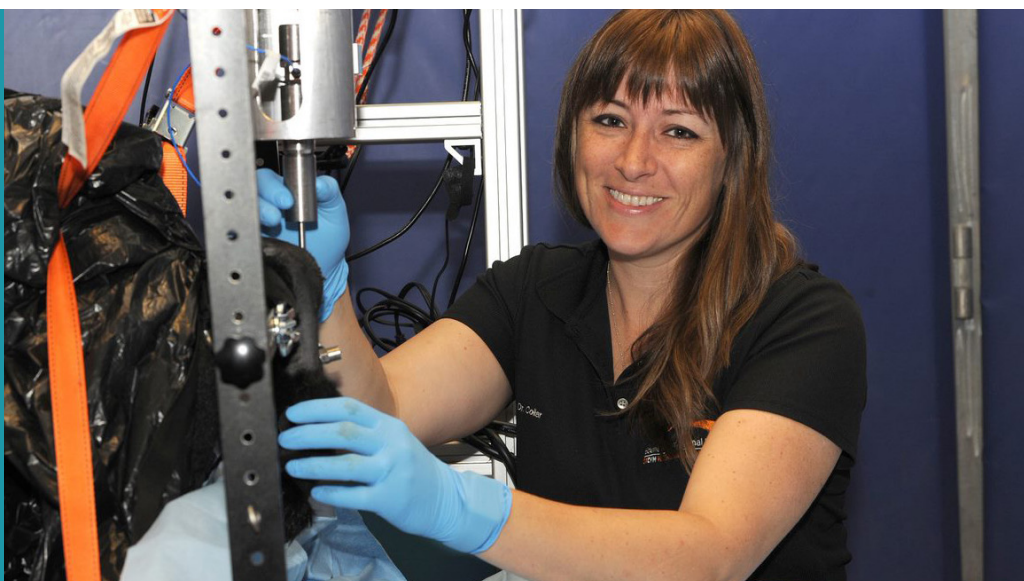
About Dr. Collar

PhD
Oregon State University

DVM
University of Minnesota

Presentations:
5 in 2022

*Posters, Abstracts, and
Proceedings:*
3 in 2022



RESEARCH INTERESTS

Racehorses; sport horses; and translational musculoskeletal disease with a focus on subchondral bone.

Dr. Michelle Dennis

ASSOCIATE PROFESSOR OF ANATOMIC PATHOLOGY
UTCVM BIOMEDICAL AND DIAGNOSTIC SCIENCES

About Dr. Dennis

PhD
Colorado State University

DVM
Purdue University

Peer-Reviewed Publications:
2 in 2022

Book Chapters:
1 in 2022

Presentations:
5 in 2022

*Posters, Abstracts, and
Proceedings:*
3 in 2022



RESEARCH INTERESTS

Pathogenesis and diagnosis of natural disease with special interest in aquatic animals and wildlife.

Dr. Cassio Ferrigno

ASSISTANT PROFESSOR OF ORTHOPEDIC SURGERY
UTCVM SMALL ANIMAL CLINICAL SCIENCES

About Dr. Ferrigno

PhD
University of São Paulo,
Brazil

DVM
Universidade Estadual
Paulista, Brazil

MVS
University of São Paulo,
Brazil



RESEARCH INTERESTS

Limb deformity corrections; complex fractures treatment; orthopedic implant biomechanics; patellar luxation; and cruciate disease.

Dr. Chiara Hampton

ASSISTANT PROFESSOR OF VETERINARY ANESTHESIA AND ANALGESIA
UTCVM LARGE ANIMAL CLINICAL SCIENCES

About Dr. Hampton

DVM
University of Messina, Italy

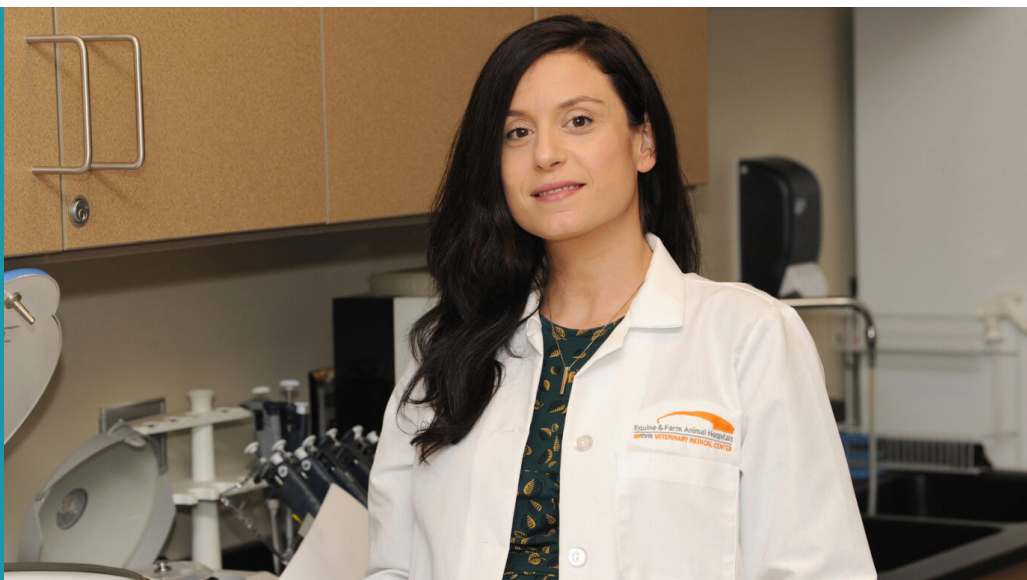
MS
Oregon State University

Peer-Reviewed Publications:
4 in 2022

Book Chapters:
2 in 2022

Presentations:
7 in 2022

*Posters, Abstracts, and
Proceedings:*
5 in 2022



RESEARCH INTERESTS

Stress alleviation; tranquilization; sedation; general anesthesia in swine; transfusion medicine and blood typing in swine; and translational research.

Dr. Ashley Hartley

ASSISTANT PROFESSOR OF INTERNAL MEDICINE
UTCVM SMALL ANIMAL CLINICAL SCIENCES

About Dr. Hartley

PhD
University of Georgia

DVM
University of Georgia



RESEARCH INTERESTS

Small animal medicine with particular research focuses in infectious diseases, immunology, and hepatobiliary diseases.

Dr. Girish Neelakanta

ASSOCIATE PROFESSOR OF INFECTIOUS DISEASES
UTCVM BIOMEDICAL AND DIAGNOSTIC SCIENCES

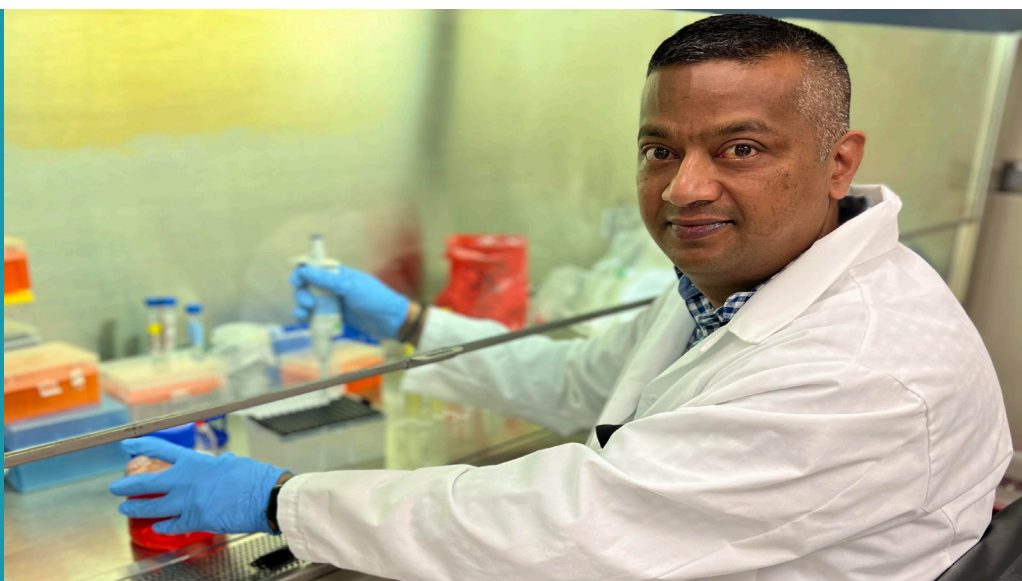
About Dr. Neelakanta

PhD
University of Cologne,
Germany

MSc
Bangalore University, India

**Peer-Reviewed
Publications:**
6 in 2022

Presentations:
12 in 2022



RESEARCH INTERESTS

Vector-borne diseases and molecular aspects of host-pathogen interactions; and development of transmission-blocking vaccines.

Dr. Sreekumari Rajeev

PROFESSOR OF INFECTIOUS DISEASES
UTCVM BIOMEDICAL AND DIAGNOSTIC SCIENCES

About Dr. Rajeev

PhD
University of Tennessee

DVM
Kerala Agricultural
University, India

Peer-Reviewed Publications:
1 in 2022

Book Chapters:
1 in 2022

Presentations:
12 in 2022



RESEARCH INTERESTS

Host-pathogen interaction; diagnosis and prevention of *Leptospira* infection in animals; diagnostics and vaccines; and development for *Ehrlichia canis* and *Anaplasma platys* infection in dogs.

Dr. Sarah Schmid

ASSISTANT PROFESSOR OF INTERNAL MEDICINE
UTCVM SMALL ANIMAL CLINICAL SCIENCES

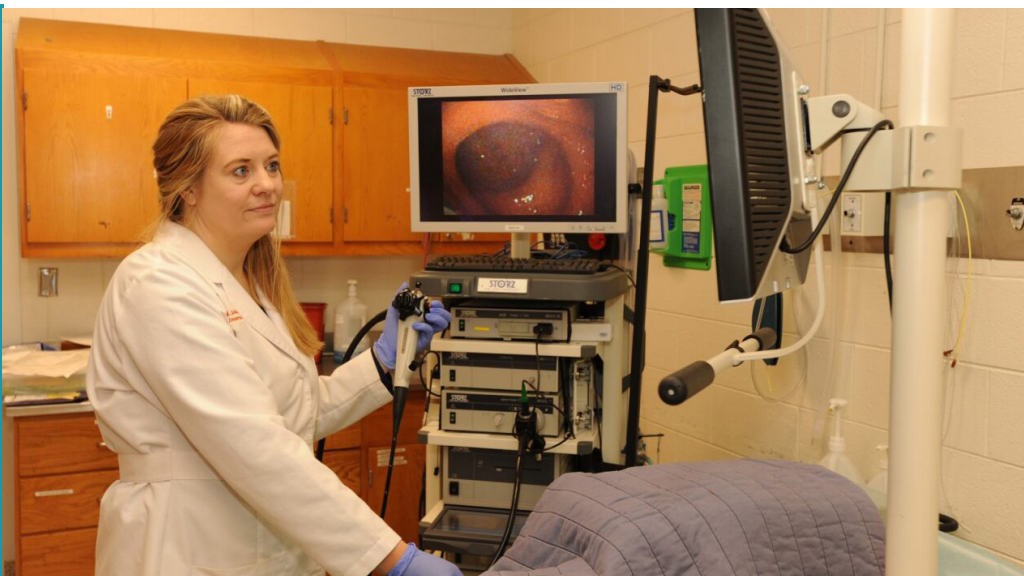
About Dr. Schmid

DVM
University of Wisconsin-
Madison

Peer-Reviewed Publications:
1 in 2022

Book Chapters:
1 in 2022

Presentations:
7 in 2022



RESEARCH INTERESTS

Gastroenterology; states of hypoalbuminemia; endoscopy; and veterinary education.

