Summer research

As the summer begins at Penn Vet, a new cohort of veterinary students, undergraduate students, and high school students are digging in to exciting research projects. The students are matched with a laboratory or field study where they will enter the world of biomedical and biological science. The Summer Undergraduate Internship Program (SUIP) and the Merial Summer Research Programs (page 6) are two of the innovative programs that introduce students to opportunities at various phases of research—basic, translational and clinical. Host laboratories expose students to research techniques along with a wide range of research topics through the weekly seminars offered at Penn Vet and campus wide. We welcome these young scholars and wish them a summer filled with learning and discovery!

Botulism, equine protozoal myeloencephalitis and equine Lyme neuroborreliosis......

Dr. Amy L. Johnson is an assistant professor of Large Animal Medicine and Neurology (CE) in the Section of Medicine, Department of Clinical Studies – New Bolton Center. Dr. Johnson received a B.A. in Biology from the University of Pennsylvania in 1999 and her D.V.M. from Cornell University College of Veterinary Medicine in 2003. She completed an internship at B.W. Furlong and Associates, a private equine practice in Oldwick, New Jersey, followed by a large animal internal medicine residency at Cornell. After becoming board-certified in large animal internal medicine in 2007, Dr. Johnson began working as a lecturer at New Bolton Center while simultaneously completing a neurology residency at the University of Pennsylvania School of Veterinary Medicine. In 2011 she became board-certified in neurology and also began her faculty position at New Bolton Center. Her clinical research focuses on characterization and antemortem diagnosis of neurologic diseases in the horse. Specific diseases of interest include botulism, equine protozoal myeloencephalitis, and equine Lyme neuroborreliosis. continued on Page 2
Botulism--from a murine bioassay to PCR

Botulism is a disease caused by the Clostridium botulinum neurotoxin, widely considered to be the most potent toxin known to mankind. Horses are exquisitely sensitive to this toxin, showing clinical signs of disease after exposure to relatively tiny doses. Affected horses show progressive muscle weakness culminating in a flaccid paralysis as well as an inability to eat and drink. The disease tends to be rapidly progressive and is almost invariably fatal unless diagnosed and treated promptly. Outbreaks are common and can be devastating, with many animals dying in a short time period. Botulism is endemic in the mid-Atlantic region, and many afflicted horses are referred to New Bolton Center for treatment and supportive care.

Botulism research has a long history at New Bolton Center, with Dr. Robert H. Whitlock establishing the Botulism Reference Laboratory, thus enabling diagnosis of equine cases of botulism through use of the mouse toxicity and neutralization bioassay (MBA). Although the MBA is considered the gold standard for botulism diagnosis, it has several limitations when used for equine samples, including a low sensitivity and long lag time.

Working with Dr. Whitlock and Dr. Ray Sweeney, Dr. Johnson has been able to optimize and validate a quantitative PCR test for equine samples. This test has largely replaced the MBA in the botulism lab, improving the likelihood of definitive diagnosis and providing results in a much shorter period of time.

In addition to improving our ability to diagnose botulism, Dr. Johnson's research has sought to provide more information about the disease and its effects on horses. Clinicians working in endemic areas are frequently faced with the difficult task of advising owners of horses whether to pursue intensive and expensive treatment for botulism. This decision is made harder by the lack of published information regarding treatment and prognosis. Dr. Johnson recently completed a retrospective study (in submission) analyzing 92 horses with botulism treated at New Bolton Center, determining that horses that maintained the ability to rise unassisted had a 95% survival rate.

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rate, compared to an 18% survival rate for horses that could not. Complications were common in hospitalized horses but did not decrease prognosis. This information will allow clinicians to counsel owners appropriately during difficult times.

**Equine protozoal myeloencephalitis (EPM)- optimizing diagnosis in the living horse**

Infection with *Sarcocystis neurona* can cause EPM, the most common infectious neurologic disease of horses in the United States. Although many horses are exposed to the protozoan parasite through contact with opossum manure, only a small percentage of exposed horses develop clinical signs of neurologic disease. There are no reliable tests for identifying the parasite in affected horses; PCR tests have a low sensitivity. Therefore, ante-mortem diagnosis relies upon immunologic testing utilizing several currently available serologic tests. However, the high seroprevalence rate in clinically normal horses confounds diagnosis. There has been much debate over the best type of test to perform and the best samples to submit. Dr. Johnson’s EPM research focuses on analyzing and comparing available serologic tests using her repository of paired serum and cerebrospinal fluid samples from well-characterized clinical cases. Initial work showed that a commercially available and commonly used ELISA test had a very low sensitivity and was not suitable for routine use. Additional work comparing a different ELISA test to an IFA test showed that highest accuracy could be achieved by submitting both serum and cerebrospinal fluid samples and using a serum:CSF ratio, which allows detection of local antibody production in the central nervous system.

