

Zweig

From the Harry M. Zweig Memorial
Fund for Equine Research at the
Cornell University College of
Veterinary Medicine



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Newly identified proteins could be key to catching arthritis early

By Lauren Cahoon Roberts

A recent study has identified key proteins in equine joint fluid that could improve the early diagnosis and treatment of osteoarthritis (OA) in equines.

The study, published May 8 in the *Equine Veterinary Journal*, used advanced proteomics to analyze synovial fluid — the lubricating liquid found in joints — from horses with and without osteoarthritis. Research out of the lab of Heidi Reesink, Ph.D. '16, and led by graduate student Erica Secor '09, D.V.M. '13, discovered that

several proteins — including alpha-2-macroglobulin and pregnancy zone protein — showed significant differences between healthy and arthritic joints.

This finding is an important step in furthering OA diagnosis and treatment, Secor says. “Most often OA is diagnosed based off clinical signs, then followed up with confirmation using radiographs,” she says. “One of the problems with this approach is that the changes seen by radiograph happen late during OA development, once the lesions within the joint are irreversible. Our best chance



Photo: Carol Jennings/CVM.



Dr. Heidi Reesink examines a horse. Photo: Carol Jennings/CVM.

of stopping or slowing the progression of OA would be very early in the process, before radiographic changes are present and clinical signs such as lameness are mild and intermittent. However, catching cases at this point is very difficult.”

Another challenge in catching equine OA early is a technical problem: diagnostic methods usually rely on having the right antibodies to bind to specific proteins in a sample, which can then be measured. “While some antibodies can bind to proteins across several species, other times they are more species-specific, and there are many proteins in the horse that we may like to be able to measure, but don’t currently have the right antibody reagents to do so,” says Secor.

To overcome this logistical problem, Secor and her team used mass spectrometry to conduct a full molecular

rollcall of all proteins in the joint fluid samples from horses with or without OA.

“The beauty of this technique is, not only do we not require any species-specific reagents, but we also don’t need to go into the experiment with specific targets in mind,” Secor says. “With this technique we can get an idea of all the proteins in the sample that we are testing, which can give us ones that we wouldn’t even know to look for. “

Most notable was the upregulation of proteins alpha-2-macroglobulin and pregnancy zone protein in diseased joints. While alpha-2-macroglobulin had been previously associated with OA in dogs and humans, pregnancy zone protein had not been described in horses before. While many of these upregulated proteins

are considered anti-inflammatory and associated with maintaining joint health, Secor explains why OA samples would have them in higher levels: “It’s thought that the body responds to the initial trauma, injury, or joint degeneration by trying to increase the proteins needed to maintain joint health, but cannot overcome the degradative or inflammatory side, resulting in the progression of OA,” she says.

While the methods used in this study aren’t immediately translatable to clinical application, the findings jumpstart an investigation into which markers should be used for a stall-side diagnostic tool.

“These findings could pave the way for a simple diagnostic test using synovial fluid to detect early-stage OA in horses,” says Secor. “Early intervention is key to preserving joint health and prolonging athletic careers.” ●

2025 research presentations

Following opening remarks by Dr. Paula Cohen, associate dean for Research and Graduate Education, the presentations discussed equine research conducted at Cornell University.

- **Dr. John Pigott**, associate clinical professor in the Department of Clinical Sciences and clinical director of Cornell Ruffian Equine Specialists: “New York Center for Thoroughbred racing safety at CVM: Prevention of fatal musculoskeletal injuries in the fetlock joint.”
- **Dr. Erica Secor**, DVM, MS, DACVS-LA: “The magic in the membrane: Immune cell and transcriptomic alterations in equine fetlock osteoarthritis.”
- **Dr. Aimee Colbath**, assistant professor in the Department of Clinical Sciences: “Mast cells and models: unlocking equine arthritis.”
- **Dr. Callum Donnelly**, assistant professor in the Department of Clinical Sciences and the Harry M. Zweig Assistant Professor: “Metabolic pathways of fertility: the emerging role of bile acids in the mare.”



Poster session at the Harry M. Zweig Memorial Fund for Equine Research. Photo: Carol Jennings/CVM.