Dr. Wesley Sheley

ASSISTANT PROFESSOR OF ANATOMIC PATHOLOGY
UTCVM BIOMEDICAL AND DIAGNOSTIC SCIENCES

About Dr. Sheley

PhD
University of Tennessee

DVM
University of Tennessee

Peer-Reviewed Publications:
1 in 2022

Presentations:
3 in 2022



RESEARCH INTERESTS

Histology; histopathology, anatomic pathology, surgical pathology; *Batrachochytrium salamandrivorans*; necropsy; and wildlife and fisheries.

Dr. Joseph Smith

ASSISTANT PROFESSOR OF LARGE ANIMAL VETERINARY CLINICAL PHARMACOLOGY
UTCVM LARGE ANIMAL CLINICAL SCIENCES

About Dr. Smith

PhD
Iowa State University

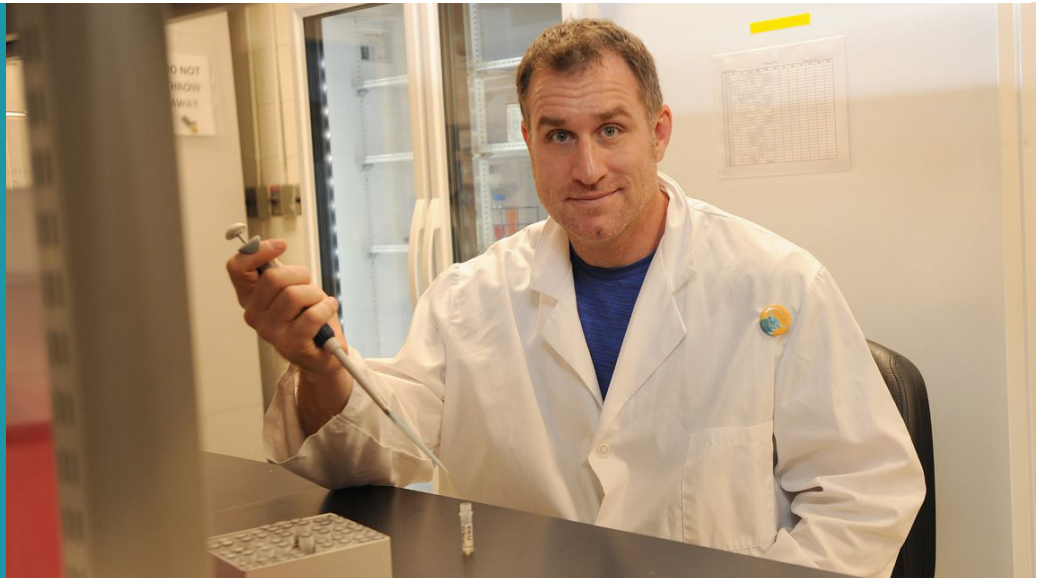
DVM
The Ohio State University

Peer-Reviewed Publications:
10 in 2022

Book Chapters:
1 in 2022

Presentations:
28 in 2022

*Posters, Abstracts, and
Proceedings:*
15 in 2022



RESEARCH INTERESTS

Pharmacology, small ruminants; ruminant pain management; and comparative animal models.

Dr. Nora Springer

ASSISTANT PROFESSOR OF CLINICAL PATHOLOGY
UTCVM BIOMEDICAL AND DIAGNOSTIC SCIENCES

About Dr. Springer

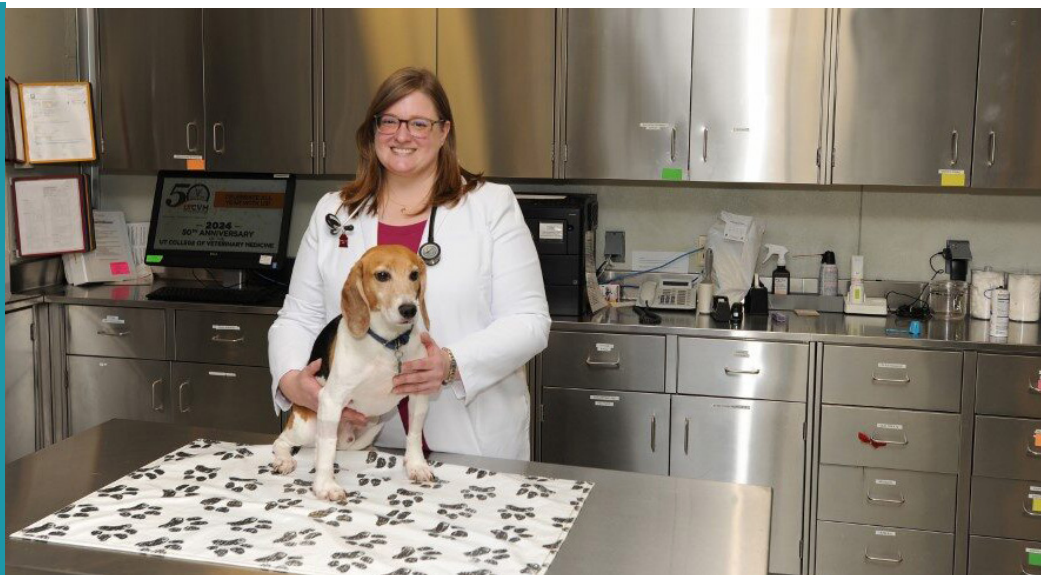
PhD
Cornell University

DVM
Kansas State University

Peer-Reviewed Publications:
5 in 2022

Book Chapters:
1 in 2022

Presentations:
2 in 2022



RESEARCH INTERESTS

Naturally occurring diseases and cancers in companion animals; veterinary clinical pathology; cancer biology; tumor microenvironment; translational medicine; and comparative oncology.

Dr. Hameeda Sultana

ASSOCIATE PROFESSOR OF INFECTIOUS DISEASES
UTCVM BIOMEDICAL AND DIAGNOSTIC SCIENCES

About Dr. Sultana

PhD
University of Cologne,
Germany

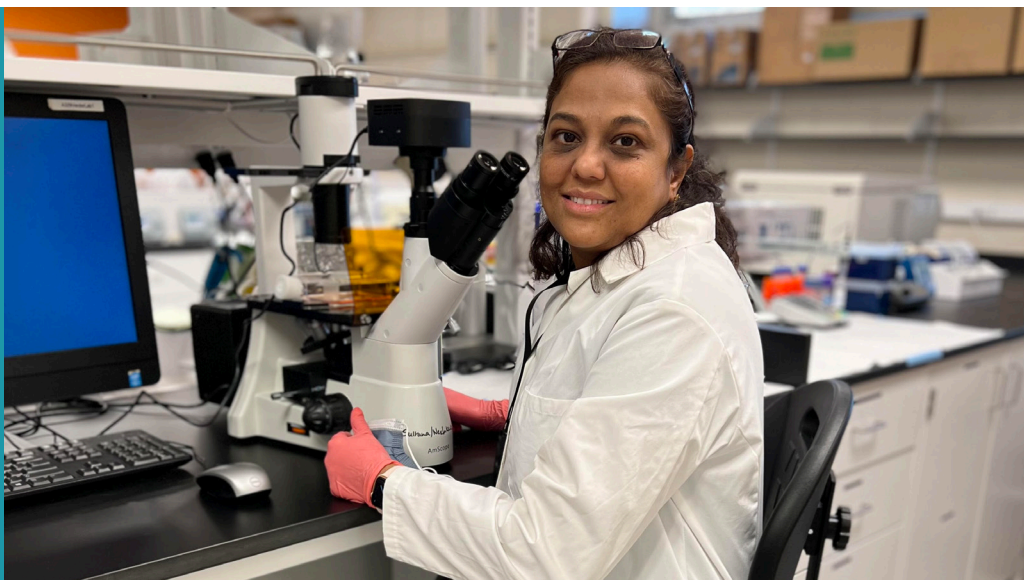
MS
Bangalore University

Peer-Reviewed Publications:
6 in 2022

Book Chapters:
1 in 2022

Presentations:
11 in 2022

*Posters, Abstracts, and
Proceedings:*
11 in 2022



RESEARCH INTERESTS

Arthropod-derived exosomes in mediating flavivirus transmission; vector-borne viral diseases involving flaviviruses; and identifying treatments for pan-flaviviral infections in humans and animals

FUNDED FACULTY RESEARCH SUMMARIES

Dr. Richard Gerhold

ASSOCIATE PROFESSOR OF PARASITOLOGY
UTCVM BIOMEDICAL AND DIAGNOSTIC SCIENCES



COE SEED FUND RESEARCH:

Establishing a surveillance program and diagnostic assay for the zoonotic tapeworm (*Echinococcus*)

Dr. Gerhold's research focuses on establishing local surveillance for both definitive and intermediate hosts while also developing ELISA for canids. *Echinococcus* is a zoonotic genus of cestode parasites that occurs globally. Canids are the primary definitive hosts, and intermediate hosts can range from small rodents to cervids. The parasite causes at least 19,000 deaths and 871,000 disability adjusted life years annually according to the WHO. In addition, carcass condemnation and impaired growth in infected livestock costs an estimated \$2 billion every year. In humans, the fatality rate can reach up to 70% if left untreated. There are two main species of concern: *E. granulosus*, the cause of cystic echinococcosis, and *E. multilocularis*, the cause of alveolar echinococcosis. Historically, this disease has been restricted to the mid-northern states and occasional outbreaks in sheep farmers in the western U.S. However, there is evidence that the disease is expanding to new states and territories. Little is known about the extent of this geographic expansion, or the potential impact it may have on wildlife, domestic animals, and humans. Currently, diagnosis of the disease in intermediate hosts requires either necropsy or ultrasound with aspiration of cystic material. Dr. Gerhold and his team hypothesized that *Echinococcus* has established a life cycle in Tennessee and potentially other nearby states. The goal of this study is to assess the prevalence and geographic extent of this parasite and develop and do preliminary testing on an ELISA for assessing exposure in wild populations.

