

# LINDA TOTH, PH.D.

## The Genetics of Sleep

“People often don’t get as much sleep as they’d like to,” says Linda Toth, Ph.D., DVM, professor of pharmacology and director of laboratory animal medicine. She is studying the mechanisms and functions of sleep.

With millions awarded in NIH funding, Dr. Toth’s ROI grants — one from the National Heart, Lung, and Blood Institute and one the National Institute of Neurological Disorders and Stroke — allow her to characterize how genes influence the pattern of sleep during health and disease, specifically focusing on how infections alter normal sleep patterns, and how sleep loss impacts the mechanisms of infectious disease and recuperation. “Facets of the immune response are likely to mediate the effects of infection on sleep, and sleep may in turn influence facets of the immune response,” Dr. Toth says.

As better therapies are developed for some chronic diseases, issues such as fatigue become more important to patients’ recovery and overall quality of life. Dr. Toth explains, “Inadequate or poor-quality sleep may increase susceptibility to disease, exacerbate symptoms of disease, or delay recuperation.”

Dr. Toth and her staff record the EEGs of mice, comparing the sleep patterns of one genetic strain of mice to another. “We are studying how the sleep patterns change during different infections,” she says. “Every mouse of each particular strains we use is genetically identical to all other mice of that strain. We can compare strains to one another and associate the specific types of genes they have with their sleep patterns, and also with factors such as the immune response and temperature response.”

She has found that a subset of genes could account for consistent differences among the sleep patterns of mice with influenza. “If we can identify genes that influence responses to disease, then we have a potential target for better therapies.”

As a veterinarian and a scientist, Dr. Toth understands both the need to investigate human health problems and the responsibility to treat the animals humanely. Her third NIH grant is funding



*Dr. Toth measures the EEG signal of her animal subjects.*

research to identify additional or improve existing analgesic treatments to keep the mice comfortable during research use.

Her fourth grant, a K26 career development award, allows her to expand her expertise and train others in the behavioral and physiological pathology of mice. “This award gives me time to mentor others and to develop my career as a scientist,” she says.

Dr. Toth enjoys looking at both the basic and clinical sides of research. Though she intended to be a veterinarian, not a scientist, research became a kind of addiction, she says, and as she earned her degrees she became “hooked on data.” “While on the course of becoming a veterinarian, I learned how to be a scientist. Eventually I realized I wanted to do both.” ■