

Frances Evelyn Feinberg Clinical  
Neuroscience Research Institute  
Center for Circadian and  
Sleep Medicine





## CENTER FOR CIRCADIAN AND SLEEP MEDICINE

Increasingly, studies show that healthy sleep is imperative for health and performance. In addition to sleep disorders, such as insomnia and sleep apnea, a growing number of people in our 24/7 society are experiencing circadian misalignment due to shift work and chronic jet lag, among other challenges. These can throw off our natural light-dark cycle and cause or exacerbate illnesses from diabetes and cardiovascular disease to neurodegenerative disorders such as depression.

Sleep and circadian rhythms, which are the body's internal time keeping systems, are as important as exercise and nutrition in maintaining one's health. Circadian rhythms regulate sleep and wake cycles, as well as the timing of nearly all cellular, physiological, and behavioral processes.

In the 1990s, Northwestern investigators discovered the first timekeeping gene and appropriately named this gene "Clock." This major breakthrough helped the scientific community to recognize and further explore the innate link between sleep and circadian rhythms. Today, our Northwestern Medicine researchers continue to be at the forefront of groundbreaking discoveries in sleep and circadian research. Ongoing progress in this area has reached the critical point where innovation is more than ready to enter the practice of medicine.

We recently launched the **Center for Circadian and Sleep Medicine** at Northwestern Medicine to pursue high-impact research, education, and clinical care for individuals living with circadian rhythm and sleep disorders here and across the globe. Our Center is led with distinction by Phyllis C. Zee, MD, PhD, Benjamin and Virginia T. Boshes Professor of Neurology and director of Northwestern Medicine's Sleep Disorder Center. Dr. Zee is an internationally recognized leader in the field of sleep and circadian rhythms who has been spearheading efforts with peers across disciplines at Northwestern Medicine to highlight the central role of sleep and circadian rhythms in the development and expression of disease.

Through this new Center, we have the great opportunity and challenge to revolutionize modern healthcare by strengthening the link between the fields of sleep and circadian rhythms and by contributing major advances that significantly increase our understanding of the role and impact of sleep and circadian rhythms on human health.

### The Nation's First Circadian Medicine Clinic

We have made important advances in sleep medicine with the establishment of sleep clinics across the country and world. However, none are exclusively devoted to the treatment of circadian rhythm disorders. With the establishment of the Center for Circadian and Sleep Medicine, Northwestern Medicine is poised to be the first institution in the nation to establish a Circadian Medicine Clinic.

Recent major discoveries in the area of circadian rhythms, many of which were made by Northwestern researchers, reveal that the circadian clock impacts nearly every cell, tissue, organ system, and behavior in humans. The sleep-wake cycle is the most obvious of the biological rhythms, but in a patient's care, we should also be looking at nearly all physiological processes, such as cognitive, cardiovascular, and metabolic functions that also are controlled by the circadian clock.

Despite the vast impact the circadian clock has on our body, current tests are not easily applied in clinical settings for chronodiagnostics. Dr. Zee and her colleagues will address the challenge facing medicine by developing clinically useful tools to assess circadian function. These tools will take two forms. First, we are working to develop new tools to measure behavioral and physiological rhythms through the use of technology, such as smart phones or small wearable devices. The second tool will be the development of a single blood test to get a "snapshot" of an individual's circadian clock status to determine if there is evidence of circadian disruption that could be the impetus for any number of diseases or disorders including sleep disorders. This knowledge will help us and our colleagues to develop and provide more effective treatments.



"Our Center for Circadian and Sleep Medicine at Northwestern Medicine represents a new cross-disciplinary field that incorporates the time domain into the practice of medicine. Through this breakthrough Center, we have established the first Circadian Medicine Clinic in the US. We are excited and ready to apply the seminal advances in circadian and sleep basic research to the practice of medicine. As pioneers in this field, we have the great opportunity to help patients with sleep and circadian disorders that in turn can contribute to metabolic, cardiovascular, and neurological disorders."

Phyllis C. Zee, MD, PhD, Benjamin and Virginia T. Boshes Professor of Neurology and Director, Northwestern Medicine Sleep Disorders Center

## Center for Circadian and Sleep Medicine Steering Committee

**Phyllis Zee, MD, PhD**, Director of the Center for Circadian and Sleep Medicine, Benjamin and Virginia T. Boshes Professor of Neurology, Director of the Northwestern Medicine Sleep Disorders Center

**Ravi Allada, MD**, Professor of Neurobiology at Northwestern University Weinberg College of Arts and Sciences  
Associate Director of the Center for Sleep and Circadian Biology

**Joseph Bass, MD, PhD**, Chief, Division of Medicine-Endocrinology  
Charles F. Kettering Professor of Medicine and Professor in Medicine-Endocrinology