About Dr. Gerhold

PhD
University of Georgia

DVM
Purdue University

MS
University of Georgia

*Peer-Reviewed
Publications:*
11 in 2022

Presentations:
18 in 2022

Dr. Luca Giori

ASSISTANT PROFESSOR OF ENDOCRINOLOGY
UTCVM BIOMEDICAL AND DIAGNOSTIC SCIENCES

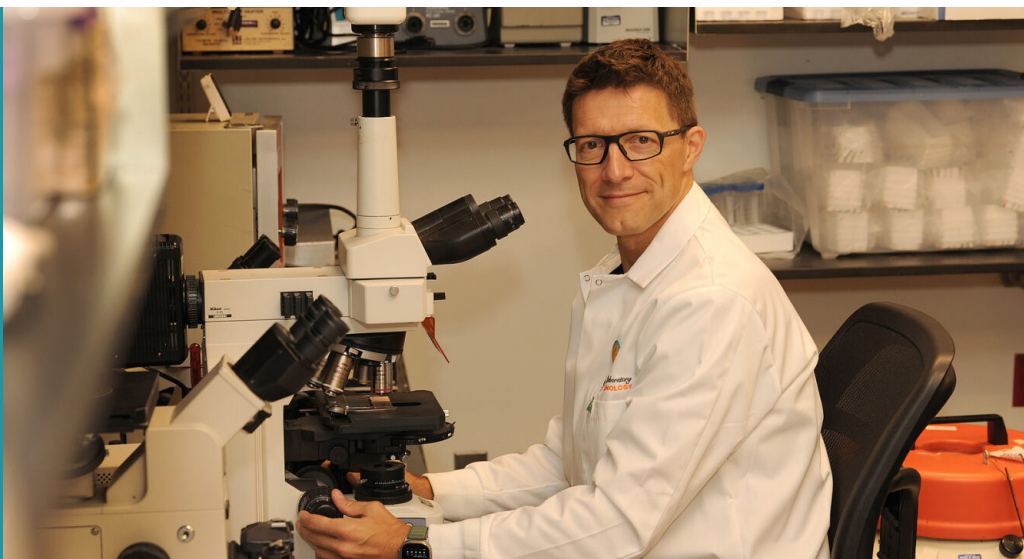
About Dr. Giori

PhD
University of Milan, Italy

DVM
University of Milan, Italy

*Peer-Reviewed
Publications:*
3 in 2022

*Posters, Abstracts, and
Proceedings:*
1 in 2022



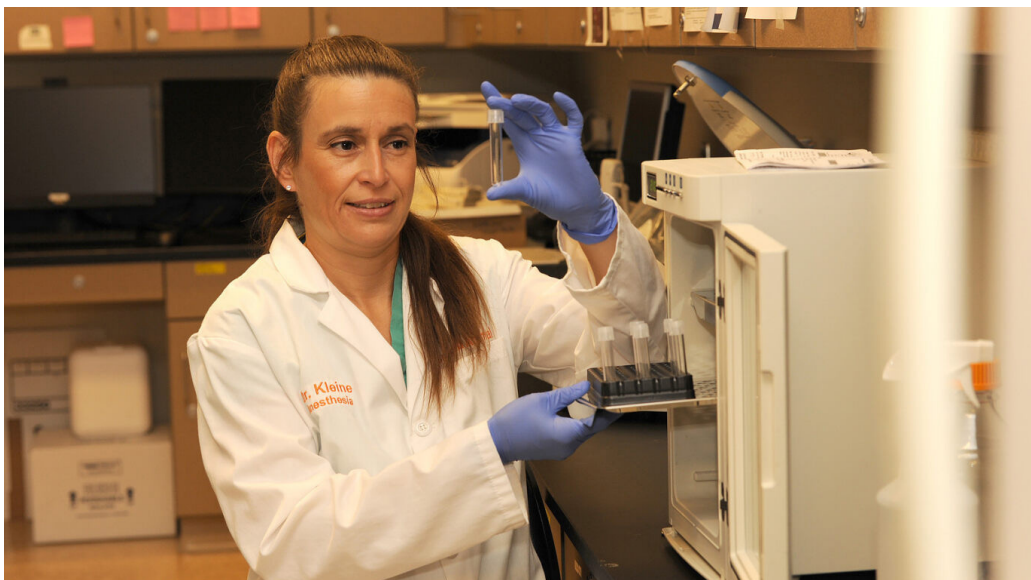
COE SEED FUND RESEARCH:

Development of a portable assay for rapid, stall-side detection of equine adrenocorticotrophic hormone (ACTH)

Dr. Giori's research focuses on creating a portable assay for detecting the equine adrenocorticotrophic hormone (ACTH). Pituitary pars intermedia dysfunction (PPID), a neurodegenerative disorder similar to Parkinson's in humans, is one of the most common endocrinopathies in the equine population. With the loss of inhibitory signals, there are increased adrenocorticotrophic hormone (ACTH) and α -melanocyte-stimulating hormone, leading to the clinical signs. Measurement of endogenous plasma ACTH is the best option to confirm the clinical diagnosis either in a basal sample or after dynamic tests. Currently, there are no field tests available for ACTH testing. Due to the labile nature of ACTH, a test that can be immediately performed stall-side would dramatically reduce measurement variations. Magnetic bead-based immunoassay offers a promising method for isolating analytes from complex matrices such as blood, without centrifugation. Moreover, bulky plate readers and spectrophotometers can be replaced by smartphone apps that serve similar functions, allowing diagnostics to be brought to the field. Dr. Giori and his team hypothesize that, with the magnetic bead enrichment, their platform will provide a shorter sample-result time, field deployability, and higher sensitivity than the current radioimmunoassays and chemiluminescent assay (CLIA).

Dr. Stephanie Kleine

ASSISTANT PROFESSOR OF ANESTHESIA AND ANALGESIA
UTCVM SMALL ANIMAL CLINICAL SCIENCES



About Dr. Kleine

PhD
University of Georgia

DVM
University of Georgia

COE SEED FUND RESEARCH:

Evaluation of kappa receptor agonism and mu opioid receptor antagonism on markers of inflammation and cartilage degradation in vitro

Osteoarthritis is estimated to affect 344 million people globally and is a major source of pain and loss of joint function. Currently there are no available treatments that prevent progression of arthritis; therefore, treatment is primarily aimed to alleviate pain. Administration of opioids, such as morphine, into the joint has been shown to provide effective analgesia due to the presence of opioid receptors within the joint. Even with frequent use within the joint, only a laboratory synthesized compound, specific to one opioid receptor (Kappa opioid receptor) has been evaluated for osteoarthritis modifying effects. Despite the findings of the latter study in decreasing markers of cartilage breakdown, there is a paucity of data on the effects of readily available opioids (i.e. butorphanol, nalbuphine, and naltrexone) on cartilage damage. As pigs are known to be excellent translational models for human disease, cartilage samples collected from healthy juvenile pigs are used to assess the efficacy of butorphanol, nalbuphine, and naltrexone on cartilage breakdown. Cartilage samples were collected from each pig and cultured in conditions shown to mimic human osteoarthritis. The supernatant was then evaluated for inflammatory substances and markers of cartilage damage.

Dr. Sreekumari Rajeev

PROFESSOR OF INFECTIOUS DISEASES
UTCVM BIOMEDICAL AND DIAGNOSTIC SCIENCES

About Dr. Rajeev

PhD
University of Tennessee

DVM
Kerala Agricultural
University, India

**Peer-Reviewed
Publications:**
1 in 2022

Book Chapters:
1 in 2022

Presentations:
12 in 2022



COE SEED FUND RESEARCH:

identifying vaccine candidates to prevent leptospirosis in cattle

Dr. Rajeev's research goal is to develop an all-species, safe, and cross-protective universal vaccine against leptospirosis. *Leptospira* infection is highly prevalent in cattle, estimated at 30-40% in endemic regions in the United States. *Leptospira* infection in cattle results in economic loss due to abortions, early embryonic death, reproductive wastage, and mortality. The current vaccines neither result in long-lasting protective immunity nor prevent *Leptospira* renal colonization or urinary shedding. We have identified several promising vaccine candidate proteins common to many pathogenic *Leptospira* through reverse vaccinology strategy and immunoinformatic analysis. In this project, Dr. Rajeev and her team predicted potential functions and 3-D structures of identified *Leptospira* proteins to select ideal vaccine candidates; expressed and purified ~nine selected proteins; and tested immunogenicity and protective efficacy of four selected candidates in hamsters. Her team's experiments will result in well-characterized candidates for vaccine development to prevent leptospirosis in cattle.

Dr. Joseph Smith

ASSISTANT PROFESSOR OF LARGE ANIMAL VETERINARY CLINICAL PHARMACOLOGY
UTCVM LARGE ANIMAL CLINICAL SCIENCES



COE SEED FUND RESEARCH:

Development of a lameness model for goats

Dr. Smith's research goal is to establish a lameness model that assesses pain from lameness in the goat population. Animal welfare is a critical aspect of the livestock industry and is receiving a growing amount of attention by consumers, which is creating new pressure to improve current pain management practices. Goats are increasing in population in North America, but few models have been established to explore animal welfare issues such as pain from lameness in goats. Currently lacking in the literature is a transient model of lameness that can be utilized to investigate analgesic drugs and other therapies in lame goats. In this study, goats were induced with lameness in a transient manner as described in cattle and horses, by intra-articular injection of Amphotericin B. The initial phase of the project determined the optimum dose for lameness induction, and the second phase evaluated this dose with a larger population of goats. Movement prior to lameness induction will be evaluated by lameness scoring, accelerometer data, and pressure mat analysis. These same parameters will be evaluated during the induced lameness phase to determine alterations caused by lameness induction by this method in goats. The model generated from this study will serve as a foundation for future studies evaluating therapies and analgesics for lameness in goats.

About Dr. Smith

PhD
Iowa State University

DVM
The Ohio State University

Peer-Reviewed Publications:
10 in 2022

Book Chapters:
1 in 2022

Presentations:
28 in 2022

Posters, Abstracts, and Proceedings:
15 in 2022

RESEARCH FUNDING, EXPENDITURES, AND BUDGETING

Research Funded Externally

Lead Investigator	Proposal Title	Sponsor	Amount Awarded
Dr. Mohamed Abouelkhair	Staphyococcus pseudintermedius vaccine composite	University of Tennessee Research Foundation (UTRF)	\$7,500
Dr. Elizabeth Collar	In vitro analysis of the optimization of stem cell therapy for the treatment of oosteoarthritis using equine synovial fluid derived mesenchymal stem cells with a soluble epoxide hydrolase inhibitor	Foundation for the Horse	\$20,000
Dr. Richard Gerhold	Investigating the fertility rates and early embryo mortality in unhatched wild turkey eggs in the southeastern United States	National Wild Turkey Federation	\$25,000
	Bear health	Tennessee Wildlife Resources Agency	\$18,000
	Funding agreement for Dr. Nicole Szafranski	Oklahoma State University	\$55,000
Dr. Luca Giori	Share the future research grant	American Society for Veterinary Clinical Pathology (ASVCP)	\$2,500
Dr. Chiara Hampton	Sparing effect of medetomidine-vatinoxan and hydromorphone on induction dose of alfaxalone	Dechra Veterinary Products, LLC	\$1,500
Dr. Sreekumari Rajeev	Boehringer Ingelheim Veterinary Scholars Program	Boehringer Ingelheim Animal Health USA, Inc.	\$15,400
Dr. Joseph Smith	Development of a lameness model for goats	United States Department of Agriculture (USDA)	\$8,743
Dr. Nora Springer	The effect of overweight and obesity on adult stem cell function for regenerative therapies in dogs	American Kennel Club Health Foundation	\$55,548
	Safety and preliminary efficacy of PV-10 for the ablation of canine soft tissue sarcomas	Provectus Biopharmaceuticals, Inc.	\$750,324
	It's all in the genes: The mutational landscape of acute myeloid leukemia in dogs	Cornell University	\$1,210
Dr. Hameeda Sultana	Arthropod exosomes mediate vector-pathogen interactions	United States Department of Health and Human Services and National Institutes of Health	\$219,000
	Arthropod exosomes mediate vector-pathogen interactions	United States Department of Health and Human Services and National Institutes of Health	\$365,000
TOTAL			\$1,544,725.00

Research Funded Internally

Lead Investigator	Proposal Title	Amount Awarded
Dr. Mohamed Abouelkhair	Novel antibiotics from extremophile bacteria	\$5,375
	Identification, molecular characterization, and comparative genomics of canine parvovirus and canine distemper virus isolates collected from domestic dogs and wild animals (foxes, raccoons, and coyotes) using Next Generation Sequencing	\$5,000
	Research development activities	\$4,000
Dr. Elizabeth Collar	Comparison of oral administration of firocoxib and t-TUCB alone and in combination for the treatment of osteoarthritis in horses	\$5,000
	Investigation into viability of synovial mesenchymal stem cells after repeated intra-articular allogenic stem cell injection in MHC-mismatched horses	\$5,000
	Evaluation of safety and osteochondral activity after repeated intra-articular allogeneic stem cell injections in MCH-mismatched horses	\$12,000
	Feasibility and safety of intraarticular ultrafiltration probes to collect synovial fluid in horses	\$4,998
Dr. Richard Gerhold	Establishing a surveillance program and diagnostic assay for the zoonotic tapeworm, <i>Echinococcus</i>	\$15,000
	Prevalence investigation of chagas disease (<i>Trypanosoma cruzi</i>) and gastrointestinal endoparasitism of domestic dogs (<i>Canis familiaris</i>) in the Salta Province in Argentina	\$5,000
Dr. Luca Giori	Development of a portable assay for rapid, stall-side deetction of equine adrenocorticotrophic hormone (ACTH)	\$14,764
Dr. Chiara Hampton	In vitro feasibility of bovine whole blood and commercially-prepared canine whole blood and packed red blood cells as a source of xenotransfusion in swine	\$5,000
Dr. Stephanie Kleine	Evaluation of kappa receptor agonism and mu opioid receptor antagonism on markers of inflammation and cartilage degradation in vitro	\$13,784
Dr. Sreekumari Rajeev	Investigating the prevalence and histopathologic lesions of leptospirosis in southeastern coyotes	\$5,000
	Identifying vaccine candidates to prevent leptospirosis in cattle	\$15,000
Dr. Joseph Smith	Development of a lameness model for goats	\$6,166
Dr. Hameeda Sultana	Expanding Horizons Faculty Development Program	\$5,000
TOTAL		\$126,087

