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Nicotine, sleep, SIDS, blood pressure ...for CVM researcher, it's just another day in the lab

BY LAURA MIZE

Linda Hayward, Ph.D., is an associate professor of cardiovascular physiology in the UF College of Veterinary Medicine, but the goal of her research is to help people. Hayward's research focuses mostly on blood pressure and how it is regulated by different body systems.

Her interest in physiology began with a focus on muscle and exercise physiology, which stemmed from her years playing tennis in high school and college. Hayward says she wanted to understand "how to become a better athlete."

"For tennis, what is the difference in someone like (an) elite athlete (such as) Roger Federer and an excellent player that doesn't make it to that level? Some of it is related to brain interaction with sensory input and muscle control," Hayward said.

One of her recent projects examines how exposure to nicotine in the womb affects the body's management of blood pressure and the respiratory system.

Hayward says the research, which she has conducted with the help of graduate student Carie Reynolds and David Fuller, Ph.D., from the College of Public Health and Health Professions, shows that nicotine exposure in the womb can affect a person for the rest of his or her life.

"It changes brain function," she said. "A lot of those changes are permanent."

Another result, she explained, is that body systems develop differently. This seems to be linked to sudden infant death syndrome.

"Our data suggest that the sleep system develops out of phase with all the other systems," Hayward explained, "and that probably contributes to the inability of these kids to arouse in response to a physiological stimulus."

Not all children exposed to nicotine in the womb die of SIDS, of course, but Hayward said such children may develop a different set of problems as they grow.

"Instead of sudden infant death syndrome, (the) child is thought to not awaken in response to low oxygen, and so they sleep really well," she said. "And then it turns out, as they grow older, the system regulating sleep has been chronically changed, and it looks like when they become adolescents and adults that they don't sleep well enough anymore."

Hayward says a lot of medical literature links poor sleep with cardiovascular disease and that rats exposed to nicotine in the womb "have a slightly higher blood pressure than the average rat or a control rat."

This supports the idea that a malfunction in the sleep control system, which controls other body systems, may cause changes in blood pressure regulation. The next step in the research is to see if moms with hypertension who smoke during pregnancy have babies with blood pressure even higher than their own.

Together with Mohan Raizada, Ph.D., from the College of Medicine, and Michael Katovich, Ph.D., from the College of Pharmacy, Hayward has received a grant from the university's Division of Sponsored Research to begin the work.

"We've started those studies and it looks like it indeed is true," she said. "So the question is: Is that a function of the interaction between what the nicotine model changes and this hypertensive situation, which involves this renin angiotensin system and changes in the brain?"

Hayward also has supervised the work of Joslyn Ahlgren, a Ph.D. student in physiology at the veterinary school, on how exercise affects the body's response to blood loss. Hayward and Ahlgren designed the study together.

Though Ahlgren is still compiling the data, findings so far show that rats that exercise maintain a higher blood pressure after losing blood than those that don't. They also return to a normal blood pressure sooner than rats that have not been exercising, and do not go into as severe a state of shock after blood loss.

Hayward said this research is important to help understand if treatments for humans deemed to be effective in sedentary rats would also work well for people who get a lot of exercise.

Ahlgren, who is in the final year of the program, said working with Hayward has helped her develop better research skills.

"She is an excellent mentor for several reasons. She is highly organized. I have definitely learned prioritizing and time management within a research design. She's just very good at it."



Dr. Linda Hayward is an associate professor of cardiovascular physiology in the college's department of physiological sciences.

Homeward bound after hemodialysis



A Welsh Corgi named Bear, center, gets a pat from Dr. Carsten Bandt before going home for the weekend with his owner, Betty Skel, far right, on Feb. 27. Bear received two weeks of hemodialysis treatment at UF to purify her blood of a toxin believed to have been antifreeze before being discharged from the UFVMC on March 9. For additional photos, see p. 2. (Photo by Sarah Carey)

Gulfstream Barbaro Awards given to two DVM students, one graduate student from UF



Three students from the University of Florida College of Veterinary Medicine have received financial awards from Gulfstream Park to further their equine studies. Established after the death of 2006 Kentucky Derby winner Barbaro, the award program is in its third year. One of a family of racetracks owned by Magna Entertainment Corp., the park provides \$12,500 in financial assistance as well as professional mentoring through the American Association of Equine Practitioners to two senior UF veterinary students committed to pursuing a career in equine medicine and surgery.

