

# Advance

Healthy Animals | Healthy People | Healthy Planet

Improving the health  
of animals and people  
at home and around  
the world.

A newsletter from the Washington State University College of Veterinary Medicine

Fall 2017

## WSU's Neuroscientists:

| Using Brain Science to Understand Drug Addiction



**Dr. Rita Fuchs**

*WSU neuroscientist and director of  
the Alcohol and Drug Abuse Research Program*

**Dr. Ryan McLaughlin**

*WSU neuroscientist*



College of

**Veterinary Medicine**

WASHINGTON STATE UNIVERSITY



Dean Bryan Slinker,  
WSU College of  
Veterinary Medicine

Thanks to our many supporters—that’s you—our team completed another very successful year, raising more than \$13.4 million in private funding. All of us in the college thank you from the bottom of our hearts because your gifts have taken on ever-increasing importance as we reach for our goals in a challenging budget climate. Challenging? The “great recession” is long in the rear view mirror, but the effect on the University and our college from those days continues to ripple because most of the state appropriation that was lost has not returned.

So today, gifts make an even bigger difference to help us continue to improve the health of animals and people locally and globally. Often, we seek gifts for specific needs. For instance, student scholarships, which are always critical, or raising funds specifically to replace our 21-year-old MRI in the Veterinary Teaching Hospital. But we also have a critical need for flexible funds that can be directed to when and where they are needed most. The uses of these funds range from buying a new piece of lab equipment that could lead to a medical breakthrough, or purchasing diagnostic equipment that might save a pet’s life, or investing in a great idea to improve our teaching or curriculum.

Flexible funds help us meet unexpected challenges and react to critical opportunities. They can provide seed money for innovative research and programs, which often sows more success. A critical, sometimes relatively small, investment in a great idea can then be leveraged into significant new funding from more targeted gifts from donors or grants from foundations. They can also leverage larger gifts by positioning the college to match other donors’ gifts to meet specific goals.

Flexible funds can also help recruit and retain the college’s best faculty minds, train graduate students for the next generation of advances, hire veterinary technicians to help our patients and our students, or meet a host of other needs, big and small, that may not be met with other sources of funding. Recently, for example, in negotiations to retain one of our brightest young faculty members, they asked for help to take some of their research in new directions that are “risky” in the sense that they may not pan out, but if they do the payoff would be very high. We really want to be able to invest in our talented faculty to allow them to do such things. This faculty member is really starting to hit their stride, and is strongly motivated to achieve more than can be reasonably funded by their current grants. Their request to us is thus eminently reasonable—if we will backstop their push into new areas with funds for the next two to three years, they will take those risks. If, during that time, they get the larger grant they are seeking to expand their program, we would stop providing the additional funds. I’ll take that deal any day from talented, motivated, thoughtful colleagues, but we need help in the form of flexible, uncommitted funds to do so.

Our critical need for this type of flexible funding often is not as visible or concrete as scholarships or a new MRI, but it is just as important.

As always, thank you, take care, and Go Cougs!

Dr. Bryan Slinker, Dean  
WSU College of Veterinary Medicine



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WSU College of  
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# An MRI Helps Solve a Dog's Medical Mystery

by Marcia Hill Gossard '99, '04 Ph.D.  
Photo by Lauren Grabelle



*Sugar at Palouse Falls in Washington state shortly after celebrating her twelfth birthday.*

Shortly after returning from a business trip in the fall of 2015, Lauren Grabelle found her dog, "Sugar," dragging herself across the floor. Her hind limbs were lifeless. Lauren became alarmed.

A few months earlier, she had noticed Sugar, an athletic and high energy Weimaraner, had been acting strangely. She would dip her head in her food bowl, but then lift it back up to eat. Kibble dropped all over the floor. Sugar, who would normally have gobbled up any fallen food, wouldn't lower her head to eat it.