Actual and Proposed Budget

	FY23 Actual			FY24 Proposed		
	Matching	Appropri.	Total	Matching	Appropri.	Total
Expenditures	\$	\$	\$	\$	\$	\$
Salaries						
Faculty	\$5,008	\$10,015	\$15,023	-	-	-
Other Professional	\$13,333	\$26,667	\$40,000	\$24,328	\$48,657	\$72,985
Clerical/ Supporting	\$23,564	\$47,128	\$70,692	\$38,628	\$77,256	\$115,884
Assistantships	\$47,668	\$95,335	\$143,003	\$64,146	\$128,293	\$192,439
Total Salaries	\$89,572	\$179,145	\$268,717	\$127,103	\$254,205	\$381,308
Longevity (Excluded from Salaries)	-	-	-	-	-	-
Fringe Benefits	\$144,577	\$29,153	\$43,730	\$16,858	\$33,716	\$50,574
Total Personnel	\$104,149	\$208,298	\$312,447	\$143,961	\$287,921	\$431,882
Non-Personnel						
Travel	\$2,221	\$4,441	\$6,662	\$6,766	\$13,531	\$20,297
Software	\$259	\$518	\$777	\$2,609	\$5,217	\$7,826
Books & Journals	-	-	-	-	-	-
Other Supplies	\$75,171	\$150,342	\$225,513	\$115,953	\$231,906	\$347,859
Equipment	\$44,278	\$88,555	\$132,833	\$224,199	\$448,399	\$672,598
Maintenance	\$2,524	\$5,048	\$7,572	\$18,191	\$36,381	\$54,572
Scholarships	\$33,387	\$66,773	\$100,160	\$39,665	\$79,330	\$118,995
Consultants	-	-	-	-	-	-
Other (Specify):						
Printing, Duplicating, & Binding	\$2,152	\$4,303	\$6,455	\$3,413	\$6,825	\$10,238
Postage, Freight, & Telephone	-	-	-	-	-	-
Professional Services & Memberships	\$36	\$71	\$107	\$828	\$1,657	\$2,485
Computer Services	-	-	-	-	-	-
Rentals	\$133	\$265	\$398	\$138	\$275	\$413
Grants & Subsidies	-	-	-	-	-	-
Contractual & Special Services	\$7,765	\$15,530	\$23,296	\$28,382	\$56,764	\$85,146
Other Expenditures	-	-	-	\$1,669	\$3,337	\$5,006
Entertainment, Food, & Housing	-	-	-	-	-	-
Facilities & Admin	-	-	-	-	-	-
Direct Cost Sharing	-	-	-	-	-	-
Total Non-Personnel	\$167,924	\$335,848	\$503,773	\$441,812	\$883,623	\$1,325,435
GRAND TOTAL	\$272,073	\$544,147	\$816,220	\$585,772	\$1,171,545	\$1,757,317
Revenue						
New State Appropriation	-	\$542,778	\$542,778	-	\$561,013	\$561,013
Carryover State Appropriation	-	\$1,483,024	\$1,483,024	-	\$1,115,410	\$1,115,410
New Matching Funds	\$271,389	-	\$271,389	\$280,507	-	\$280,507
Carryover from Previous Year Matching Funds	\$741,512	-	\$741,512	\$557,705	-	\$557,705
TOTAL REVENUE	\$838,691	\$1,677,381	\$22,516,072	\$857,477	\$1,714,954	\$2,572,431

Requested Budget

	FY24 Requested		
	Matching	Appropri.	Total
Expenditures			
Salaries			
Faculty	-	-	-
Other Professional	\$22,553	\$45,105	\$67,658
Clerical/ Supporting	\$38,628	\$77,255	\$115,883
Assistantships	\$64,146	\$128,293	\$192,439
Total Salaries	\$125,327	\$250,653	\$375,980
Longevity (Excluded from Salaries)	-	-	-
Fringe Benefits	\$17,701	\$35,402	\$53,104
Total Personnel	\$143,028	\$286,065	\$429,084
Non-Personnel			
Travel	\$5,531	\$11,063	\$16,594
Software	\$2,609	\$5,217	\$7,826
Books & Journals	-	-	-
Other Supplies	\$114,286	\$228,573	\$342,859
Equipment	\$220,866	\$441,732	\$662,598
Maintenance	\$18,191	\$36,381	\$54,572
Scholarships	\$39,665	\$79,330	\$118,995
Consultants	-	-	-
Other (Specify)			
Livestock	-	-	-
Printing, Duplicating, & Printing	\$3,413	\$6,825	\$10,238
Postage, Freight, & Telephone	-	-	-
Professional Services & Memberships	\$829	\$1,657	\$2,486
Computer Services	-	-	-
Rentals	\$140	\$279	\$419
Grants & Subsidies	-	-	-
Contractual & Special Services	\$28,382	\$56,764	\$85,146
Other Expenditures	\$168	\$337	\$505
Entertainment, Food, & Housing	-	-	-
Facilities & Admin	-	-	-
Direct Cost Sharing	-	-	-
Total Non-Personnel	\$434,079	\$868,159	\$1,302,238
GRAND TOTAL	\$577,107	\$1,154,214	\$1,731,322
Revenue			
New State Appropriation	-	\$610,805	\$610,805
Carryover State Appropriation	-	\$543,409	\$543,409
New Matching Funds	\$305,403	-	\$305,403
Carryover from Previous Year Matching Funds	\$271,705	-	\$271,705
TOTAL REVENUE	\$577,108	\$1,154,214	\$1,731,322

SCHOLARLY ACTIVITY CITATIONS

Dr. Mohamed Abouelkhair

PEER-REVIEWED PUBLICATIONS

Caroline Billings*, Rebecca Rifkin*, Mohamed Abouelkhair*, Rebekah Duckett-Jones, Austin Bow, Jaydeep Kolape, Sreekumari Rajeev, Stephen Kania, David E. Anderson. (2022). In vitro and in vivo assessment of caprine origin *Staphylococcus aureus* ST398 strain UTCVM1 as an osteomyelitis pathogen. *Front. Cell. Infect. Microbiol.* doi: 0.3389/fcimb.2022.1015655

BOOK CHAPTERS, ABSTRACTS, AND PROCEEDINGS

Abouelkhair, MA and Kennedy M. (2022). Basic Virology, Veterinary Microbiology 4th edition, Elsevier. <https://doi.org/10.1002/9781119650836.ch4>

Abouelkhair, MA and Kennedy M. (2022). Caliciviridae, Veterinary Microbiology 4th edition, Elsevier. <https://doi.org/10.1002/9781119650836.ch55>

Abouelkhair, MA and Kennedy M. (2022). Papillomaviridae and Polyomaviridae, Veterinary Microbiology 4th edition, Elsevier. <https://doi.org/10.1002/9781119650836.ch50>

PRESENTATIONS

Celia Gelpey, Mohamed Abouelkhair, Katie Dziendziel, Aaron Shults. Development of a reverse transcription loop-mediated isothermal amplification (RT-LAMP) assay for rapid detection of canine distemper virus. Comparative & Experimental Medicine and Public Health Research Symposium. Knoxville, TN. Oral presentation.

Camille Cordero-Aponte, Michelle Dennis, Mohamed Abouelkhair, Andrew Cushing. Adenoviral nephropathy in Zoo Budgerigars (*Melopsittacus undulatus*). UTCVM morning rounds. Oral presentation.

Morgan Adkins, Andi Lear, Marc Caldwell, Jon Beever, Mohamed Abouelkhair. Viral Trojan horse: Exosome formation mediates BVDV transmission to susceptible cells. Comparative & Experimental Medicine and Public Health Research Symposium. Knoxville, TN. Oral presentation.

Lufuno Phophi, Mohamed Abouelkhair, Rebekah Jones, Maryke Henton, Nenene Qekwana, Stephen Kania. The molecular epidemiology of *S. pseudintermedius* isolated from dogs in South Africa. Comparative & Experimental Medicine and Public Health Research Symposium. Knoxville, TN. Oral presentation, the presenter was Lufuno Phophi.

Roositalab, S. Kania, O. Elsakhawy, Mohamed Abouelkhair. Molecular characterization of thirteen *Staphylococcus pseudintermedius* strains isolated from the United States. Comparative & Experimental Medicine and Public Health Research Symposium. Knoxville, TN. Oral presentation.

Lufuno Phophi, Mohamed Abouelkhair, Rebekah Jones, Maryke Henton, Nenene Qekwana, Stephen Kania. The molecular epidemiology of *S. Pseudintermedius* isolated from dogs in South Africa. Kentucky-Tennessee Branch of the American Society for Microbiology Meeting, Cooleville, TN. Oral presentation.

Roositalab, S. Kania, O. Elsakhawy, R. Donnell, Mohamed Abouelkhair. Genome Sequencing and Molecular Characterization of a Novel Canine Distemper Virus Strain, Isolated from a Fox (*Otocyon megalotis*) in the United States. Kentucky-Tennessee Branch of the American Society for Microbiology Meeting, Cooleville, TN. Oral presentation.

Lufuno Phophi, Mohamed Abouelkhair, Rebekah Jones, Maryke Henton, Nenene Qekwana, Stephen Kania. Temporal changes in the molecular epidemiology of methicillin resistant *Staphylococcus pseudintermedius* in the United States. Kentucky-Tennessee Branch of the American Society for Microbiology Meeting, Cooleville, TN. Oral presentation.

Ola Elsakhawy, Mohamed Abouelkhair, S. Kania, R. Jones. Antimicrobial Genes in Thermophilic *Bacillus paralicheniformis* Associated with Mobile Elements. Comparative & Experimental Medicine and Public Health Research Symposium. Knoxville, TN. Oral presentation.

Celia Gelpey, Mohamed Abouelkhair. Development of a reverse transcription loop-mediated isothermal amplification (RT-LAMP) assay for rapid detection of canine distemper virus. 2022 Summer Veterinary research presentations. Knoxville, TN. Oral presentation.

Camille Cordero-Aponte, Michelle Dennis, Mohamed Abouelkhair, Andrew Cushing. Adenoviral nephropathy in Zoo Budgerigars (*Melopsittacus undulatus*). ACVP meeting Westin Boston Seaport District Boston, Massachusetts. Oral presentation.

Ola Elsakhawy, Mohamed Abouelkhair, S. Kania, R. Jones. Antimicrobial Genes in Thermophilic *Bacillus paralicheniformis* Associated with Mobile Elements. ASM Conference on Rapid Applied Microbial Next-Generation Baltimore, MD. Oral presentation.

Roositalab, S. Kania, O. Elsakhawy, R. Donnell, Mohamed Abouelkhair. Genome Sequencing and Molecular Characterization of a Novel Canine Distemper Virus Strain, Isolated from a Fox (*Otocyon megalotis*) in the United States. Conference on Rapid Applied Microbial Next-Generation Baltimore, MD. Oral presentation.

Lufuno Phophi, Mohamed Abouelkhair, Rebekah Jones, Maryke Henton, Nenene Qekwana, Stephen Kania. Temporal changes in the molecular epidemiology of methicillin resistant *Staphylococcus pseudintermedius* in the United States. American Society for Microbiology Microbe, 2022, Washington, DC. Oral presentation.

