

NOVEMBER | ISSUE 1

# Spotlight on Research

QUARTERLY NEWSLETTER HIGHLIGHTING  
THE WORK OF OUR CVM COMMUNITY

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## Breathing easier with ALS

*Enhanced respiratory plasticity may hold the key to preserve breathing capacity in patients with motor neuron disease.*

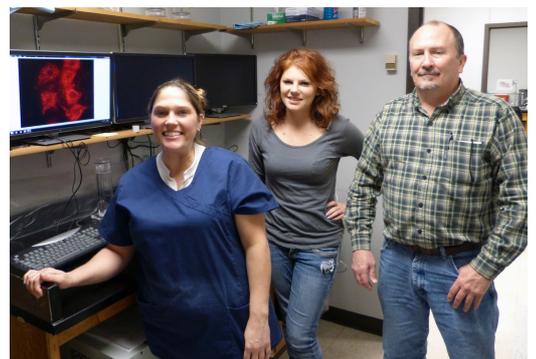
Patients with amyotrophic lateral sclerosis (ALS) experience a gradual deterioration of the motor neurons that control breathing, resulting in respiratory failure and death within 3-5 years. In a study funded by NIH, Biomedical Sciences Assistant Professor, **Nicole Nichols** and colleagues, developed a rat model specific for respiratory motor neuron death in the absence of other ALS complications. They used the rat model to study respiratory plasticity, a phenomenon where intermittent hypoxia produces a persistent, positive change in neural control. The researchers found that motor neuron death itself is sufficient to enhance respiratory plasticity, suggesting that neuron death triggers a “fight back” response in surviving phrenic motor neurons. They successfully achieved the response during the acute phase, but not the chronic phase of motor neuron death. Future studies will dissect the underlying mechanisms for respiratory plasticity and may lead to treatment options to improve length and quality of life for patients with ALS. To read the full study in the Journal of respiratory physiology and Neurobiology [click here](#).

## Editorial Team

*Dr. Chris Lorson*  
*Dr. Sherri Sachdev*  
*Emily Reyland*



Nicole Nichols adjusts the data acquisition system used to amplify and record phrenic neural signals.



Nicole Nichols, Lauren Borkowski and Miles Tanner visualize phrenic motor neurons using immunohistochemistry and confocal microscopy.



## Important Dates:

11/15: Morris Animal Foundation Wildlife/ Exotics Proposals due

11/18: Small Animal Medicine & Emergency Critical Care Short Course

12/1: Coulter Letters of Intent due

1/16: Research Council Grant Deadline

2/23: Richard Wallace Faculty Incentive Grant Deadline

3/12: Research Council Grant Deadline

5/25: CVM Research Day

## Biomarkers Lend a Hand to Conventional Diagnostics

*Sensitive and specific biological indicators can provide additional information about disease control and help guide better treatment decisions.*

Immune-mediated diseases in dogs can be life threatening and generally require long-term treatment and monitoring. The use of serum biomarkers is appealing because serum is much easier to collect compared to joint fluid and other invasive samples. In a study supported by the Cisco and Izzy



Cisco was an Italian greyhound treated at MU for immune-mediated hemolytic anemia. He lost his battle to this devastating disease and his family created the Cisco and Izzy Fund in his memory and in the memory of his sister Izzy (who died from lymphoma).

Fund for Immunologic Research, Veterinary Medicine & Surgery Professor, **Carol Reinero** and colleagues, analyzed a panel of potential biomarkers in the serum of dogs with immune-mediated disease. The research team identified specific combinations of biomarkers that were sensitive and specific for detecting dogs with poorly controlled disease. Future studies will confirm the value of these biomarkers in monitoring the ability of different treatments to control immune-mediated disease, in the hopes of more

rapidly tapering immunosuppressant medications and detecting relapse early. To read the full study in the Journal of Veterinary Internal Medicine [click here](#).



## Fun Facts:

A cat has 32 muscles in each ear.

An ostrich's eye is bigger than its brain.

A cat's jaws cannot move sideways.

A starfish can turn its stomach inside out.

The largest eggs in the world are laid by a shark.

A crocodile's tongue is attached to the roof of its mouth.

Giraffes are unable to cough.