Those awards are known as the Gulfstream Barbaro Awards.



Megan Lamb

In addition, the park provides \$5,000 through the Barbaro Research Award to a UF veterinary graduate student who is conducting equine research.

The D.V.M. student awards went to Megan Lamb and Erica Rosen, both from the class of 2009.

Lamb grew up on her parent's Thoroughbred breeding farm in Reddick, Fla., and started riding at an early age. She competed successfully for many years in hunter/jumper and eventing competition and subsequently graduated Phi Beta Kappa from Colgate University. While at Colgate, she participated in animal behavior research projects in both Thailand and Belize. Lamb has been an active member of the student chapter of AAEP and the UF colic team while in veterinary school.

After graduation from UF, she will complete an internship at the New Jersey Equine Clinic in the interest of working toward board certification in either equine surgery or medicine.

The Gulfstream Barbaro Award program offers financial assistance to two senior UF veterinary students and one graduate student focusing on careers in equine practice or research.

Rosen, a summa cum laude graduate of Cornell University, also grew up riding and showing horses in hunter/jumper competition and is a former captain of Cornell's Varsity Equestrian Team. During her undergraduate years, she worked alongside equine veterinarians in private practice as well as in the clinical research field. While a veterinary student, she has been active in equine clubs and activities and also has worked closely with surgical faculty on a research project pertinent to the equine athlete.

She plans to pursue the field of sport horse medicine, focusing on lameness, diagnostic imaging and surgery.

The graduate student award went to Astrid Grosche, a board-certified internist in large animal medicine. Grosche is the UF veterinary college's current Deedie Wrigley-Hancock Equine Colic Research Fellow and is pursuing her Ph.D. under the mentorship of Dr. David Freeman.

She received her veterinary degree from Leipzig University in Germany in 1997 and subsequently worked as a scientific collaborator in the department of large animal internal medicine at Leipzig University, specializing in veterinary internal medicine and clinical laboratory medicine.

Grosche is now focusing on the role of inflammation in mucosal damage and restitution in the equine colon during ischemia and reperfusion.

All three awards were presented at the annual Florida Derby, held March 28 at Gulfstream Park.