"I decided to give her some chicken on a plate and put it on the floor," says Lauren. "She didn't eat it. But when I picked up the plate and held it to her mouth, she wolfed it down. That was the connection for me that she couldn't bend over to get it."

In August of that year, she had taken Sugar to a local veterinarian who took x-rays (radiographs), and diagnosed Sugar with bone spurs in her elbow and spondylosis, a degenerative condition often associated with age that causes bone spurs along the spinal column. For Lauren, the symptoms of stiffness and pain seemed to match the diagnosis. And because Sugar was 10 ½ years old, Lauren thought it might explain her behavior.

Sugar was put on medication, but according to Lauren, it didn't seem to make much difference. "She couldn't get up on my bed anymore," she says. "And she would pace at night because she couldn't get comfortable."

But by early September, Sugar was even worse. She had climbed up on a chair in Lauren's bedroom—one she knew she wasn't allowed to be on. Normally, as soon as she would hear Lauren coming, Sugar would have jumped down. This time she just laid there and stared at Lauren. "She didn't get down because she was in pain," she says.

She decided to take Sugar to another veterinarian who also diagnosed her with arthritis after reviewing the same x-rays. Although the condition is degenerative, the veterinarian assured Lauren they would have many more active months together before the disease slowed her down. Two days later Sugar's back limbs were paralyzed. To Lauren, nothing seemed to make sense. Sugar was

getting worse, not better. "She was dragging herself around," she says. "I worried that she was suffering."

Lauren called a mobile veterinarian, expecting she would have to put Sugar down. "Thank goodness no one called me back," she says.

Lauren spent the weekend after her business trip crying and trying to decide what to do. She carried Sugar outside to go to the bathroom, and she bought diapers for when she couldn't get Sugar outside. "Having a 50-pound dog that can't walk is so hard," she says. "I was tired and exhausted."

Over that weekend, Lauren remembered another veterinarian she had known in the community. She took Sugar first thing Monday morning, but she was told that the veterinarian was off that day. Lauren was distraught. The clinic staff called Dr. Barbara Calm at home and she came in on her day off. Dr. Calm took new radiographs and did blood work on Sugar. "She also told me about the WSU veterinary hospital when I brought Sugar in," she says. "But I expected she would need back surgery and I didn't think I could afford it."

One week later, Lauren was sitting in the parking lot of a big box retail store getting ready to buy more puppy pads and diapers for Sugar when Dr. Calm called. Based on the test, Dr. Calm said she wasn't sure what was wrong with Sugar and hoped that Lauren would reconsider going to Pullman.

"I hung up, looked at Sugar in the rearview mirror, and called the WSU neurology unit," she says. "At first, they told me they didn't have any open appointments for two weeks, but said they would talk to the doctors. I got a call back within hours and they wanted to see Sugar the very next day."

Without any time to think about it, Lauren packed a bag and made the six-hour trip to Pullman from western Montana. "I couldn't put my dog down until I knew why I was putting her down," she says. "Finding answers would put my mind at ease. I wasn't afraid of a little debt to find out what was wrong."

At WSU, neurology resident Dr. Tom Jukier examined Sugar and ordered an MRI. "The best test for spinal cord conditions is an MRI," says Dr. Jukier. In Sugar's case, the disease was advanced enough that the x-rays, or radiographs, were difficult to interpret. "We took radiographs, but because she had degenerative changes to her spine, it made it difficult to interpret if it was inflammation or something more benign like arthritis from the radiographs alone."

The MRI results: Discospondylitis, an infection of the spinal discs most often caused by bacteria. For Sugar, it also affected her spinal cord.

MRI allows veterinarians to see things they sometimes can't with an x-ray alone. "It is vastly superior for earlier detection, so we can treat sooner," says Jukier. Dr. Jukier prescribed antibiotics, and Sugar started feeling better within days.

"I never expected what happened," says Lauren. "Two days later she was standing."

