



Sleep and Circadian Rhythm Research

Sleep-related problems represent a severe health concern for millions of Americans of all age groups. Sleep disturbances reduce productivity and quality of life; increase the likelihood of workplace, home, and vehicular accidents; and are associated with a higher risk of poor health or death. Sleep disorders such as sleep apnea and insomnia are becoming well known, but chronic sleep loss has only recently been correlated with such dysfunctions as disrupted immune responses and myocardial infarction. Disrupted circadian rhythms result in the fatigue and decreased productivity associated with shift work and jet travel. It is estimated that more than \$16 billion of industry productivity is lost each year in the U.S. alone. Thus, there are both health and economic reasons to develop useful treatments for chronic sleep loss.

Research

Sleep abnormalities and excessive daytime sleepiness are recognized as an important clinical symptom of many illnesses, but the role of sleep abnormalities in the pathophysiology of disease has not been widely studied. SRI's Dr. Thomas Kilduff was part of a team of sleep researchers that discovered hypocretin/orexin (H/O), a neuropeptide system that stimulates arousal and is involved in sleep regulation (de Lecea et al., *Proc Natl Acad Sci USA*, 1998, 95, 322-7). Disruption of the H/O system results in the sleep disorder narcolepsy in both animals and humans, indicating that this system is part of the intricate sleep/wakefulness network. We are currently studying the relationship between the H/O system and other sleep disorders and using differential gene expression approaches including microarrays to identify other components of this network. Discovering the molecular bases for sleep disorders could lead to improved treatments for:

- Insomnia
- Shift work/jet lag
- Age-related sleep disturbances
- Fatigue
- Narcolepsy



Bridging the drug development gap

SRI has a new, dedicated Sleep and Circadian Rhythm Facility for animal studies. Two light- and temperature-controlled experimental rooms used for recording rodents in long-term experiments flank a central procedure room where neurochemicals are prepared for injection, and perfusions and dissections are performed. Data collection is continuously monitored from an adjacent data analysis room. A surgery suite is also adjacent to the recording rooms. Specialized equipment includes:

- ClockLab circadian data collection and analysis system
- E-mitter system for measurement of activity and body temperature by inductive telemetry
- Embla digital EEG/EMG recording system for sleep studies
- Grass Instruments polygraphs
- Photobeam activity monitoring system

Services

SRI's Sleep and Circadian Rhythm Facility can evaluate investigational drugs or induced mutant animals for effects on activity, body temperature, sleep/wakefulness, and arousal. Study capabilities include:

- Sleep/wake recordings and analysis
- Quantified electroencephalogram (EEG) recording
- Electromyogram (EMG) recording
- Core body temperature recording (by telemetry)
- Circadian rhythms, indicated by
 - Running wheel activity
 - Photobeam activity monitoring
 - Core body temperature rhythms

You Make the Call

For further information, contact our Client Services Team:

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