Dr. Astrid Grosche

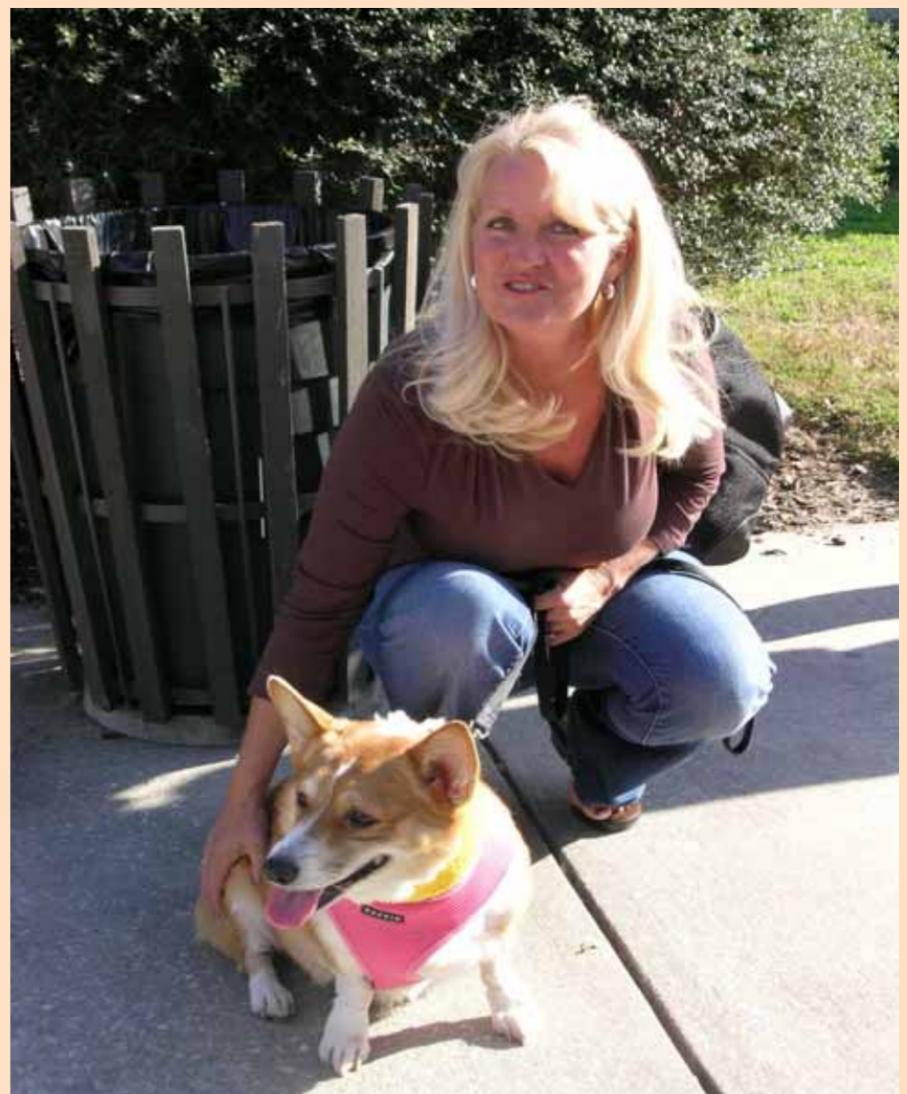
Journey through hemodialysis



Bear received a series of hemodialysis treatments at the UF VMC.



Andrea Shultz, triage and hemodialysis technician, monitors Bear's condition during one of her hemodialysis treatments.



Betty Skel, Bear's owner, was happy to pick her dog up from the small animal hospital Feb. 27 to take Bear home to Ft. Myers for the weekend between hemodialysis treatments.

Small animal surgeons shine at Veterinary Orthopedics Society annual meeting

Several UF small animal surgeons were honored for their presentations during the annual meeting of the Veterinary Orthopedics Society, held Feb. 28-March 7 in Steamboat Springs, Colo.

"The meeting was dominated by the UF small animal surgery section, our comparative oncology group and the collaborative orthopedics and biomechanics laboratory," said Dr. Dan Lewis, a professor of small animal surgery.

Dr. Alastair Coomer, a third-year small animal surgery resident, received a Mark S. Bloomberg Award, which provided funding for seven residents to attend the VOS meeting and present their research. Coomer subsequently received the award for the Best Research Presentation in the Bloomberg session for his paper on "Anti-Tumor Effects of Radiation Therapy, Carboplatin and Combrestastatin-A4 Phosphate Combination Therapies in a Mouse Model of Xenografted Canine Osteosarcoma."

According to Lewis, Coomer's work may significantly improve the survival of dogs affected with osteosarcoma.

Dr. Kelley Thieman, a first-year small animal surgery resident, received the award for the week's best podium presentation. Her topic was "The Contact Mechanics of Meniscal Repairs and Partial Meniscectomy as Treatment for Simulated Bucket Handle Tears in the Stifle of Dogs."

Thieman's presentation was "beautifully illustrated," Lewis said, adding that the work provided a rationale for preserving meniscal function which should help mitigate the development of arthritis in dogs with cranial cruciate ligament ruptures and meniscal damage.

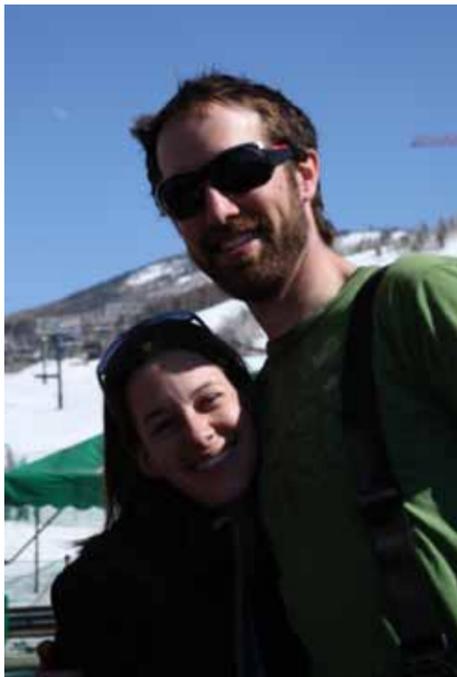
Dr. Antonio Pozzi won the award for Best Clinical Poster Presentation in the clinical category.