Recent Zweig-funded research publications

- Wagner B, Schnabel CL, & Rollins A. (2025) Increase in virus-specific mucosal antibodies in the upper respiratory tract following intramuscular vaccination of previously exposed horses against equine herpesvirus type-1/4. *Vaccines*, 13(3), 290.
- Sipka A & Wagner B. (2025) Fluorescent bead-based multiplex assays improve serological disease diagnostics and have potential of identifying sensitive immune biomarkers for maintaining health and performance. *J Am Vet Med Assoc.*, Mar 17;263(S1):S33-S44.
- Lection J, Schnobrich M, Wagner B, Byron M, Back B, Rollins A, Castro Alves RF, Cheong SH & Diel de Amorim M. (2025) Inflammatory marker analysis of uterine cytobrush samples helps identify mares with endometritis. *Am J Vet Res.*, May 29;86(8):ajvr.25.02.0059.
- Sun Y, Yu YT, Castillo XO, Anderson R, Wang M, Sun Q, Tallmadge R, Sams K, Reboul G, Zehr J, Brown J, Wang X, Marra N, Stanhope B, Grenier J, Pusterla N, Divers T, Mittel L & Goodman, LB. (2025) Investigation of the blood microbiome in horses with fever of unknown origin. *Vet Med Sci*, 11:e70272.
- Yu YT, Olarte Castillo X, Reboul G, Zehr J, Sun Y, Anderson R, Wang M, Sun Q, Tallmadge R, Sams K, Brown J, Marra N, Stanhope B, Grenier J, Parrish CR, Pusterla N, Divers T, Mittel L & Goodman LB. (2025) Genome sequence of Equine Erythrovirus 1, identified in the United States. *Microbiol Resour Announc.*, 14:e00897-24.

Dr. Aimee Colbath, recipient of the Harry M. Zweig Early Career Excellence Award



Dr Aimee Colbath. Photo: Carol Jennings/CVM.

By Elodie Smith

Dr. Aimee Colbath is a graduate of University of Pennsylvania School of Veterinary Medicine. She continued her training with a rotating internship in large animal medicine at University of Georgia, followed by an internship in equine surgery at Tufts Cummings School of Veterinary Medicine. Colbath did her residency at Colorado State University, in equine surgery, where she also acquired a Master's degree in Clinical Sciences in 2015, and a Ph.D. in 2019.

Dr. Aimee Colbath, an assistant professor in the Department of Clinical Sciences at Cornell University's College of Veterinary Medicine, has become the inaugural recipient of the Harry M. Zweig Early Career Excellence Award. The award, created by the Harry M. Zweig Memorial Fund for Equine Research, honors outstanding early-career scientists who have made significant

contributions to equine health and the horse racing community.

Are you an equestrian?

Yes! I started riding when I was five years old, and today I am a Horsemanship-A in the US Pony Clubs. I have competed in eventing for more than 30 years through the preliminary level, competed in Dressage through second level. In college, I was the captain of the equitation team for three years, and I have competed in the 1.10m Jumpers. I have owned and competed primarily off-the-track Thoroughbreds. Just two years ago, I had the pleasure of competing in the Retired Racehorse Project with my current off-the-track Thoroughbred who received ninth place in amateur eventing. I have a small farm in Dryden, NY, with three to four horses at a time.

What is your research focus?

My lab focuses on musculoskeletal disease and treatment. Overall, I'm interested in inflammation and inflammatory cells in osteoarthritis and therapeutics which target the inflammatory processes. Specifically, I'm exploring and developing pre-clinical models to study arthritis, meaning my lab works with cells or other large animals to investigate potential therapeutic strategies before they are translated to clinical trials.

My full-time Ph.D. student (Abigail Loucks) recently received an NIH F31 training grant for her work identifying the role of mast cells in osteoarthritis. Mast cells are immune cells that play a crucial role in allergic reactions and inflammation. Loucks works with mouse models of arthritis, and in vitro, with mast cells from mice and horses.

Clinically, I'm specialized in orthopedic surgery including arthroscopy, fracture repair, lameness, regenerative medicine and whole horse rehabilitation techniques (including acupuncture, kinesiotape, and physiotherapy).

What does the Zweig Early Career Excellence Award mean for your research?

Awards such as this one are crucially important for researchers. They provide a source of funding that allows us to obtain preliminary data – a prerequisite to successfully apply for larger grants from organizations such as the NIH and Grayson Jockey Club Foundation.

I feel very lucky to have received such a prestigious award. The Harry M. Zweig Memorial Fund for Research provides monumental support to equine

researchers such as myself. This support is unparalleled at other universities and truly drives the care of our equine athletes forward whilst encouraging graduate student and undergraduate student participation. Through the support of the Harry M. Zweig Memorial Fund for Research we are able to train the next generation of researchers and change the lives of horses.

What do you hope to accomplish with the support from the Zweig Committee through his award?

My lab will continue expanding knowledge on osteoarthritis, always with a focus on effective interventions. Our early research on equine mast cells is both promising and new. Promising because our mouse mast cell work has clearly shown that they have a significant influence on the development of osteoarthritis, and indicates they may be a powerful therapeutic target. And new because I'm also unaware of another group that has grown equine mast cells. The ability to grow these cells in culture opens up new research on these powerful cells, and new therapeutic directions. We are very excited about that! ●



Dr Aimee Colbath. Photo: Brant Gamma Photos.