This work had an immediate impact on testing practices at New Bolton Center and other equine hospitals. Accurate identification of infected horses allows clinicians to institute prompt and aggressive treatment for horses that need it, improving prognosis.

**Equine Lyme neuroborreliosis—widely feared but poorly understood**

Horses are frequently bitten by ticks that transmit *Borrelia burgdorferi*, the causative agent of Lyme disease. The majority of these infections are subclinical. Clinical Lyme disease is not well-defined in horses, and many horses with various problems, including arthritis, soft tissue injuries, or training issues, are misdiagnosed as having Lyme disease. Misdiagnosis is exacerbated by misconceptions regarding the significance of available tests and the fact that a high number of horses are serologically positive to *Borrelia* in endemic areas. Recent case reports have documented multiple horses with Lyme neuroborreliosis, or infection of the nervous system with *Borrelia*, which appears to be one of the more common manifestations of disease in this species.

Dr. Amy Johnson continued on page 4
Michael Povelones has joined the Department of Pathobiology as an assistant professor in parasitology. An alumnus of Stanford University where he received his PhD in 2004, Dr. Povelones arrived here after completing a postdoctoral interim at Imperial College London in the Laboratory of Immunogenomics. His main research interest is in the area of innate immune recognition and elimination of pathogens. His work focuses on the interaction between mosquitoes and the animal and human pathogens they transmit. As insects are the most species-rich group of animals on the planet and occupy a vast array of ecological niches, they are a fantastic example of the potencty of innate defenses. Dr. Povelones' laboratory is located in 304 Rosenthal Building and and his office is in 390 ED in Old Vet Building.

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In collaboration with Dr. Julie Engiles (Pathobiology - NBC) and Dr. Laura Johnstone (large animal medicine resident – NBC), Dr. Johnson is currently working on a retrospective study of horses diagnosed with Lyme neuroborreliosis at New Bolton Center. Goals include improving our understanding of disease manifestations and identifying possible diagnostic criteria that can be used in future studies to improve diagnosis and prognosis for this tick-borne disease.

The botulism PCR projects have received support from the Grayson Jockey Club. The equine protozoal myeloencephalitis work has been funded internally by a neurologic research fund. Dr. Johnson's office is located in the Widener Hospital at New Bolton Center.

References

Calendar
Attention Postdocs
Biomedical Life Sciences & Career Fair
Wednesday, October 1, 2014
1 pm - 4 pm
BRB Auditorium and Lobby
For more information:
http://www vpul upenn ed u/careerservices/careerfair/
    biofairstudents php

Research Honors
Tracy Bale PhD spoke at the French Society for Neuroscience Biannual Meeting in Lille, France on May 21, 2014 and is an invited speaker for the European Behavioral Pharmacology Society: From Basic Science to Therapeutic Intervention to be held in Rehovot, Israel, September 7th 2014.

Gustavo Aguirre, VMD, PhD has been made an honorary member of the European College of Veterinary Ophthalmologists, 2014.
The 2014 Faculty Research Retreat was held on the campus of New Bolton Center on Friday June 13.

Dean Joan Hendricks and Professor Ralph Brinster presented the Dean’s Distinguished Service Award for 2014 to Professor Narayan Avadhani.

Faculty presentations were given by Amy Johnson DVM; Susan Volk VMD, PhD; Igor Brodsky PhD; Montserrat Anguera PhD; P Jeremy Wang, MD, PhD; Kendra Bence PhD; Helen Aceto, PhD, VMD; Ron Harty PhD; Nicola Mason BVetMed, PhD; and Carolina López PhD. Poster awards went to Charles Vite, Ning Li and Laurie Mack.

Penn Vet faculty enjoyed the day long event. 44 posters competed for prizes.


