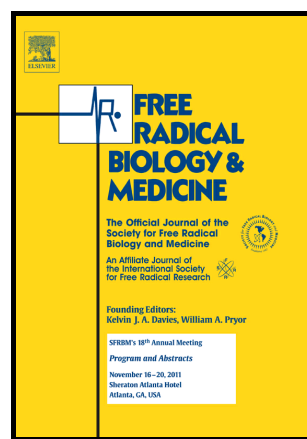


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Circadian Clock-Mediated Regulation of Blood Pressure

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Abstract

Most bodily functions vary over the course of a 24 hour day. Circadian rhythms in body temperature, sleep-wake cycles, metabolism, and blood pressure (BP) are just a few examples. These circadian rhythms are controlled by the central clock in the suprachiasmatic nucleus (SCN) of the hypothalamus and peripheral clocks located throughout the body. Light and food cues entrain these clocks to the time of day and this synchronicity contributes to the regulation of a variety of physiological processes with effects on overall health. The kidney, brain, nervous system, vasculature, and heart have been identified through the use of mouse models and clinical trials as peripheral clock regulators of BP. The dysregulation of this circadian pattern of BP, with or without hypertension, is associated with increased risk for cardiovascular disease. The mechanism of this dysregulation is unknown and is a growing area of research. In this review, we highlight research of human and mouse circadian models that has provided insight into the roles of these molecular clocks and their effects on physiological functions. Additional tissue-specific studies of the molecular clock mechanism are needed, as well as clinical studies including more diverse populations (different races, female patients, etc.), which will be critical to fully understand the mechanism of circadian regulation of BP. Understanding how these molecular clocks regulate the circadian rhythm of BP is critical in the treatment of circadian BP dysregulation and hypertension.

Graphical abstract

Keywords: blood pressure, hypertension, non-dipping, circadian rhythm, humans, mouse

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