His presentation was titled, "Minimally Invasive Percutaneous Tarsal and Carpal Arthrodesis."

Pozzi's poster examined an innovative means of performing arthrodeses, or fusion of the joints. His techniques appear to decrease post-operative morbidity and make possible faster fusion of the joints.

UF's team shone in terms of physical prowess as well as academics.

"To top it off, Drs. Coomer and Pozzi placed second and first in their respective age groups in the ski race," Lewis said.



UF surgery residents Alastair Coomer, right, and Kelley Thieman take a break on the slopes with others on the UF surgery team between presentations at the annual meeting of the Veterinary Orthopedic Society in Steamboat Springs, Colo.

Discovery highlight

Evaluation of novel osteoporosis therapies



Dr. Tom Wronski, right, is shown in his laboratory with laboratory technician Mercy Rivera in this file photo.

Dr. Tom Wronski, a professor in the UF College of Veterinary Medicine's department of physiological sciences, has recently published a study which explains why medical treatments that activate a specific growth receptor have limited potential as a treatment for postmenopausal osteoporosis.

The paper by Wronski and colleagues* provides new insights about the use of basic fibroblast growth factor (bFGF) and a chemical that stimulates prostaglandin E2 receptor 4 as therapies for the treatment of osteoporosis. Wronski has shown that these treatments increase bone formation — which is highly desirable and essential for an osteoporosis therapy — but only bFGF increases bone mass. A combination of cell culture studies and analyses in a rat model for postmenopausal osteoporosis was used to show that the chemical that stimulates the EP4 receptor also increases the numbers and activity of the cells that remove bone.

Wronski's research shows, despite strongly stimulating bone formation, the chemical activation of the EP4 receptor does not increase bone mass because of the opposing and equally strong stimulation of bone breakdown cells.

*(Downey, M.E., Holliday, L.S., Aguirre, J.I., Wronski, T.J., 2009: In Vitro and In Vivo Evidence for Stimulation of Bone Resorption by an EP4 Receptor Agonist and Basic Fibroblast Growth Factor: Implications for their Efficacy as Bone Anabolic Agents. *Bone* 44(2):266-74.)

Department of Agriculture bulletin moves to online format

Because of increasing costs and wide access to electronic mailing, the Florida Department of Agriculture and Consumer Services has discontinued publication of hard copies of its Animal Health Bulletin and now will be moving to an online-only format.

The current issue of the bulletin is available at: http://www.doacs.state.fl.us/ai/pdf/Animal_Health_Bulletin_2009.pdf

Titles of articles in the current winter edition include: Equine Piroplasmiasis Update; Avian Influenza--Then and Now; Rift Valley Fever Exercise; Gertrude Maxwell Save-a-Pet, Inc.; Tuberculosis in a Roping Steer from Florida; The Dangers of Brucellosis in Feral Swine; and Construction of New Necropsy and Incineration Facility for the Bureau of Diagnostic Laboratories (BDL).

Anyone who would like to receive the Animal Health Bulletin by e-mail is asked to provide their e-mail address to: strickm@doacs.state.fl.us.

"If people provide us with their e-mail address, we will be happy to send them notification and the link every time there is a new issue, so they can go right to it," said Thomas Holt, D.V.M., state veterinarian and director of the Division of Animal Industry.

Key dates: Mark your calendars

May 8: Completion ceremony and reception for graduating offshore students will be held at 3:30 p.m. in the equine hospital auditorium.

May 9: The sophomore professional coating ceremony will take place at 2 p.m. at University Auditorium with a reception to follow.

May 23: Commencement exercises for the graduating class of 2009 will be held at 2 p.m. at UF's Phillips Center for Performing Arts. A reception will follow immediately afterward at the Touchdown Terrace, Ben Hill Griffin Stadium.

Superior Accomplishment Award winners honored



Ten employees of the UF College of Veterinary Medicine received Superior Accomplishment Awards for 2008-2009 and were honored at a banquet held March 3 at the Savannah Grande.