**Kathryn Reid, PhD**, Research Associate  
Professor of Neurology  
Center for Circadian and Sleep Medicine

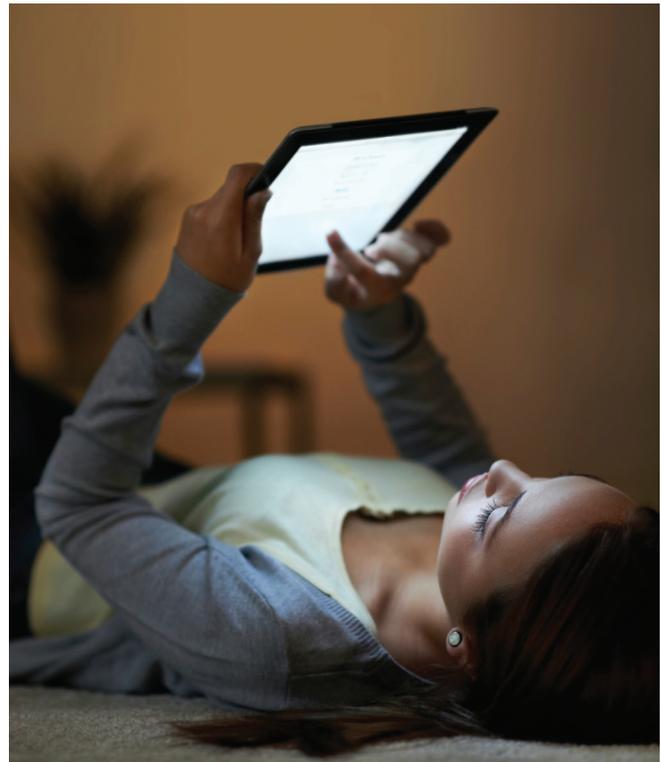
**Fred Turek, PhD**, Charles and Emma H. Morrison Professor of Biology at Weinberg College of Arts and Sciences, Professor of Neurology at Feinberg School of Medicine, Director, Center for Sleep and Circadian Biology

### Research that Leads to Innovation

At Northwestern, research conducted by our physicians and basic scientists has already contributed substantially to the discovery and characterization of molecular clocks, including their presence in nearly all cells of the body and their role in regulating the timing of expression of thousands of genes. We have established the links between circadian clocks and metabolic disease, sleep, and characterized clock disruptions in human disease. We are the recognized leader in the field.

Today, we continue to initiate novel research studies, including basic research, clinical trials, and technology development, that we believe will ultimately lead to improved health outcomes for our patients with circadian rhythm and sleep disorders. Our interdisciplinary teams are now capitalizing on seminal insights into how disturbed or inadequate sleep— independently or coupled with disturbed circadian timing— has been linked to an increased prevalence of disease and disorders including cardiovascular disease, diabetes, obesity, cancer, and mental illness.

In addition to laboratory investigations, Dr. Zee and Northwestern colleagues are measuring sleep and wake cycles and other circadian rhythms through questionnaires, polysomnography (used in the study of sleep) actigraphy (a method of monitoring human rest and activity cycles through wrist activity), and measurements of hormones and autonomic function.



### Sleep Medicine Program

It is estimated that 50 to 70 million Americans suffer from a chronic sleep disorder. In some, insomnia, sleep apnea, and restless leg syndrome have been shown to lead to severe and life-long disabilities. As mentioned, scientific evidence continues to mount that shows disrupted sleep and/or circadian timing are associated with many mental and physical disorders such as depression, diabetes, cardiovascular disease, and cancer.

Northwestern's sleep medicine program within the Center for Circadian and Sleep Medicine continues to be recognized as one of the top five academic sleep medicine programs in the nation. Through this program, we conduct approximately 3,000 sleep studies for patients and see more than 5,000 patients each year. Our regarded Sleep Medicine Program is central to the growth and success of our new Center for Circadian and Sleep Medicine.

### Education and Training

As part of a world-class academic medical center, we proudly educate and train the next generation of clinicians and researchers across a number of disciplines, including new areas of biomedicine, such as chronomedicine. These disciplines are truly innovative and at the cutting-edge. As part of our educational mission, our faculty members provide education and training at all levels—to medical students, residents, and fellows. Through our rigorous residency and fellowship programs, we are training both clinical and research specialists within the area of Circadian and Sleep Medicine. We are delighted to provide trainees with the rare and intellectually challenging experience of participating in the nation's first academic center dedicated to circadian and sleep medicine.



THROUGH NORTHWESTERN MEDICINE, WE ARE CREATING A NATIONAL EPICENTER FOR HEALTHCARE, EDUCATION, RESEARCH, COMMUNITY SERVICE, AND ADVOCACY.

## Northwestern Medicine

Northwestern Memorial HealthCare and Northwestern University Feinberg School of Medicine are seeking to impact the health of humankind through Northwestern Medicine. We aspire to be the destination of choice for people seeking quality healthcare; for those who provide, support, and advance that care through leading-edge treatments and breakthrough discoveries; and for people who share our passion for educating future physicians and scientists. Our commitment to transform healthcare and to be among the nation's top academic medical centers will be accomplished through innovation and excellence.

Through the **Center for Circadian and Sleep Medicine** within the Frances Evelyn Feinberg Clinical Neuroscience Research Institute, we have an unprecedented opportunity to catapult our world-class work to find the links between sleep and circadian disorders and chronic diseases with the goal of

improving current treatments. Better treatments will enhance the overall quality of life, performance, safety, and productivity of people everywhere who are grappling daily with debilitating sleep and circadian disorders.

We recognize that every positive contribution we have made to discovery, care, training, and outreach in the field of sleep medicine—and now chronomedicine—has been made possible by donors who have continued to entrust us with their philanthropic support. We invite interested friends to join us in propelling the compelling research and training efforts of our Center for Circadian and Sleep Medicine through gifts of outright support and endowment.