Dr. Elizabeth Collar

PEER-REVIEWED PUBLICATIONS

Collar, E.M. (2022), Equid elbow luxation and subluxation: Anatomical review and case management considerations. *Equine Vet Educ*, 34: 342-345. <https://doi.org/10.1111/eve.13572>

BOOK CHAPTERS, ABSTRACTS, AND PROCEEDINGS

Collar, E.M., Smith, J., Johnson R. (2022) Pharmacokinetics and Pharmacodynamics of Epidural and Intramuscular Triamcinolone in Horses with Chronic Lameness. *Scientific Presentation Abstracts. Veterinary Surgery*. Portland, OR. Primary author.

Collar, E.M., Rifkin, R.E. (2022) Hematogenous Septic Arthritis in the Coxofemoral Joint of an Adult Horse. *Proceedings of the World Veterinary Orthopaedic Congress and Veterinary Orthopedic Society*. 49. Snowmass Village, CO. Primary author.

Johnson R.M., Collar, E.M., Smith, J. (2022) Pharmacokinetics and Pharmacodynamics of Epidural and Intramuscular Triamcinolone in Horses with Chronic Lameness. *Proceedings of the World Veterinary Orthopaedic Congress and Veterinary Orthopedic Society*. 49. Snowmass Village, CO.

PRESENTATIONS

December 2022 Henton Veterinary Conference University of Tennessee, College of Veterinary Medicine, Knoxville, TN “Foals: Orthopedic Considerations in Early Weeks, Months, and Years” 1 hour oral presentation.

Collar, E.M., Smith, J., Johnson R. (2022) Pharmacokinetics and Pharmacodynamics of Epidural and Intramuscular Triamcinolone in Horses with Chronic Lameness. *Veterinary Surgery*. Portland, OR. 0.25 hour oral presentation + poster presentation.

Collar, E.M., Rifkin, R.E. (2022) Hematogenous Septic Arthritis in the Coxofemoral Joint of an Adult Horse. *Proceedings of the World Veterinary Orthopaedic Congress and Veterinary Orthopedic Society*. 49. Snowmass Village, CO. 0.25 hour oral presentation.

Collar, E.M. (2022) Rehabilitation Strategies for Joint Related Injuries. *AO VET NA Webinar*. hour oral presentation. Invited Speaker.

April 2022 AAVC Residents' Professional Development and Leadership Conference: “Early Career Faculty Panel”. Webinar. One hour faculty panel. Invited Speaker.

Dr. Michelle Dennis

PEER-REVIEWED PUBLICATIONS

C.G. Duncan, W.E. Sander, M.M. Dennis. Veterinarians will save more than their patients by acting on climate change and embracing sustainability. *Journal of American Holistic Veterinary Medical Association*. 2022. 69:10-22. DOI: 10.56641/CGYO3028

T.J. Hancock, P. Hickmen, N. Kazerooni, M. Kennedy, S.A. Kanie, M.M. Dennis, N. Szafranski, R. Gerhold, C. Su, T. Masi, S. Smith, T.E. Sparer. Possible cross-reactivity of feline and white-tailed deer antibodies against the SARS-CoV-2 receptor binding domain. *Virology*. 2022, 96, e00250-22. DOI: 10.1128/jvi.00250-22

BOOK CHAPTERS, ABSTRACTS, AND PROCEEDINGS

C. Duncan, M.M. Dennis, C. Sangster. Chapter 4 – The Study and Classification of Climate Associated Disease in Animals. In: *Climate Change and Animal Health*, C. Stephen and C. Duncan (eds.). CRC Press. 2022. 67-85. DOI: 10.1201/9781003149774

PRESENTATIONS

C. Cordero-Aponte, M.M. Dennis*, M. Abouelkhair, A. Cushing. Adenoviral nephropathy in Zoo Budgerigars (*Melopsittacus undulatus*). *American College of Veterinary Pathologists Annual Meeting*, November, 2022, Boston, MA.

C.I. Rivera-Pérez, A.A. Mignucci-Giannoni, M.A. Freeman, M.M. Dennis. Verminous pneumonia as a cause of death in an Antillean manatee (*T. m. manatus*) from Puerto Rico. *24th Biennial Conference on the Biology of Marine Mammals*, 2022, West Palm Beach, Florida.

Metcalfe, M.M. Dennis*, A. Cushing. Spinal disease in a captive population of Panthera species: review of 86 cases (2003-2021). *American College of Veterinary Pathologists Annual Meeting*, November, 2022, Boston, MA.

Picknell, H. Fenton, M.M. Dennis, M.J. Navarrete Talloni, P. Bolfa, K. Stewart. Causes of Morbidity and Mortality in Free-Ranging Sea Turtles Found on St. Kitts and Nevis (2015-2022). *70th Annual International Conference of the Wildlife Disease Association*, July 23-29, 2022, Madison, WI, USA.

Urinary and Endocrine Systems. *Thompson Davis Foundation Current Literature and Image Interpretation Course*, July 25-29, 2022, Virtual. >150 attendees. Instructors: L. Craig, K. Newkirk, D. LoBato, W. Sheley, M.M. Dennis

Dr. Richard Gerhold

PEER-REVIEWED PUBLICATIONS

- Hancock, T., J. Pittman, S. Kania, M. Kennedy, N. Szafranski, M. Dennis, C. Su, R. Gerhold and T. Sparer 2022. Possible Cross reactivity of feline and white-tailed deer antibodies against the SARS-CoV-2 receptor binding domain. *Journal of Virology*. DOI: <https://doi.org/10.1128/jvi.00250-22>
- Johnson, V., C. Harper, R. Applegate, R. Gerhold and D. Buehler. 2022. Nest-site selection and survival of wild turkeys in Tennessee. *Journal of the Southeastern Association of Fish and Wildlife Agencies* 9: 134-143. <https://fwf.tennessee.edu/wp-content/uploads/sites/24/2022/03/Harper-TN-nest-site-selection-and-survival.pdf> - I mentored Vinny Johnson
- Sheldon, J., C. Cordero, V. Reibel, C. Blair, X. Zhu, R. Gerhold, A. Cushing, E. Ramsay, D. Dodd and M. Dennis. 2022. Morbidity and mortality of American black bears (*Ursus americanus*) undergoing rehabilitation in eastern Tennessee, USA, 1996-2021. *Journal of Wildlife Diseases* 58: 575-583. <https://doi.org/10.7589/JWD-D-21-00191> -I assisted with data analysis, follow up testing, and manuscript editing.
- Kurth, K., E. Watson, R. Gerhold*, D. Metts, B. Miller, D. Morin, S. Eda, S. Yang, and L. Muller. Elk Mortality, Survival, and Health in the Cumberland Mountains of Tennessee. *Journal of Wildlife Diseases*. Accepted and In press, Dec, 2022.
- Burbank, E., R. Hardman, W. Sutton, S. Reinsch, M. Freake, E. Holder, C. Frost, B. Nissen, E. Nolan, R. Gerhold*, and D. Miller. Prevalence and molecular analysis of hellbender trypanosomes in Tennessee. *Journal of Wildlife Diseases*. Accepted and In press, Sept, 2022.
- Hardman, R., S. Ammar, R. Gerhold, W. Sutton, D. Carter, S. Snyder, J. Silva Neto, M. Tarkington, M. Gray, and D. Miller. Coccidiosis in wild eastern newts: an unexpected finding in consecutive mortality events. Submitted for peer review - *Journal of Wildlife Diseases* Nov 2022.
- Purple, K., M. Dhar, S. Newby, A. Bow, A. Allison, and R. Gerhold*. Evaluation of the cytopathic effect of *Trichomonas gallinae* before and after persistence in simulated bird baths. Submitted for peer review - *Avian Diseases* Oct 2022.
- C. England, H. Wyrosdick, E. Baker, W. Stiver, R. Williamson and R. Gerhold*. Parasite prevalence in feral swine (*Sus scrofa*) from the Great Smoky Mountains National Park. Submitted for peer review - *Journal of Wildlife Diseases* Nov 2022.
- Ammar, S., T. Dawant, J. Kelly, G. Hickling, J. Brown, K. Van Why, R. Poulson, C. Su, and R. Gerhold*. *Toxoplasma gondii* survey in waterfowl and gulls from eight states in the United States. Submitted for peer review - *Journal of Wildlife Diseases* Oct 2022.
- Baker, E., A. Geick, M. Hines, and R. Gerhold*, and C. Cordero-Aponte. *Halicephalobus gingivalis* in a Tennessee pony. Submitted for peer review - *Veterinary Parasitology: Regional Studies and Reports* Oct 2022.
- Richards, J., S. Kania, A. Wilson, E. Kent, and R. Gerhold*. Novel methods of antigen selection for serological diagnosis of *Parelaphostrongylus tenuis* infections. Submitted for peer review - *Scientific Reports*. Sept 2022.

PRESENTATIONS

- Gerhold, R. 2022. Improving diagnostics for two competitive exclusion parasites. Department of Microbiology, University of Tennessee, Knoxville TN. October 2022
- Horton, L., S. Ammar, M. Bruce and R. Gerhold*. An outbreak of blackhead on a private farm in Oak Ridge TN. American Association of Avian Pathologists, Philadelphia PA, July 2022.
- Riese, K., E. Baker, M. Lee and R. Gerhold*. Black bear (*Ursus americanus*) population health monitoring in eastern Tennessee. Southern Appalachian Black Bear Study Group (SABBSG) meeting, Gatlinburg, TN. October 2022.
- Riese, K., E. Baker, M. Lee and R. Gerhold*. Black bear (*Ursus americanus*) population health monitoring in eastern Tennessee. UTCVM Research Day, Knoxville TN. September 2022.
- Baker, E., D. Miller, and R. Gerhold* PCR prevalence and histologic characterization of *Trypanosoma cruzi* in urban wildlife. UTCVM Research Day, Knoxville TN. September 2022.
- Richards, J., S. Kania, A. Wilson, E. Kent, and R. Gerhold*. Novel methods of immunogenic antigen selection for serological diagnosis of *Parelaphostrongylus tenuis* infection. UTCVM Research Day, Knoxville TN. September 2022
- Broadway, K., L. Horton, and R. Gerhold*. Parasites of wild turkeys in Middle Tennessee. UTCVM Research Day, Knoxville TN. September 2022
- Lee, M., K. Riese, and R. Gerhold*. Fecal float and examination of tissue samples for parasites of black bears (*Ursus Americanus*). UTCVM Research Day, Knoxville TN. September 2022
- Szafranski, N. and R. Gerhold*. Serological response of Mallards (*Anas platyrhynchos*) following an experimental infection of *Toxoplasma gondii* tachyzoites. UTCVM Research Day, Knoxville TN. September 2022
- Gerhold R. Update on chronic Wasting Disease. Henton Veterinary Conference, Knoxville, TN. December 2022.
- Dawant, T., S. Ammar, J. Kelley, G. Hickling, C. Su., R. Poulson, and R. Gerhold*. *Toxoplasma gondii* prevalence in waterfowl and gulls from eight states in the United States. Toxo2022 Virtual Conference.
- Gerhold, R. 2022. Ecology of competitive exclusion parasites. University of Maine, Orono, Maine. October 2022.
- Baker, E., D. Miller, and R. Gerhold*. Prevalence of *Hepatozoon* sp. and *Trypanosoma cruzi* in southeastern coyotes. Population Health Class, University of Georgia, Athens, GA. February 2022.
- Szafranski, N., Van Why, K., Kelly, J., Veon, J., Bahnson, C., Cohen, B, Blake-Bradshaw, A., Gerhold, R*. Investigation of the Prevalence of *Toxoplasma gondii* in Waterfowl in the United States. American Association of Veterinary Parasitology Annual Conference, Snow Bird, UT, June 2022.
- Baker, E., D. Miller, and R. Gerhold*. Widespread *Hepatozoon* sp. Infection in Wild Canids. International Wildlife Disease Association. Madison, WI, July 2022.