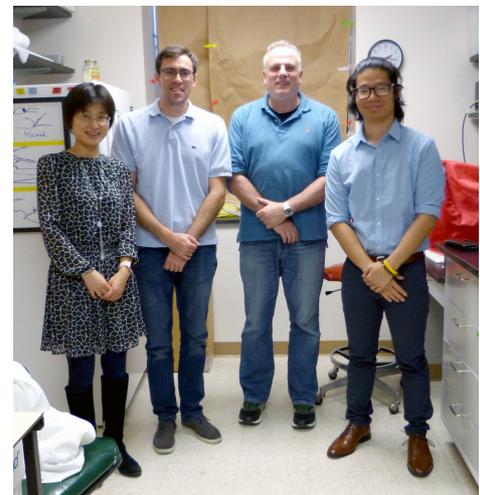
# Building stronger barriers to virus transmission

*Enzymes in the mosquito gut may hold the key to the spread of viruses*

When a mosquito ingests blood from a human infected with a virus such as dengue or chikungunya, the mosquito midgut is the first tissue to become infected. If the virus can exit the midgut and disseminate to the salivary glands, the mosquito can then transmit the virus to another animal/human host. Depending on the virus and/or mosquito strain, there can be a barrier preventing efficient escape of the virus from the midgut, ultimately resulting in diminished virus transmission by the mosquito. This phenomenon has important relevance for public health, but requires better understanding. In a study funded by National Institutes of Health (National Institute of Allergy and Infectious Diseases), Veterinary Pathobiology Assistant Professor, **Alexander Franz** and colleagues, have begun to unravel the mystery of the midgut escape barrier. The research team compared the midgut barrier in mosquitoes fed a blood meal versus a sugar meal. They found that enzymes activated by ingestion of a bloodmeal can cause damage to the extracellular matrix surrounding the midgut, potentially allowing viruses to escape. In contrast, the extracellular matrix in the sugar-fed mosquitoes remained intact. This work provides a foundation to understand the functional relationship between midgut enzymes, extracellular structures and virus dissemination. Exciting update: Dr. Franz has received notice that his NIH R01 grant will be funded to continue this project for 5 years. To read the full study in the journal Plos Neglected Tropical Diseases [click here](#).



An *Aedes aegypti* ("yellow fever mosquito") colony inside the insectary of Connaway Hall. The females can transmit important human-pathogenic viruses such as dengue, yellow fever, Zika, and chikungunya. In southern Missouri, these tropical mosquitoes can be occasionally found during the summer months and they breed all year round in the tropics of the world including the southern regions of Florida and Texas.



Current members of the Franz lab: Jingyi Lin, Asher Kantor, Alexander Franz, Allen Wang

## Grant Funding

### 1. Melanocortin ligands in disease cachexia

• **PI: Sandra Bechtel, Veterinary Medicine & Surgery**

• Sponsor: Tensive Controls, Inc.

• Award Amount: \$48,850

• To recruit, treat and monitor dogs with spontaneously occurring cachexia for this clinical trial

### 2. The role of the gut microbiota in sex differences in Alzheimer's Disease

• **PI: Elizabeth Bryda, Veterinary Pathobiology**

• Sponsor: NIH

• Award Amount: \$92,020

• To provide detailed characterization of the gut microbiota in a rat model of Alzheimer's Disease, confirm sex differences in the gut microbiota and determine if modulation of the gut microbiota using probiotics has a beneficial effect

### 3. 2017 USDA Lab Level 2 Agreement

• **PI: Shuping Zhang, Veterinary Medical Diagnostic Laboratory**

• Sponsor: USDA

• Award Amount: \$120,693

• To maintain level 2 designation and increase in laboratory capacity and capabilities to meet the needs faced during an adverse animal health event caused by the presence of an emerging disease or foreign animal disease

### 4. Shelter Cat Adoption in Families of Children with Autism: Impact on Children's Social Skills and Anxiety as well as Cat Stress

• **PI: Gretchen Carlisle, Veterinary Medicine & Surgery**

• Sponsor: Morris Animal Foundation

• Award Amount: \$52,204

• To investigate the effect of the introduction of a shelter cat into the family of a child with Autism Spectrum Disorder on social skills and anxiety of the child, and to examine stress in the cat