Sugar stayed on the antibiotics for about nine months. Today, at 12 years old, Sugar is hiking and doing the outdoor activity she loves. Lauren keeps a close eye on her to make sure the infection doesn't return, but she also knows that as Sugar is aging symptoms of arthritis can mimic infection. "I'm always watching for it," she says.

"Lauren put in a lot of dedication to help Sugar," says Jukier. "If it wasn't for her dedication, we wouldn't have had such a good outcome."

## Sugar Rising

Lauren, a professional photographer by trade, chronicled Sugar's illness and time at the WSU Veterinary Teaching Hospital. Her photographs will be on display through January 2018 in the WSU Animal Health Library.

Read more at  
[www.vetmed.wsu.edu/news/art](http://www.vetmed.wsu.edu/news/art).

*The first in a series of stories featuring what the WSU College of Veterinary Medicine is doing to improve the health of people at home and around the globe.*

# WSU's Neuroscientists: Using Brain Science to Understand Drug Addiction

by Marcia Hill Gossard '99, '04 Ph.D. | Photo by Henry Moore

Like many kids her age, Kelli, a tenth-grade high school student, learned about the dangers of using marijuana in health class. "They teach us not to do it because it is a gateway drug, and it can take you down a bad path," she says.

But despite the educational warnings, she knows many kids in her school are smoking marijuana. "They don't worry about it at all. They think it is a cool thing to do." Although Kelli says that she would never try marijuana, she admits that because kids talk about it so openly, she doesn't think about the dangers of marijuana as much as she does with other drugs.

According to a *JAMA Pediatrics* article published in December 2016, Washington state eighth- and tenth-graders perceived marijuana as less harmful and reported an increase in use when compared to teens in states where marijuana is not legalized. And that worries Ryan McLaughlin, assistant professor of neuroscience in the College of Veterinary Medicine.

"Since marijuana has legalized for recreational use in Washington state, the concern has been that with reduced stigma, there may also be a reduction in perceived harm," he says. Washington state legalized marijuana for medical use in 1998, and recreational use in 2012. Because of reduced stigma and a growing number of young people who may decide to use the drug, McLaughlin wants to know how marijuana affects the developing brain, particularly in adolescents and during pregnancy.

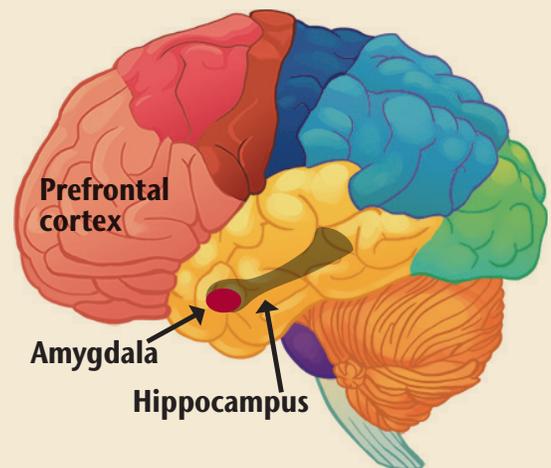
"When there is any interference during sensitive developmental stages, then it could lead to maladaptive behavior or changes in brain development," says McLaughlin. "If people smoke marijuana during adolescence, for example, it could lead to changes in how the prefrontal cortex in the brain develops."

In teens, the prefrontal cortex, which is the rational or reasoning area of the brain, is developing rapidly. It helps to control impulses and regulate emotions, and it is the center for decision-making, organization, and working memory. During adolescence and until the early- to mid-20s, synapses in the prefrontal cortex are pruned to strengthen the connections between other areas in the brain including the amygdala, the emotional center of the brain. But because the rational part of the brain is underdeveloped in teens, they are less capable of managing their thoughts and impulses, which might lead to more risky behavior, such as taking drugs.

"There is very little research on effects of early life cannabis use on cognition and emotion in adolescence or adulthood," says McLaughlin.