- Ammar, S., C. Christopher, N. Szafranski, R. Jones, S. Rejeev, H. Castro, S. Campagna, J. Antiabong, R. Gerhold*. 2022. Metabolic profile of *Histomonas meleagridis* in synthetic media with and without rice starch reveals riboflavin as the metabolite contributing most to different metabolic profiles between treatments. American Association of Avian Pathologists, Philadelphia PA, July 2022.
- Richards, J., S. Kania, A. Wilson, E. Kent, and R. Gerhold*. Novel methods of immunogenic antigen selection for serological diagnosis of *Parelaphostrongylus tenuis* infection. International Wildlife Disease Association. Madison, WI, July 2022.
- Szafranski, N., Van Why, K., Gerhold, R*. Investigation of the Prevalence of *Toxoplasma gondii* in Pennsylvania Waterfowl. Pennsylvania Chapter of The Wildlife Society Annual Conference – virtual. March 2022.

Dr. Luca Giori

PEER-REVIEWED PUBLICATIONS

- Fecteau KA, Giori L*, Cushing A, Price JM, Zhu X. Comparison of steroid and thyroid hormone concentrations in blood serum and plasma of captive tigers. *Journal of Veterinary Diagnostic Investigation*. 2022;34(3):547-551. doi:10.1177/10406387221090538. My role: I am co-primary-author: I organized the validation study design with Dr Fecteau, contributed to the collection of a few samples, revised the manuscript, figures and tables, collaborated with Dr Fecteau with the rebuttal letter after the first revision.
- Hampton C, Zhu X., Giori L*. Validation of a human paper-based blood typing method (EldonCard) for use in pet pigs. Submitted on 11/4/2022 to *Journal of Veterinary Emergency and Critical Care*. My role: I am Co-primary author with Dr Hampton. We submitted an IACUC proposal for the validation of the blood-typing method EldonCards in pet swine. The study will provide additional information needed to complete the validation process for the use of this blood-typing card in pet pigs. The outcome measures of this study are precision (repeatability, reproducibility), and robustness, of EldonCards. (Dr Hampton's start up departmental funds).
- Fecteau KA., Giori L., Eiler H., Esteller-Vico A., Lear A., Videla R. Blood serum steroid and thyroid hormone concentrations in healthy domestic male and female alpacas. Submitted on 12/2022 to *Frontiers in Veterinary Science, Comparative and Clinical Medicine* sections. My role: Co-author, contributed to manuscript preparation.

BOOK CHAPTERS, ABSTRACTS, AND PROCEEDINGS

- Hunt A., Olin S., Whittemore J., Esteller-Vico A., Giori L. The Effects of Sedation on Cortisol and Sex Hormone Concentrations in Dogs. *Proceedings of ACVP/ASVCP annual meeting 2022*. November 11nd-15th, 2022, Boston (MA). Oral communication.

Dr. Chiara Hampton

PEER-REVIEWED PUBLICATIONS

- Barras, E.D., Hampton, C.E., Takawira, C., Taguchi, T., Nourbakhsh, A. and Lopez, M.J., 2022. Hemodynamic Changes in Response to Hyperacute Spinal Trauma in a Swine Model. *Comparative Medicine*, 72(1), pp.30-37.
- Hampton, C.E., Dehghanpir, S., Armstrong, C., Scully, C., Baker, R.E. and Mitchell, M., 2022. Prevalence of AO blood group and level of agreement for AO blood typing methods in pet pigs from Louisiana. *Journal of Veterinary Emergency and Critical Care*.
- Reabel, S.N., Queiroz-Williams, P., Cremer, J., Langohr, I.M., da Cunha, A.F., Hampton, C.E., Carossino, M., Liu, C.C. and Nevarez, J.G., 2022. Comparison of blind and endoscopic-guided orotracheal intubation on laryngeal and tracheal damage in domestic rabbits (*Oryctolagus cuniculus*). *Veterinary Anaesthesia and Analgesia*.
- Barden, L.E., Gaschen, L., Hampton, C.E., Takawira, C., Liu, C.C., Nourbakhsh, A. and Lopez, M.J., 2022. Computed tomography myelography technique and spinal morphometry in healthy Yucatan pigs. *Plos one*, 17(4), p.e0266396.

BOOK CHAPTERS, ABSTRACTS, AND PROCEEDINGS

- Hampton, C.E.; Thermoregulation. In: Doherty T, Valverde A, Reed RA, editors. *Manual of equine anesthesia and analgesia*. John Wiley & Sons; 2022.
- Hampton, C.E.; Monitoring the Anesthetized Horse. In: Doherty T, Valverde A, Reed RA, editors. *Manual of equine anesthesia and analgesia*. John Wiley & Sons; 2022
- Hampton, C.E. (Author and Presenter), "Perioperative management of the diabetic dog: Fine tuning for a successful outcome", University of Tennessee. Published on *Proceedings of the 2022 Annual Veterinary Conference*, Knoxville, TN, USA (February, 2022).
- Shanks, G.A. (Veterinary Student and Presenter), Hampton, C.E. (Mentoring Author), Kleine, S.A., Smith, J., Xiaojuan, Z., Mulon, P.Y., Smith, C.K., Giori, L., Cox, S., Seddighi, R., 2022. Pharmacokinetics of oral clonazepam in commercial swine (*Sus scrofa*). *Research Day 2022*, University of Tennessee, Knoxville, TN, USA. Oral Presentation and publication on *Proceedings of the Research Day 2022*. Awarded 3rd place in the Veterinary Student category.

Gebert, J. (Veterinary Student and Presenter), Smith, J., Ebner, L.S., Bennett, K., Collins, R., Hampton, C.E., Kleine, S.A., Mulon, P.Y., Smith, C.K., Seddighi, R., Bussieres, G., Mochel, J., Knych, H., 2022. Pharmacokinetics of extravascular maropitant citrate in swine. Research Day 2022, University of Tennessee, Knoxville, TN, USA. Oral Presentation and publication on Proceedings of the Research Day 2022.

Hampton, C.E. (Author and Presenter), "Monitoring refresher". University of Tennessee, Henton Veterinary Conference, Knoxville, TN, USA (December, 2022). Published on Proceedings of the 2022 Henton Veterinary Conference.

Benton-Levith, E. (Veterinary Student), Hampton, C.E. (Mentoring Author), Mitchell, C., Sun, X., Da Cunha, A., Queiroz-Williams, P., Mitchell, M.; 2022 Phi Zeta Research Emphasis Day. "Correlation between sepsis scores and arterial blood pressures variability in anesthetized foals." Poster Presentation.

PRESENTATIONS

Hampton CE (2022). "MS Teams orientation for Department of Large Animal Sciences". University of Tennessee, College of Veterinary Medicine, Knoxville, TN, USA (January, 2022). Oral Presentation.

Hampton, C.E. (2022). "Perioperative management of the diabetic dog: Fine tuning for a successful outcome". University of Tennessee, Annual Veterinary Conference, Knoxville, TN, USA (February, 2022). Oral Presentation.

Hampton, C.E. (2022). "MS Teams orientation for incoming House Officers". University of Tennessee, College of Veterinary Medicine, Knoxville, TN, USA (July, 2022). Oral Presentation.

Hampton, C.E. (2022). "Perioperative management of the diabetic dog: Fine tuning for a successful outcome". University of Tennessee, Seminar Series, Knoxville, TN, USA (July, 2022). Oral Presentation.

Hampton, C.E. (2022). "Investigations into clinically-applicable options for oral sedation and blood transfusion in swine". University of Tennessee, Research Showcase, Knoxville, TN, USA (October, 2022). Oral Presentation.

Hampton, C.E. (2022). "Monitoring refresher". University of Tennessee, Henton Veterinary Conference, Knoxville, TN, USA (December, 2022). Oral Presentation.

Hampton, C.E. (2022). "MS Teams orientation for Diagnostic Endocrinology Laboratory". University of Tennessee, College of Veterinary Medicine, Knoxville, TN, USA (December, 2022). Oral Presentation

Dr. Girish Neelakanta

PEER-REVIEWED PUBLICATIONS

Namjoshi P, Dahmani M, Sultana H and Neelakanta G*. Rickettsial pathogen inhibits tick cell death through tryptophan metabolite mediated activation of p38 MAP kinase. *iScience* (Cell Press), 2023. 26(1): p. 105730.

Liu L, Sonenshine DE, Sultana H and Neelakanta G.* Identification of a rickettsial endosymbiont in a soft tick *Ornithodoros turicata americanus*. *PLoS One*, 2022. 17(12): p. e0278582.

Khanal, S., Taank, V., Anderson, J.F., Sultana, H., and Neelakanta, G.*. Rickettsial Pathogen Perturbs Tick Circadian Gene to Infect the Vertebrate Host. *Int J Mol Sci* 23.

Fasae KD, Neelakanta G and Sultana H. Alterations in arthropod and neuronal exosomes reduce virus transmission and replication in recipient cells. *Extracell Vesicles Circ Nucleic Acids* 2022; 3: 247-62

Ahmed W, Rajendran KV, Neelakanta G, Sultana H. An Experimental Murine Model to Study Acquisition Dynamics of Tick-Borne Langat Virus in *Ixodes scapularis*. *Front Microbiol*. 2022;13:849313. Epub 2022/05/03. doi: 10.3389/fmicb.2022.849313. PubMed PMID: 35495703; PubMed Central PMCID: PMC9048798.

Neelakanta, G.,* and Sultana, H.*. Tick Saliva and Salivary Glands: What Do We Know So Far on Their Role in Arthropod Blood Feeding and Pathogen Transmission. *Front Cell Infect Microbiol* 11, 816547. Impact factor: 6.07

PRESENTATIONS

Neelakanta G. Targeting tick transporter to prevent rickettsial pathogen transmission. American Society for Rickettsiology, Greenville, SC.

Neelakanta G. Rickettsial pathogen modulates tick exosomes. American Society of Intercellular Communication, Potomac, MD.

Neelakanta G. Tick exosomal HSP70 at the crossroads of vector-host-pathogen interactions. Cell Stress symposium. Society for Thermal Medicine, 2022 Virtual Annual Meeting.

Neelakanta G. Anti-tick vaccine to target anaplasmosis. Henton Veterinary conference. University of Tennessee, Knoxville, TN.

Neelakanta G. The dynamics of tick-pathogen interactions. 2022 UTCVM Annual conference, Knoxville, TN.

Namjoshi P, Dahmani M, Sultana H and Neelakanta G. Rickettsial pathogen uses arthropod tryptophan metabolite xanthurenic acid to facilitate tick cell survival. Research Day conference, UTCVM. Postdoc oral presentation

Mahesh PP, Namjoshi P, Sultana H and Neelakanta G. Organic anion transporting polypeptide based anti-vector vaccine impairs transmission of human anaplasmosis. Research Day conference, UTCVM. Postdoc oral presentation

Liu L, Sonenshine DE, Sultana H and Neelakanta G. An endosymbiont of a relapsing fever tick *Ornithodoros turicata* Research Day conference, UTCVM. Student Oral presentation

Nandy K, Tamakloe C, Sonenshine DE, Sultana H and Neelakanta G. Subolesin regulates innate immune genes in soft ticks. Research Day conference, UTCVM. Student Oral presentation

Ahmed W, Neelakanta G and Sultana H. Novel arthropod exosomal cement protein mediates transmission of tick-borne flavivirus by modulation of human skin chemokines. Research Day conference, UTCVM. Postdoc oral presentation

Fasae KD, Neelakanta G, and Sultana H. Arthropod and neuronal exosome alterations reduced virus transmission and replication in recipient cells. Research Day conference, UTCVM. Student Oral presentation

Basak S, Neelakanta G, and Sultana H. Denuge virus modulates cell cycle signaling in human megakaryocytes. Research Day conference, UTCVM. Student Oral presentation

Dr. Sreekumari Rajeev

PEER-REVIEWED PUBLICATIONS

Gorman M, Xu R, Prakoso D, Salvador LCM, Rajeev S. Leptospira enrichment culture followed by ONT metagenomic sequencing allows better detection of Leptospira presence and diversity in water and soil samples. PLoS Negl Trop Dis. 2022 Oct 26;16(10):e0010589. doi: 10.1371/journal.pntd.0010589. PMID: 36288395; PMCID: PMC9639851.

