

Preface

Circadian Clocks: Implication for Health and Disease



Phyllis C. Zee, MD, PhD
Editor

Recent evidence from animal and human studies indicates that circadian (near 24 hour) rhythms that are regulated by circadian clock genes are intimately involved in the regulation of molecular, cellular, and physiologic functions in central and peripheral tissues. Approximately 20% of all genes are rhythmically expressed, and the circadian system synchronizes biochemical, hormonal, and metabolic processes with feeding behavior, sleep-wake activity, neuropsychiatric function, and daily light-dark cycles. Given the fundamental role of circadian clocks in biological processes, it is perhaps not surprising that disruption of circadian organization results in physiologic aberrations, alterations, and dysfunctions that are relevant for the maintenance of health and development of disease. Aging has been associated with notable changes in sleep and circadian rhythms. For example, in older adults, decreased amplitude of the circadian rest-activity rhythm and greater fragmentation of sleep have been demonstrated to correlate with and predict poor physical and mental health, as well as neuropsychiatric, cardiometabolic, and neurodegenerative disorders. Indeed, the strength and timing of endogenous circadian rhythms and their proper alignment with the external environment are

essential for the health of all organisms. As discussed in this issue, the impact of circadian dysfunction and misalignment goes way beyond the circadian sleep-wake disorders, but should be considered in the expression and development of neurologic, psychiatric, metabolic, and cardiovascular disorders. The articles in this issue provide an update on the regulation and interactions of circadian clocks on cardio-metabolic and brain health; evaluate the role of circadian rhythms on brain function and the expression and treatment of age-related neurologic and cardiometabolic disorders, recognition, and treatment of circadian rhythm sleep-wake disorders; and discuss the transformative potential of integrating the time domain in medicine for improving health.

Phyllis C. Zee, MD, PhD
Department of Neurology
Northwestern University
Feinberg School of Medicine
710 North Lake Shore Drive
Suite 520
Chicago, IL 60611, USA

E-mail address:
p-zee@northwestern.edu