From Farm to Lab: A Horse-Centered Career for Dr. Amanda de Mestre



LISTEN TO THE PODCAST

Adapted from the Cornell veterinary podcast

Raised on a small Australian farm with sheep, cattle and horses, Dr. Amanda (Mandi) de Mestre imagined veterinary life early. The research bug came later. “I think I wanted to be a veterinarian early on, and the scientist came later for sure,” she says. A formative moment arrived at age 12, when a run of unexpected heifer pregnancies brought the local vet out for multiple C-sections. Standing beside the chute, she remembers thinking, “this is fascinating.”

A gap year in Germany deepened the pull. While tutoring a young dressage rider at an international training barn, she became interested in the work that went into breeding Olympic-level horse athletes. “I got hooked again,” she says. By veterinary college, she was working on equine infectious diseases like strangles and taking research stints at North Carolina State and Cornell. “Discovering something new, I guess, is the really exciting part of being a scientist,” she says.

Studying pregnancy, loss, and the foal’s start in life

Clinical years in a busy equine neonatal unit shaped de Mestre’s research questions. “The fundamental thing we’re trying to do is to ensure that a neonate horse foal or baby is born healthy, alive, and programmed for lifelong health.” Her lab investigates why some pregnancies fail early or result in compromised foals, zeroing in on the embryo’s own genetic blueprint.

Science had long emphasized the mare’s uterus, hormones and immune adaptations, while “we knew practically nothing about how the embryo itself controls its own fate,” she says. A shift in focus, to the embryo’s genetic programming, has yielded pivotal findings, including that 50-60% of the pregnancies that don’t progress through early gestation are due to abnormal numbers of chromosome.

Why horse research matters to human health

Because mares are monitored intensively, often with ultrasound beginning two weeks post-conception, researchers can watch very early development in ways that are not feasible in people. That window helps identify genes and mechanisms tied to early miscarriage. This knowledge is likely relevant to human loss, where timing and access to tissue are major barriers. This illustrates the concept of “One Health”: discoveries that benefit horses may clarify causes of human pregnancy loss many families quietly shoulder.

Cornell Equine: A campus-wide push

De Mestre also leads Cornell Equine, a new initiative unifying equine discovery, care and learning across campus. It connects polo and equestrian teams, the Equine Hospital, Cooperative Extension, and 35 faculty engaged in horse-related research across Cornell.



A mare and her foal. Phot: Adobe Stock.



Mandi de Mestre. Photo: John Enright.

Two priorities top the list: sustained mentoring from high school all the way through veterinary college to recruit and retain equine veterinarians, and catalyzing cross-disciplinary projects that tackle multidisciplinary problems. A monthly seminar series has already built significant momentum.

The Baker Institute: 75 years of translational impact

As director of Cornell’s Baker Institute for Animal Health, de Mestre now stewards a 75-year legacy of discoveries that moves from bench to barn and bedside, and follows in the steps of the institute’s early breakthroughs such as the canine parvovirus vaccine. Today, research spans infectious disease, immunology, reproduction, genomics and cancer.

The most exciting, according to de Mestre, is how Baker scientists “follow the science,” even if that means leaping

fields – like fundamental sperm biochemistry powering a new diagnostic approach for stroke – leading to translational work with shared benefits for animals and people.

Advice for budding scientists

For students eyeing research, de Mestre offers two pieces of guidance.

First, “surround yourself with good mentors” who are the right match for you. Second, “don’t take failure or hardship too personally.”

She quotes Ted Lasso with a smile: “He has this saying, ‘Just pretend you’re a goldfish to forget something.’ I should add as a veterinarian, I have since looked that up, and goldfish don’t have a bad memory. They actually have a reasonable memory. But you need to learn from certain things, and you need to have a short memory and keep going on. I think that is absolutely critical to success in anything you do.” ●

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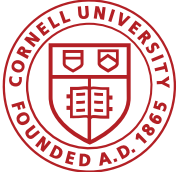
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We are moving to a dual format. Starting in 2026, Zweig News Capsule will publish one printed and one digital issue each year.

With the goal to eliminate paper waste, we are planning to move to a fully digital publication in the coming years.

Scan the QR code to register for the electronic edition.

Thank you for helping us make a greener, sustainable world for humans and equines alike!



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The Harry M. Zweig Memorial Fund for Equine Research honors the late Dr. Harry M. Zweig, a distinguished veterinarian, and his numerous contributions to the state's equine industry. In 1979, by amendment to the pari-mutuel revenue laws, the New York State Legislature created the fund to promote equine research at the College of Veterinary Medicine at Cornell University. The Harry M. Zweig Committee is established for the purpose of administering the fund and is composed of individuals in specified state agencies and equine industry positions and others who represent equine breeders, owners, trainers and veterinarians.

Our site provides information on the projects and publications resulting from the Zweig Memorial Fund, and demonstrates the objectives of the Fund in promoting equine health in the racing industry. The Zweig News Capsule is published twice a year, and can be downloaded at bit.ly/ZweigNews. Please encourage other equine enthusiasts to visit the site.

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