To understand the unique effects on the brain, studies must be done in a controlled environment. With humans, says McLaughlin, there are too many other factors such as poor nutrition, early life stress, use of other drugs or alcohol, or trauma that could also affect brain development. In his lab, rats self-administer cannabis in a vapor chamber, a system like an e-cigarette. WSU is currently one of a handful of places in the world using vapor chambers to mimic voluntarily smoking marijuana, which, according to McLaughlin, could produce more accurate findings. "There may be different neurobiological effects when taken voluntarily," says McLaughlin. "There is also a complex interplay of the compounds in the plant that determines the effects."

One of the questions Dr. McLaughlin is trying to answer is how drug use changes the prefrontal cortex structure during adolescence and the effects it has on making decisions or adopting new decision-making strategies later in life.



**Prefrontal cortex:** Highly developed part of the frontal lobe that plays a role in the regulation of complex cognitive, emotional, and behavioral functioning

**Amygdala:** The emotional center of the brain

**Hippocampus:** Involved in forming, storing, and processing memory

“If the prefrontal cortex is underdeveloped, there would be less cognitive flexibility and less ability to shift rules,” he says. For humans, researchers use the Wisconsin Card Sorting Test to measure this mental flexibility. For rats, they train them to press levers and use different strategies to optimize delivery of sugar rewards. “We want to understand what happens when the brain is exposed to cannabis during sensitive developmental periods.”

McLaughlin’s future research will examine whether exposure to marijuana in utero could increase the risk of addiction to drugs later in life. “Ultimately, the goal of this type of research is to inform people who use marijuana about the potential benefits and risks,” he says.

### THE PERSISTENCE OF MEMORY

“Exposure to drugs changes the brain,” says Dr. Rita Fuchs, associate professor and director of the Alcohol and Drug Abuse Research Program at WSU. “But *the experience* of taking a drug also changes the brain.”

When someone uses drugs, elements from the environment around them—sights, smells, sounds, and colors—go into their memory. “Learning takes place while someone is using drugs and the associations are stored,” says Fuchs. “For instance, a red house isn’t just a red house, but a crack house.” And it is one of the reasons it is so difficult for addicts to quit. When a recovering drug user visits a place or a neighborhood where they had taken drugs it brings back maladaptive memories, such as getting high and enjoying it, and that could trigger a relapse.

Dr. Fuchs maps where these maladaptive memories persist in the brain to learn where a memory could be changed. Memory stored in the amygdala, the emotional center of the brain, can influence people’s desire to use more drugs, make poor decisions, or lead to a relapse. Fuchs explains that once a memory is recalled it becomes destabilized and has to be restored. The hippocampus holds the memories while they are restabilized in the amygdala.

“The brain is like a maze,” she says. “The more that is unveiled and that we can know, the more points of weakness we can find to alter a memory.” And that could lead to more effective drug treatments. “By altering the memory, someone would remember going to the crack house, but would not be transported back emotionally,” says Fuchs. “The memories become two-dimensional rather than three-dimensional. They would not emotionally experience the craving, but rather feel detached. It doesn’t get rid of the memory altogether, but could give them an edge on therapy.”

The Centers for Disease Control report that between 2002 and 2015, drug overdose deaths more than doubled in the United States. Fuchs’s research to understand how drug memories could be manipulated before a relapse could help pharmaceuticals develop advanced treatments such as gene therapy or lead to new

**“Exposure to drugs changes the brain. But *the experience* of taking a drug also changes the brain.”**

—Dr. Rita Fuchs, associate professor and director of the Alcohol and Drug Abuse Research Program at WSU

behavior techniques that prevent the restorage of maladaptive memories in the brain. It could also lead to treatments for opioid use, one of the leading causes of drug overdose. “There is no reason why this type of circuitry mapping wouldn’t have an impact on developing treatments for heroin and opioid addiction,” says Fuchs.

“It is difficult to halt drug taking once someone has relapsed,” says Fuchs. “It is better to prevent the relapse altogether. And having science based treatments will likely be more effective.”