Pictured from left to right in the above photo are Stephanie Stein (LACS); Mary Ring (Dean's Office); Celia Yemma (SACS); Rebecca Richardson (Micro Parasitology); Brandy Woodley (SA Surgery); MaryAnn Dixon (Anatomic Pathology); Dr. Matt Winter (SACS); Wendy Davies (SA Surgery); Dr. Amy Stone (SACS); and Dieter Haager (VMC Client Services.)

Stone and Winter were honored from the academic personnel category; Haager, Stein, Woodley and Yemma from the administrative/supervisory category; Davis, Dixon, and Richardson from the scientific/technical category and Ring from the clerical/office support category.

Congratulations to all!

UF vets make right whale sedation possible, enabling disentanglement effort

Two UF veterinarians were part of a multi-institutional team that helped disentangle a North Atlantic right whale from life-endangering fishing gear March 6 near the coast of St. Augustine Beach.

Dr. Mike Walsh, associate director of UF's Aquatic Animal Health program, has been working with sedation and anesthesia in dolphins and whales in oceanaria and with the support of the Aquatic Animal Health provided the drugs and dosages used to sedate the endangered animal. This allowed rescuers to remove 90 percent of the entanglement that was wrapped around the animal. Dr. James Bailey, an anesthesiologist and clinical assistant professor at UF's College of Veterinary Medicine with a longtime interest in marine mammals, provided anesthesia support and helped to document the sedation procedure.

The rescue involved the efforts of a multi-institutional team including the Woods Hole Oceanographic Institution; NOAA Fisheries, which manages the Atlantic Large Whale Disentanglement Network, based at the Center for Coastal Studies in Provincetown, Mass.; the University of Florida's Aquatic Animal Health Program; Florida Fish & Wildlife Conservation Commission; Georgia Department of Natural Resources and Coastwise Consulting Group.

Team members on four boats assisted by an aerial survey plane worked for two days to free the animal. Eventually they succeeded in injecting the 40-foot, 40,000-pound whale with two darts containing a mixture of sedatives that allowed them to cut away the gear that wrapped around the animal's head.

The new sedation delivery system, built by Trevor Austin of Paxarms, New Zealand, consists of a 12-inch needle and a syringe driven by compressed air, which injects the drug into the whale's muscle.

This is the first time in worldwide history a free-swimming large whale was successfully sedated in the wild, according to experts at NOAA Fisheries Service and Woods Hole Oceanographic Institution.

"This tool enhances fishing gear removal from entangled whales and minimizes the added stress from repeated boat approaches to the animals," said Dr. Michael Moore, a veterinarian and research biologist at WHOI. Moore has led the investigation into chemical and physical tools to facilitate and enhance the safety of large whale restraint during efforts to remove entangling fishing gear. "It's gratifying to have successfully employed this new technique."

North Atlantic right whales are frequently entangled in fixed fishing gear, especially from the trap and gill net fisheries. Many of them eventually disentangle themselves, but some entanglements persist for months, at times resulting in a slow and presumably very painful death.

Whale avoidance of boats attempting disentanglement has historically limited resolution of complex cases. Over the past 10 years WHOI, in collaboration with NOAA Fisheries, UF and the University of Wisconsin, has now developed a sedation system to hopefully make them more approachable by rescue boats.

Walsh said he initially was brought on board back in 2001, based on his experience at Sea World, where he was head veterinarian for nearly 20 years, and his familiarity with anesthetics used in marine mammals.

"I developed the anesthetic procedures, with the help of UF veterinarians, on manatees and the initial procedures used on walrus," Walsh said. "Many of these have improved, but we set baselines and also did a lot of the initial work on dolphins and whales."

He said this gave him a comfort zone in working with these animals.

"If we hadn't already worked out these techniques in other cetaceans (whales and dolphins), we'd be less likely to attempt this," Walsh said. "We plan things so that we decrease that potential for failure in the sedation process."

In the case of the most recent right whale — known as 3311 — Walsh convinced the team that the drug used was the best one that was available and had worked in other animals. He said Aquatic Animal Health program administrators had prepared for the possibility of a whale needing sedation this year by purchasing the drug ahead of time.

"Dr. (Charlie) Courtney helped us tremendously," Walsh said. "I felt that 'it's probably going to happen, so let's be ready.' In this case, it was a bigger investment than most people would be willing to take a chance on, but that is what wildlife vets are supposed to do — they take a chance, make the effort and prepare for any issue."