BOOK CHAPTERS, ABSTRACTS, AND PROCEEDINGS

Leptospira In: Veterinary Microbiology. 4th ed. D.S. McVey, M.M. Chengappa, M.A. Kennedy, and R.P. Wilkes, eds., in press-planned release Fall 2022.

PRESENTATIONS

Towe AE, Rajeev S, Miller DL, Sheley W, Carter ED, DeMarchi J, Bletz M, Woodhams D, Gray MJ. 2022. Risk of bacteremia associated with probiotic treatment of Batrachochytrium salamandrivorans. Global Amphibian and Reptile Disease Conference, Knoxville, TN, 4-10 Aug.

Myranda Gorman, Liana Barbosa, Alejandro Llanes, Sreekumari Rajeev Testing Virulence of a Leptospira strain in hamsters – Preliminary Study. UTCVM Research Day.

Liana Barbosa, Myranda Gorman, Alejandro Llanes, Sreekumari Rajeev. Functional and structural characterization of potential immunogenic proteins of pathogenic Leptospira. UTCVM Research Day.

Kellie McCreight, Liana Barbosa, Sreekumari Rajeev. Leptospira Seroprevalence in dogs and cats in Tennessee. UTCVM Research Day.

Jaclyn Azelby, Porsha Reed, Rebekah Jones, Brian Johnson, Sreekumari Rajeev. Characterizing Mycobacterium isolates from dogs and cats. UTCVM Research Day

Sreekumari Rajeev, Alejandro Llanes, Dhani Prakoso, Liana Barbosa, Myranda Gorman. Mutations and structural variations occurring in Leptospira during laboratory maintenance affects virulence and serologic reactivity. 12th International Leptospirosis Society Meeting November 13-16, 2022, Bangkok, Thailand.

Sreekumari Rajeev Alejandro Llanes, Liana, Barbosa. A rational approach to develop a canine Leptospira vaccine using reverse vaccinology 12th International Leptospirosis Society Meeting November 13-16, 2022, Bangkok, Thailand.

Towe AE, Rajeev S, Miller DL, Sheley W, Carter ED, DeMarchi J, Bletz M, Woodhams D, Gray MJ. 2022. Risk of bacteremia associated with probiotic treatment of Batrachochytrium salamandrivorans. American Association of Zoo Veterinarians Conference, Houston, TX, 17-23 Sept. (Accepted)

Towe AE, Rajeev S, Miller DL, Sheley W, Carter ED, DeMarchi J, Bletz M, Woodhams D, Gray MJ. 2022. Risk of bacteremia associated with probiotic treatment of Batrachochytrium salamandrivorans. ExoticsCon, Denver, CO, 14-18 Aug.

Towe AE, Rajeev S, Miller DL, Sheley W, Carter ED, DeMarchi J, Bletz M, Woodhams D, Gray MJ. 2022. Risk of bacteremia associated with probiotic treatment of Batrachochytrium salamandrivorans. Wildlife Disease Association Conference, Madison, WI, 23-29 July.

Towe AE, Rajeev S, Miller DL, Sheley W, Carter ED, DeMarchi J, Bletz M, Woodhams D, Gray MJ. 2022. Risk of bacteremia associated with probiotic treatment of Batrachochytrium salamandrivorans. Southeastern Partners in Amphibian and Reptilian Conservation, Virtual, 24-26 Feb.

Stephen A. Kania, Mohamed Abouelkhair, Rebekah Jones, Sree Rajeev Antimicrobial Genes in Thermophilic Bacillus paralicheniformis Associated with Mobile Elements, ASM Microbe Annual meeting 2022, Washington, DC

Dr. Sarah Schmid

PEER-REVIEWED PUBLICATIONS

Galoni A., Schmid S. Hold that steroid! Diet trials for chronic enteropathy. Today's Veterinary Practice. May/June 2022, Mentoring author (for intern), Review article. <https://todaysveterinarypractice.com/nutrition/diet-trials-for-chronic-enteropathy/>

BOOK CHAPTERS, ABSTRACTS, AND PROCEEDINGS

Schmid S., Tolbert MK. Pet Owner Educational Atlas: Digestive System, 1st Edition, Edra, 80 pages, September 21, 2022.
Primary author

PRESENTATIONS

Henton Veterinary Conference, University of Tennessee, Knoxville, TN. When Ur-ine Trouble: Diagnostic Approach to PU/PD. December 2022. 1 hour, oral, 120 participants.
Henton Veterinary Conference, University of Tennessee, Knoxville, TN. Chronic Enteropathies. December 2022. 1 hour, oral, 120 participants.
Henton Veterinary Conference, University of Tennessee, Knoxville, TN. How to say no: Preventing Burnout in Veterinary Medicine. December 2022. 1 hour, oral, 120 participants.
ACVIM Forum, Austin, TX, The Dog Aging Project- Early Findings from 27,541 Dogs. 50-minute oral presentation. 200 participants.
Comparative Gastroenterology Society, GutSea, St. Petersburg, FL A case of unexplained abdominal pain: Abdominal Epilepsy. 15-minute Case Discussion. 50 participants.
Annual Practitioners Seminar, University of Wisconsin, Madison, WI, Hypoadrenocorticism: Don't Miss the Great Pretender. March 2022. 1-hour lecture, 40 participants.
Greater Rockford Veterinary Medical Association, Diagnosis & Management of Chronic Enteropathies in Dogs and Cats. February 2022. 1-hour Lecture. 50 participants.

Dr. Wesley Sheley

PEER-REVIEWED PUBLICATIONS

Sheley WC, Gray MJ, Wilber MQ, Carolyn C, Carter ED, Miller DL. Electrolyte imbalances and dehydration play a key role in *Batrachochytrium salamandrivorans* chytridiomycosis. *Frontiers in Veterinary Science*. 2022; 9: 1055153. Doi: 10.3389/fvets.2022.1055153.
Hauck A & Sheley WC. Islet cell Carcinoma (Malignant Insulinoma) in a rabbit. *Journal of the American Veterinary Medical Association (Pathology in Practice)*. 2022; 260(26): 1-2. Doi: 10.2460/javma.22.09.0390.

PRESENTATIONS

Sheley WC, Gray MJ, Wilber MW, Cray C, Carter ED, Miller DL. Electrolyte imbalances and dehydration play a key role in *Batrachochytrium salamandrivorans* chytridiomycosis. (2022, August). Global Amphibian and Reptile Disease Conference, Knoxville, TN.
Le Sage MJ, McCartney J, Sheley WC, Stilz CR*, Woodhams DC, Miller DL, Gray MJ, Rollins-Smith LA. Enhanced survival in Eastern newts after a second exposure to *Batrachochytrium salamandrivorans*. (2022, August). Global Amphibian and Reptile Disease Conference, Knoxville, TN. (Presented by M. Le Sage).
Rollins-Smith LA, Le Sage MJ, McCartney J, Sheley WC, Stilz CR*, Woodhams DC, Miller DL, Gray MJ. Enhanced survival in Eastern newts after a second exposure to *Batrachochytrium salamandrivorans*. (2022, June). North American Comparative Immunology Workshop, Banff, Canada. (Presented by LA Rollins-Smith)

Dr. Joseph Smith

PEER-REVIEWED PUBLICATIONS

Jeff Olivarez*, Pierre-Yves Mulon, Lisa Sams Ebner, Haley Cremerius, Channing Cantrell, Rebecca R. Rahn, Windy Michelle Soto-Gonzalez, Joan Bergman, Sherry Cox, Jonathan Paul Mochel, Amanda Jo Kreuder and Joe S Smith*. Pharmacokinetic and pharmacodynamic properties of pantoprazole in calves.
Garcia, Jessica, Smith, Joe*, Fry, Michael, Mulon, Pierre-Yves. Cerebrospinal nematodiasis in neurologic goats presenting to a veterinary teaching hospital.
Fladung R, Smith JS*, Hines MT, Soto-Gonzalez WM, Fayne B, Rahn RR, Escher OG, Harvill L, Bergman J, Garcia JD, Kreuder AJ and Cox S (2022) Pharmacokinetics of esomeprazole in goats (*Capra aegagrus hircus*) after intravenous and subcutaneous administration. *Front. Vet. Sci.* 9:968973. doi: 10.3389/fvets.2022.968973
Ebner L, O O, Simon B, Lizarraga I, Smith J and Cox S (2022) Pharmacokinetics of butorphanol following intravenous and intramuscular administration in donkeys: A preliminary study. *Front. Vet. Sci.* 9:979794. doi: 10.3389/fvets.2022.979794
Bowden AC, Allbaugh RA, Smith JS, Mochel JP and Sebbag L (2022) Kinetics and minimal inhibitory concentrations of ceftiofur in tear film following extended-release parenteral administration (Excede®) in dogs. *Front. Vet. Sci.* 9:975113. doi: 10.3389/fvets.2022.975113

- Amanda James, Joe Smith*, Julie Sheldon, Ricardo Videla, "Failure of Passive Transfer in Camel Calves: 4 Cases (2010-2019)", Case Reports in Veterinary Medicine, vol. 2022, Article ID 8182648, 5 pages, 2022 <https://doi.org/10.1155/2022/8182648>
- Smith JI, Griffin C, Jones P, Mulherin BL, Hecht S. Severe mandibular osteomyelitis and exfoliation of a mandibular canine tooth in a Vietnamese potbellied pig. Veterinary Record Case Reports; 2022. e348. <https://doi.org/10.1002/vrc2.348>
- Burlison, C., Cox, S., Smith, J., Stokes, J., Whittemore, J. C., & DeBolt, B. (2022). Pharmacokinetics of orally administered single-dose ponazuril in cats. Journal of Veterinary Pharmacology and Therapeutics, 00, 1– 6. <https://doi.org/10.1111/jvp.13047>
- Sherry Cox, Lainey Harvill; Sarah Bullock; Joe Smith; Joan Bergman. Validation of a Method for Pantoprazole and its Sulfone Metabolite in Plasma Using High Performance Liquid Chromatography. Journal of Chromatography Open, 2022, Volume 2. <https://doi.org/10.1016/j.jcoa.2022.100038>.
- Breuer, Ryan; Riedesel, Elizabeth; Fowler, Jennifer; Yaeger, Michael; Smith, Joe; Page Kreuder, Amanda. Ultrasonography and digital radiography findings in sheep with clinical disease associated with small ruminant lentivirus infection. Canadian Veterinary Journal, April 2022; 63(4): 391-399.

BOOK CHAPTERS, ABSTRACTS, AND PROCEEDINGS

- Smith, Joe; Seddighi, Reza. Sedation and Anesthesia of Companion Miniature Pigs. Veterinary Clinics of North America: Exotic Animal Practice, Volume 25, Issue 1, 2022, Pages 297-319, ISSN 1094-9194, ISBN 9780323896764, <https://doi.org/10.1016/j.cvex.2021.08.007>.