A rat in a vapor chamber puts its nose in a hole when it wants to receive a puff of cannabis. WSU is currently one of a handful of places in the world using vapor chambers to mimic voluntarily smoking marijuana. The research is aimed at understanding the effects of cannabis use on cognition and emotion in teens and adults.

➔ For more information about the Alcohol and Drug Abuse Research Program at WSU, visit [www.adarp.wsu.edu](http://www.adarp.wsu.edu).



Lynne Haley,  
Senior Director of Development

On a sunny July afternoon this past summer, 38 golfers in Colfax, Washington, raised money for WSU neuroscience student scholarships and honored the memory of Peter A. Zornes ('03 B.S. neuroscience). Over the last 10 years, the Peter A. Zornes Memorial Golf Tournament has raised thousands of dollars and helped 11 neuroscience students pursue their dreams to become doctors, veterinarians, and medical researchers. The endowment, now valued at over \$66,000, provides financial support to neuroscience students each year.

Although Peter's life was tragically cut short, his legacy lives large in the students who are awarded scholarships from the Peter A. Zornes Memorial Neuroscience Scholarship fund. I never had the chance to meet Peter, but through knowing his mom, Kathy, his dad, Tom, and his sister, Joy, over the last decade, I know just how special he was. I've also had the opportunity to meet some of Peter's extended family, his friends, and his colleagues—many who come back for the tournament year after year.

We are so proud of all the Zornes Scholars. And we couldn't do it without your support. Thank you for giving your time to volunteer at this event, for playing a round of golf, or supporting our students with a financial gift. My special thanks go out to Peter's family for the time, effort, and love you've put into making this scholarship a reality. You all make a difference in the lives our students.



Peter Zornes  
October 12, 1980–December 10, 2005



For more information about the scholarship fund and the tournament, visit [www.vetmed.wsu.edu/Zornes](http://www.vetmed.wsu.edu/Zornes).

## Your Gifts in Action

### A Gift to the WSU Clinical Simulation Center Trains Future Veterinarians

by Marcia Hill Gossard '99, '04 Ph.D. | Photo by Henry Moore Jr.

Nick Larson gently guides a long flexible line with a light on the end into a model made of soft latex tubing in search for a "foreign body." The light helps him see his way. Called an endoscope, the device is used to look inside a patient's body to examine the esophagus, stomach, intestines, and other internal organs. A video image is projected on a screen so they can see where they are going and other students in the room can see what is happening inside the patient.

In the WSU Clinical Simulation Center, veterinary students use medical models and sophisticated equipment, like the endoscope, to practice their diagnostic and treatment skills before they work with live patients. The endoscope model recreates a patient's intestinal tract using latex tubing. At the end of the tubing is a hollow ball, which creates a "stomach." Students learn to navigate through the intestines, reach the stomach, and use a grasper that runs through the endoscope to retrieve items

such as a small button.

The first time Larson and his other classmates tried to get the button, it took 45 minutes.

"It takes some practice to know where you are in a patient's body, and how to turn to make sure you get to the right place," says Dr. Julie Cary, director of the center. "Students may get frustrated, but then they can also start to see that they are getting better the more they practice."

# Your Gifts in Action Continued

The endoscope, used exclusively for training veterinary students, was donated by Jim and Lisa King, WSU graduates and friends of the college.

“Having the support of donors is incredible,” says Larson. “I find it exciting and humbling to know that there are individuals who are choosing to invest in us and our education.”

## FROM SUTURES TO THE EMERGENCY ROOM

Veterinary students start in the Clinical Simulation Center on the very first day of their first semester in a surgery class designed to give them the skills and the confidence to do basic surgical techniques, such as closing skin incisions when they mentor with a veterinarian later in their education. All students are encouraged to come to the open lab, now in its sixth year, where they can practice the specific skills they would like to improve. The peer taught lab is run by veterinary teaching assistants. If a student needs practice with basic sutures, or has mastered that skill and is ready to perform entire surgical procedures, the lab has options for students at all skill levels.

