

SPOTLIGHT ON Lincoln Memorial University Veterinary Medicine

Advancing animal health and welfare through research

Novel leptospirosis research at Lincoln Memorial University

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Leptospirosis is a zoonotic disease with broad global distribution. Challenging to diagnose, it persists in animal reservoirs with perpetual environmental shedding. The Center for Infectious, Zoonotic and Vector-borne Diseases at Lincoln Memorial University's Richard A. Gillespie College of Veterinary Medicine (LMU-CVM) investigates leptospirosis and other diseases of veterinary and public health importance. This center utilizes multidisciplinary approaches to study the biology and ecology of *Leptospira* with the aim of improving diagnosis and control.

Novel proteins offer potential for improved diagnostic tests

LMU-CVM researchers study the mechanisms that *Leptospira* employs to infect its hosts, persist, and interact with host components. Our researchers have discovered new infection-associated leptospiral proteins contributing to the evasion of the alternative pathway of complement system, host invasion, and attachment to the components of the host extracellular matrix. These proteins are expressed early in infection, are present only in pathogenic *Leptospira*, and are highly conserved among pathogenic serovars, making them ideal diagnostic candidates. The usefulness of these leptospiral proteins and their encoding genes is currently being evaluated for diagnostic testing. If successful, they may offer improved diagnostic testing for leptospiral infection.

Insights into pathogenic mechanisms of *Leptospira*-associated uveitis

Another area of investigation is understanding the pathogenesis of *Leptospira*-associated equine recurrent uveitis (ERU). Our scientists have identified several leptospiral proteins that are expressed in the eyes of horses with uveitis. Some of these proteins share antigenic similarities with the components of normal equine eyes, indicating the possibility of cross-reactivity between leptospiral and equine eye proteins. Previous studies from our researchers have also shown relationships between some of the ERU-associated leptospiral proteins and human leptospiral uveitis and some other human autoimmune uveitic entities.

Ecology and epidemiology in the Cumberland Gap Region

Our researchers study the presence of *Leptospira* in animals in the Cumberland Gap Region (CGR) near LMU-CVM's Harrogate, Tennessee, campus. This campus is in the Central



Leptospirosis research at LMU-CVM focuses on multiple aspects of the disease and uses multidisciplinary approaches to address important research questions.

Appalachian plateau near the state boundaries of Kentucky, Tennessee, and Virginia. This region is rural with hot and humid summers, mild winters, high annual precipitation, dense forest cover, and low socioeconomic status of its residents, all described as risk factors for leptospirosis.

Rodents are known reservoirs of leptospirosis. LMU researchers' studies demonstrated that 62% of rats and mice in the CGR carried leptospires in their kidneys; other small wild mammals, such as shrews, voles, and chipmunks, were also reservoirs. However, LMU-CVM researchers also showed that 13% of local reptiles and amphibians were leptospiral reservoirs. Specifically, researchers demonstrated for the first time that newts, salamanders, frogs, snakes, and freshwater fish had leptospiral renal carriage.

In addition, our researchers investigated seroprevalence and urinary shedding in shelter dogs and cats, cattle, and horses in the region. Understanding ecology and epidemiology in the local context is critical in treatment and control, especially because of the protean clinical manifestations of leptospirosis.

Finally, student involvement in research is a core principle of our research philosophy. Our DVM students actively participate in every step of the research process. Students present their findings at national conferences and are coauthors of peer-reviewed, high-impact scientific publications.