PRESENTATIONS

- Kailee Bennett, Joe Smith, Pierre-Yves Mulon, Jessica Gebert, Joan Bergman, Jessica Garcia, Olivia Escher, Lainey Harvill, Ryan Flynn, and Sherry Cox. Pharmacokinetics and pharmacodynamics of pantoprazole in sheep. Presented at the 2022 UT CVM Research Day, 9/19/2022, Knoxville, TN. Pg 4.
- Catherine Burlison, Sherry Cox, Joe Smith, Jennifer Stokes, Jacqueline Whittemore, and Becky DeBolt. Pharmacokinetics of orally administered single-dose ponazuril in cats. Presented at the 2022 UT CVM Research Day, 9/19/2022, Knoxville, TN. Pg 7.
- Ryan Flynn, Kailee Bennett, Jessie Gerber, Lainey Harvill, Olivia Escher, Jessica Garcia, Pierre-Yves Mulon, Lisa Ebner, and Joe Smith. A field trial of two point-of-care glucometers in healthy ewes. Presented at the 2022 UT CVM Research Day, 9/19/2022, Knoxville, TN. Pg 11.
- Rebekah Johnson, Liz Collar, and Joe Smith. Pharmacokinetics and pharmacodynamics of intravenous and oral esomeprazole in horses. Presented at the 2022 UT CVM Research Day, 9/19/2022, Knoxville, TN. Pg 14.
- Alex Shanks, Stephanie Kleine, Chiara Hampton, Christopher Smith, Pierre-Yves Mulon, Reza Seddighi, Sherry Cox, and Joe Smith. Pharmacokinetics of oral clonazepam in commercial swine (Sus Scrofa). Presented at the 2022 UT CVM Research Day, 9/19/2022, Knoxville, TN. Pg 24.
- Soto-Gonzalez WM, Rahn RR, Fayne BN, Escher OG, Geletka AM, Harvill LE, Bergman JB, Mochel JP, Smith JS, and Cox S. 361 Pharmacokinetics of Pantoprazole and Pantoprazole Sulfone in Goats After Intravenous Administration: A Preliminary Report. 2022 Exhibition of Undergraduate Research and Creative Achievement (EURēCA), Knoxville, TN, 4/25/22.
- "Preventive Medicine for Companion Mini Pigs", 2022 Henton Veterinary Conference, Knoxville, TN, 12/15/2022
- "Medication Use in Camelids", UTK Camelid Conference, Knoxville, TN, 8/13/2022
- "Food Animal Pharmacology Update I and II", 2022 Veterinary Nutrition and Health CE Conference for Livestock and Equids, Murfreesboro, TN, 1/28/2022
- "Perusal as a Force Multiplier for Veterinary Education", UTK CVM Master Teacher Seminary Program, Knoxville, TN. 3/17/22.
- "What to expect after you are expecting (food animal neonates)", UTK Theriogenology Club, Knoxville, TN. 3/1/22
- Collar EM, Smith JS, Johnson RM. Pharmacokinetics and Pharmacodynamics of Epidural and Intramuscular Triamcinolone in Horses with Chronic Lameness. Presented at the 2022 American College of Veterinary Surgery Summit, October 13-15th, Portland, Oregon.
- Jessica Garcia, Joe S. Smith, Michael M. Fry, Pierre-Yves Mulon. "Therapeutic strategies and clinical management of presumptive cerebrospinal nematodiasis in six neurologic goats." Abstract 129. ICG2022, the 13th International Congress of Goats. 19-22 September, 2022.
- Fladung, R; Smith, J; Hines, M; Soto-Gonzalez, W; Fayne, B; Rahn, R; Escher, O; Harvill, L; Bergman, J; Garcia, J; Kreuder, A; Cox, S. Pharmacokinetics of subcutaneous esomeprazole in goats. Presented at: ICG2022, the 13th International Congress of Goats. 19-22 September, 2022.
- Geneviève Bussi res, Joe Smith, Sherry Cox, Reza Seddighi, P-Yves Mulon. Pharmacokinetics of morphine and concentrations of morphine-6-glucuronide after a single intravenous (IV) and intramuscular (IM) administration in dairy cattle. Presented 10/13/22 at the American College of Veterinary Surgeons 2022 Surgery Summit, Portland, OR.
- Benjamin K. Schneider, Jessica Ward, Samantha Sotillo, Agnes Bourgois-Mochel, Allison Mosichuk, Joseph Smith, Chelsea Iennarella-Servantez, Charles Johnson, Catherine Garelli-Paar, Emilie Guillot, Marc Prikazsky, Jonathan P. Mochel. Breakthrough: A First-In-Class Virtual Simulator for Dose Optimization With ACE Inhibitors in Veterinary Cardiology. Accepted for presentation at 2022 ECVIM Congress.
- Jeff Olivarez, Pierre-Yves Mulon, Joe Smith, Haley Cremerius, Channing Cantrell, Amanda Kreuder, Lisa Ebner, Sherry Cox. Pharmacokinetics and Pharmacodynamics of Pantoprazole in Calves. Presented at the 2022 Annual Meeting of the American Association of Bovine Practitioners, Long Beach, CA, September 22-24, 2022.

Joe Smith, Claude Magnard, Yeon-Jung Seo, Pauline Traynard, Jonathan P. Mochel. Pharmacokinetic Modeling of Fentanyl Citrate and Norfentanyl in Calves Using a Nonlinear Mixed-Effects Approach. Presented at the 2022 American Conference on Pharmacometrics, Aurora, CO, 10/29-11/4/2022.

T. Henniger, Pierre-Yves Mulon, Joseph S. Smith, Jonathan E. Beever, Troy N. Rowan, Jim E. Wells, Larry A. Kuehn, Brynn H. Voy, and Phillip R. Myer. Validation of a minimally-invasive rumen wall sampling method for use in beef cattle. 2022 American Society for Microbiology Microbe Conference. Washington, DC, 6/9-13/2022.

Dr. Nora Springer

PEER-REVIEWED PUBLICATIONS

Kumar D, Anderson AV, Pittman J, Springer NL, Marthaler DG, Mwangi W. Antibody response to rotavirus C pre-farrow natural planned exposure to gilts and their piglets. *Viruses* 2022;14:2250. <https://doi.org/10.3390/v14102250>

Kumar D, Shepherd FK, Springer NL, Mwangi W, Marthaler DG. Rotavirus infection in swine: Genotypic diversity, immune responses, and role of gut microbiome in rotavirus immunity. *Pathogens* 2022;11:1078. <https://doi.org/10.3390/pathogens11101078>

Lai P, KuKanich KS, Springer NL. Elective ovariohysterectomy or castration can proceed in shelter dogs despite mild to moderate presurgical leukocytosis. *J Am Vet Med Assoc* 2022;260:765-773. PMID: 35239508

Frohlich M#, Kastl B, Nelson S, Highland M, Springer NL*† What's Your Diagnosis? Caudal shoulder mass in a cat. *Vet Clin Pathol* 2022;51:449-452. PMID:35137435

Wu B, Kastl B, Cino-Ozuna G, Springer NL, Biller D, Whitehouse W, Easterwood L, Nguyen TA. Feline sarcomatoid renal cell carcinoma with peritoneal effusion and serosal metastasis. *J Vet Diag Invest* 2022;34(1):153-159. PMID:3473776

BOOK CHAPTERS, ABSTRACTS, AND PROCEEDINGS

Wilkerson MJ and Springer NL. Cluster of Differentiation (CD) Antigens. In: Schalm's Veterinary Hematology, Seventh Edition, 2022. Eds, D. Weiss and J. Wardrop, Wiley Blackwell.

PRESENTATIONS

Hauck A#, Kastl B, Springer NL. Evaluating chemokine and sphingolipid receptor expression in canine diffuse large B cell lymphoma. University of Tennessee College of Veterinary Medicine Research Day, September 19, 2022.

The effect of obesity on canine adipose-derived stromal cells: implications for oncology and regenerative medicine. Comparative and Experimental Medicine Seminar Series, University of Tennessee, February 2022.

Dr. Hameeda Sultana

PEER-REVIEWED PUBLICATIONS

Alterations in arthropod and neuronal exosomes reduce virus transmission and replication in recipient cells. Fasae, K.D., Neelakanat, G., Sultana, H #. *Extracellular Vesicles and Circulating Nucleic Acids*. 2022 Aug. DOI: 10.20517/evcna.2022.30

An Experimental Murine Model to Study Acquisition Dynamics of Tick-Borne Langat Virus in *Ixodes scapularis*. Ahmed, W., Rajendran, KR., Neelakanta, G., Sultana, H #. *Front Microbiol*. 2022 Apr. 14;13:849313. doi: 10.3389/fmicb.2022.849313.

Rickettsial pathogen inhibits tick cell death by tryptophan metabolite-mediated activation of p38 mitogenactivated protein kinase. NamJoshi, P., Dahmani, M., Sultana, H., Neelakanta, G #. 2022, Nov. *iSCIENCE, Cell Press*. 2022 Dec 5;26(1):105730. doi: 10.1016/j.isci.2022.105730.

Identification of a rickettsial endosymbiont in a relapsing fever tick *Ornithodoros turicata*. Liu, L., Sonenshine, D.E., Sultana, H., Neelakanta, G #. 2022, *PLoS One*, 2022 Dec 6;17(12):e0278582. doi: 10.1371/journal.pone.0278582.

Rickettsial Pathogen Perturbs Tick Circadian Gene to Infect the Vertebrate Host. Khanal, S., Taank, V., Anderson, J.F., Sultana, H., Neelakanta, G #. *Int J Mol Sci*. 2022 Mar 24;23(7):3545. doi: 10.3390/ijms23073545.

Tick Saliva and Salivary Glands: What Do We Know So Far on Their Role in Arthropod Blood Feeding and Pathogen Transmission. Neelakanta, G #., Sultana, H #. *Front Cell Infect Microbiol*. 2022 Jan 19;11:816547. doi: 10.3389/fcimb.2021.816547.

BOOK CHAPTERS, ABSTRACTS, AND PROCEEDINGS

Sultana, H#, and Neelakanta, G (2022). Isolation and characterization of Extracellular Vesicles from West Nile virus infected cultures and tissues. *Springer Nature Protocols*, vol. 1435:83-101, Springer Press.

PRESENTATIONS

- Sultana, H., Arthropod exosomes at the crossroads of vector-host-pathogen interactions. 2021 Henton Veterinary Conference, University of Tennessee, College of Veterinary Medicine (UTCVM), Knoxville, TN, USA (Dec).
- Sultana, H., Targeting vector-borne viral diseases with exosomes; breakthroughs and beyond. UTCVM. Research Showcase In-person talk, (March) (Invited Talk; In Person).
- Namjoshi P, Dahmani M, Sultana H and Neelakanta G. Rickettsial pathogen uses arthropod tryptophan metabolite xanthurenic acid to facilitate tick cell survival. Research Day conference, UTCVM.
- Mahesh PP, Namjoshi P, Sultana H and Neelakanta G. Organic anion transporting polypeptide based antivector vaccine impairs transmission of human anaplasmosis. Research Day conference, UTCVM.
- Liu L, Sonenshine DE, Sultana H and Neelakanta G. An endosymbiont of a relapsing fever tick *Ornithodoros turicata*. Research Day conference, UTCVM.
- Nandy K, Tamakloe C, Sonenshine DE, Sultana H and Neelakanta G. Subolesin regulates innate immune genes in soft ticks. Research Day conference, UTCVM.
- Ahmed W, Neelakanta G and Sultana H. Novel arthropod exosomal cement protein mediates transmission of tick-borne flavivirus by modulation of human skin chemokines. Research Day conference, UTCVM.
- Fasae KD, Neelakanta G, and Sultana H. Arthropod and neuronal exosome alterations reduced virus transmission and replication in recipient cells. Research Day conference, UTCVM.
- Basak S, Neelakanta G, and Sultana H. Dengue virus modulates cell cycle signaling in human megakaryocytes. Research Day conference, UTCVM.
- Sultana, H., Arthropod exosomes in vector-borne diseases: breakthroughs and beyond. 2nd Annual meeting of the American Society for Intercellular Communication (ASIC), Bolger Center, Potomac, MD, USA (Oct) (Invited Talk; In-Person)
- Sultana, H., Arthropod exosomes in vector-borne diseases: breakthroughs and beyond. Spectradyme LLC Nanoparticle Analysis Webinar, LIVE-ONLINE SelectBio's WEBINAR (May) (Invited Talk, Online)