### 5. D17CA-501 (COTC026): Evaluation of a recombinant, attenuated *Listeria monocytogenes* expressing a chimeric human HER2/neu protein in dogs with osteosarcoma in the adjuvant setting

• **PI: Brian Flesner, Veterinary Medicine & Surgery**

• Sponsor: Morris Animal Foundation

• Award Amount: \$167,184

• To investigate the anti-metastatic effects of ADXS31-164c when added standard treatment of canine osteosarcoma, as measured by a statistically significant improvement in disease-free interval over standard treatment alone

### 6. Generation of Cre/lox rats

• **PI: Elizabeth Bryda, Veterinary Pathobiology**

• Sponsor: University of Southern California

• Award Amount: \$103,454

• To generate Cre/lox rats to preserve rat research line

### 7. How Do Arboviruses Escape the Mosquito Midgut?- Analysis of a Novel Mechanism

• **PI: Alexander Franz, Veterinary Pathobiology**

• Sponsor: NIH

• Award Amount: \$1,914,850

• To elucidate the mechanism of the midgut escape barrier and its underlying genetic background through ultrastructural imaging, proteomics, gene expression analyzes, and manipulation of gene expressions in mosquitoes

[Click Here for Grant FAQ](#)

## Publications

### \*Top Impact Factor CVM Publications\*

Booth FW, Roberts CK, Thyfault JP, Ruegsegger GN, Toedebusch RG. Role of inactivity in chronic diseases: Evolutionary insight and pathophysiological mechanisms. **Physiological Reviews**. 2017;97(4):1351-402. doi: 10.1152/physrev.00019.2016. PubMed PMID: 28814614. Full article [here](#).

Rosenfeld CS. Neuroendocrine disruption in animal models due to exposure to bisphenol A analogues. **Frontiers in Neuroendocrinology**. 2017. Epub 2017/08/13. doi: 10.1016/j.yfrne.2017.08.001. PubMed PMID: 28801100. Full article [here](#).

Rosenfeld CS, Denslow ND, Orlando EF, Gutierrez-Villagomez JM, Trudeau VL. Neuroendocrine disruption of organizational and activational hormone programming in poikilothermic vertebrates. **Journal of Toxicology and Environmental Health – Part B: Critical Reviews**. 2017;20(5):276-304. doi: 10.1080/10937404.2017.1370083. PubMed PMID: 28895797. Full article [here](#).

### \*Top Impact Factor Veterinary Science Publications\*

Shimoyama M, Smith JR, Bryda E, Kuramoto T, Saba L, Dwinell M. Rat genome and model resources. **ILAR Journal**. 2017;58(1):42-58. doi: 10.1093/ilar/ilw041. PubMed PMID: 28838068. Full article [here](#).

Pollard DA, Reichard MV, Cohn LA, James AM, Holman PJ. Genetic variability of cloned *Cytauxzoon felis* ribosomal RNA ITS1 and ITS2 genomic regions from domestic cats with varied clinical outcomes from five states. **Veterinary Parasitology**. 2017;244:136-43. doi: 10.1016/j.vetpar.2017.08.002. PubMed PMID: 28917305. Full article [here](#).

View the entire list of CVM Publications [here](#).

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# Hot Topics

## Facilities and Administrative (Indirect) Costs

The US House of Representatives Committee on Appropriations' Subcommittee on Labor, Health and Human Services, Education, and Related Agencies held a hearing on the Role of Facilities and Administrative (F&A) Costs in Supporting NIH-Funded Research.

**Click here** to view the webcast  
**Click here** to learn more about what F&A costs are and how cutting F&A would hurt the individual investigator.

## ResearchGate Backs Down

The ResearchGate networking site, which enables researchers to easily upload and share their (sometimes publisher copyrighted) research papers, has been the target of publishers' ire for some time, but now it seems the situation has escalated, with some publishers threatening legal action. Researchers "should be careful not to make work publicly available without permission."

**Read more here.**

Proposed tax plan would tax  
tuition wavers

**Read more here.**

The House GOP tax bill would  
raise the cost of college.

**Read more here.**

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