MICHAEL LEVENSON V’15 RECEIVES MORRIS ANIMAL FOUNDATION AWARD

Michael Levenson V’15, has been selected to receive the Veterinary Student Scholars Program award from the Morris Animal Foundation as stipend support for his summer research project. Michael's project is entitled: Support for a Paradigm Shift in the Detection and Treatment of Canine Osteosarcoma in an Era of Novel Therapies. As a Veterinary Student Scholar in 2014, he is invited to participate in the Merial Summer Scholars Symposium at Cornell in early August. Michael Levenson's mentor is Dr. Nicola Mason, Departments of Pathobiology and Clinical Studies Philadelphia.

He hopes to determine the number of new cases of canine osteosarcoma (OSA) each year in the American pet population by reviewing records from a national veterinary radiology reference laboratory. He suspects this number will be much greater than the previous estimate of 8,000-10,000 new cases per year last determined over twenty years ago. Confirmation of an increased incidence would raise awareness among general practice veterinarians allowing for earlier intervention. He will review records from Penn Vet’s Ryan Hospital to determine whether the interval between onset of clinical signs (lameness) and amputation surgery has an effect on overall survival.

BROWZINE APP FOR SCHOLARLY JOURNALS

Browzine is an app for tablets and iPhone* that can simplify online reading of scholarly journals. Once installed with your Penn credentials, it provides the full text of journals in a browsable table-of-contents format. Journals are arranged on virtual bookshelves by subject matter. Find veterinary journals under Biomedical and Health Sciences -> Veterinary Medicine (currently 70 journals listed). Within the subject they are 'shelved' in categories — from Comparative and Laboratory Animal Medicine to Veterinary Toxicology and Pharmacology. Biomedical journals like Nature, Cell, Science can be found in Penn's Browzine library. Introduction to BrowZine video: https://www.youtube.com/watch?v=AUv1HCRPsIo For more information: http://pennvetlib.wordpress.com/2014/05/08/browzine-app-for-scholarly-journals/

THERESA ALENGHAT, VMD, PHD

Theresa Alenghat, a graduate of Penn Vet’s dual degree program, has been awarded a Burroughs Wellcome Fund (BWF) Career Award for Medical Scientists, a competitive program that provides funding for five years to bridge advanced training and early years of faculty service. She is the first veterinarian to receive this award from BWF. Dr. Alenghat has accepted a position of assistant professor in the Division of Immunobiology at Cincinnati Children’s Hospital Medical Center. Her new contact information will be: Theresa.Alenghat@cchmc.org
Grant Tips

What to Do After You Apply, Before Your Application's Peer Review

If you think your work is done once you submit your application, think again. Even after the viewing window closes, you can still improve your chances of success.

1. Check Your Study Section Assignment

Log in to the eRA Commons to check that your application is assigned to a study section you requested in your cover letter. NIH's Center for Scientific Review (CSR) inputs your assignment as soon as it assigns your application to a study section. Keep checking if you don't see your assignment immediately.

If you did not get the study section you requested, check that you are assigned to one that has the expertise needed to understand your application. You can request a change. For instructions on how to do so, read Request a Change of Study Section in the Strategy for NIH Funding.

2. Check Your Institute Assignment

Check your study section assignment and your institute assignment. If you didn't get the right assignment or you think you chose the wrong institute, contact your program officer. Your application stands the best chance of getting funded if it goes to an institute that considers your research high priority.

3. Send Additional Information as Needed

Keep track of changes in your budget, equipment, and personnel, or new professional accomplishments for you or your key personnel. Notify your scientific review officer of changes until 30 days before your review date. NIH accepts the following items after you apply:

• Revised budget page(s) (e.g., change in budget request due to new funding or institutional acquisition of equipment).

• Biographical sketches (e.g., change in senior/key personnel due to the hiring, replacement, or loss of an investigator).

• Letters of support or collaboration resulting from a change in senior/key personnel due to the hiring, replacement, or loss of an investigator.

• Adjustments resulting from natural disasters (e.g., loss of an animal colony).

• Adjustments resulting from change of institution (e.g., PI moves).

• Letter of acceptance that a manuscript has been accepted for publication (a copy of the article should not be sent).

• News of a professional promotion or positive tenure decision for any PIs or key personnel.

Keep in mind that the parenthetical examples are usually the only items NIH will accept, and your scientific review officer has the final authority over what to accept.

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Suggestions, requests, comments and story ideas may be directed to:
resnews@vet.upenn.edu

Phillip Scott, Ph.D.
Vice Dean for Research & Academic Resources
University of Pennsylvania
School of Veterinary Medicine

Editor:
Gayle P. Joseph
380 S University Avenue
319 Hill Pavilion
Philadelphia PA 19104-4539