Courtney, the college's associate dean for research and graduate studies, oversees the AAH program within the college. ZooPharm in Colorado had the drugs needed in the right concentrations to fit the darts and in a form that the two could be mixed together.

"We were attacking the drug delivery system, the drug type and the potential drug effects at the same time," Walsh said, adding that the goal with 3311 was not to anesthetize the whale but rather to seek its cooperation so that it would continue breathing and moving on its own while the material ensnaring it was cut away.

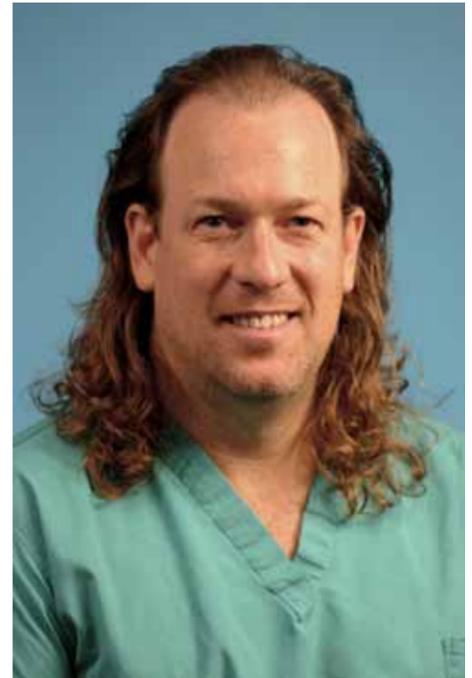
"Trying to balance the safety of animals with the procedural needs to cut off the material is where the tension comes in," Walsh said.

The disentanglement team initially tried unsuccessfully to sedate whale 3311 back in January when it was swimming off the Georgia/Florida border. The animal subsequently left the area, but returned about five weeks later in early March, when the most recent effort was made. The dosage for the second attempt was increased significantly, but the dart did not hit the animal at the desired angle. There was a change in its respirations but the whale did not allow the disentanglement boat to get near its head. The next day, the drug dose was increased again. The dart team was able to make its approach and the whale was successfully darted.

"We felt confident that we got the drug into the muscle of the animal and after waiting 30 minutes for the drugs to take effect the animal allowed the disentanglement boat to approach



Dr. Mike Walsh



Dr. James Bailey



Disentanglement team cuts rope tightly wrapped over the whale's head. Cut releases approximately 150 feet of rope. (Photo courtesy of Wildlife Trust)

and did not turn away," Walsh said. "This allowed Jamie Smith, the right whale disentanglement coordinator, to begin cutting off the line."

He was disappointed that not all of the gear was able to be cut away.

"It was a mixture of elation and disappointment," Walsh said. "We accomplished something that hadn't been done before with a great team effort, but I was really hoping we could get it all off. However, now we have a potential tool that can be used to intervene more quickly with severely entangled whales that are slowly starving to death."

Walsh added that the new sedation technique may greatly expand the options for the disentanglement teams dealing with these severely compromised whales, and for the whales themselves.

"It is very exciting to be able to see this technique have an effect in an animal so large," he said.

UF's Bailey has worked with Walsh on a variety of marine mammals since the early 1990s.

"I've had opportunities to work with various large, difficult or dangerous species, including polar bears, manatees and dolphins," Bailey said. "Some of these patients even came here to UF for various procedures."

In the case of the recent whale disentanglement, Bailey was invited to participate when another member of the team was unable to participate at the last minute.

"This event was over a decade in the making and has involved numerous highly skilled and dedicated individuals from multiple organizations — sometimes with divergent opinions," Bailey said. "In the end, they all came together to get this done and they made me feel like a part of the team."

"The obvious concern was that the whale could drown. I was there to help everyone to believe their decisions were sound and I just happened to be on base when they hit a home run."

The animal remains in very poor condition and has a guarded prognosis, but the disentanglement will give it a better chance for survival.

The North Atlantic right whale is the most endangered great whale, with a population of less than 400. Human activity—particularly ship collisions and entanglement in commercial fishing gear—is the most common cause of North Atlantic right whale deaths.