“There is no judging student competence,” says Cary. “It is a safe space where students can come, practice, make mistakes, and learn from those mistakes.”

In the technical simulation room, or “Oz Room” as Dr. Cary calls it, they simulate operating room and emergency room situations using an anesthesia team, surgical team, and code team (cardiac life support). On the video screen, using a model developed by Dr. Robert Keegan, a graphic eyeball blinks when the “mock” patient is wide awake. If it is still blinking after the student has given anesthesia, the students know that the patient is not all the way under. The pupil dilates based on what is happening in the room, and then students try to figure out what is causing the reaction in the patient. Blood pressure readings can also change so a student may see a sudden drop in the patient’s blood pressure and then they must decide how to treat, what to administer, and at what dose.

“This is what you have to practice before doing it on a live animal so that it is second nature,” says Larson.



(right) Nick Larson ('18 DVM) and Drew Fleischman ('19 DVM) use the endoscope to grab a button inside the digestive model. Models like these give students the opportunity to practice their medical skills

## COWS AND HORSES

In the barn side of the simulation center are Gladys and Ferdinand, a cow and her calf ready to be born. Gladys, the 31st model of her kind, is life-sized.

Ferdinand is made from a heavy pliable rubber-like material, so when he gets wet it feels like a real calf being born. Students learn to practice pulling a calf out in different positions, much like they would experience on live animals. Students learn to feel for a leg, where to put the straps to pull out the calf, and how much force to use. They may learn if they need to stand on a stool and how to position themselves. For some students, just being next to something this big and figuring out how position themselves can make a difference.

“Assisting with a difficult birth is something the most students don’t get exposure to,” says Cary. “If you never have the experience, you don’t get good at it. The model lets them have that experience.”

Standing next to Gladys is Whiskey, the horse. Whiskey has all parts of a horse’s digestive tract so students can practice exams for colic, a common illness. In the center, they can create in the model symptoms for different kinds of colic so students learn how to accurately diagnose them. It is important to be able to tell the common kinds of colic from the dangerous kinds so a horse can get care quickly. Students also learn where to stand so they are less likely to get kicked.

“It is nice to learn these things prior to standing in front of a client,” says Cary with a smile.

## PRACTICE MAKES PERFECT

Confidence, says Larson, is what practice in the center’s labs gives him and other students. Confidence not only helps with the procedure, but also in how to talk to a client who may be feeling upset or distressed.

“Until you have the opportunity to try something new, you always have that self-doubt,” says Larson. “Being able to practice numerous procedures gives me the confidence that I can tackle anything down the road in my career.”

Simulations improve techniques and give students feedback as to how they could do better the next time. It might be how team members communicate with each other during an emergency, and what they could do to improve communication to better help future patients. Or it could be something as simple as if the students had lowered the table, they could have given more effective chest compressions to the patient.

“We reinforce with models so they see the common things they are going to see in their practice,” says Cary. “A lot of times it is the confidence that gets you through the whole thing.”

 To learn more about how your gift can make a difference, please visit [www.vetmed.wsu.edu/GiftsinAction](http://www.vetmed.wsu.edu/GiftsinAction).



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Look for Gatherings of WSU Alumni, Friends,  
and Students at these Upcoming Events!

## Mark your calendars

**October 21** College hosts Homecoming Pre-Game and CE event in Pullman (vs. Colorado)

**November 19** Alumni reception at the American Association of Equine Practitioners Conference in San Antonio, Texas

**April 7** College of Veterinary Medicine Open House in Pullman

**April 25–26** Golden and Diamond (50-year and 60-year) graduate reunions in Pullman.

**July 13** Alumni reception at American Veterinary Medical Association in Denver, Colorado

*CE courses at WSU and online are offered year round; visit [www.vetmed.wsu.edu/CE](http://www.vetmed.wsu.edu/CE) for more information.*

*For more information about upcoming events visit [www.vetmed.wsu.edu/Events](http://www.vetmed.wsu.edu/Events).*

