Special Issue

Molecular and Cellular Mechanisms of Synchronization within the Mammalian Circadian System

Message from the Guest Editors

In mammals, many brain and body rhythms are driven by a circadian system. The circadian system comprises three key components, the circadian rhythm generator located in the suprachiasmatic nucleus (SCN); the input pathways entraining the SCN to rhythmic events in the environment, the so-called “zeitgeber”; and output pathways mediating rhythmic signals from the SCN to subordinate oscillators within the brain and the periphery. The most prominent zeitgeber adjusting SCN timing is the environmental light/dark cycle. Light is received by the retinal photoreceptors and transmitted to the SCN. Rhythmic cell function in the SCN, retina and subordinate oscillators is driven by a molecular clock, which is composed of transcriptional/translational feedback loops of clock genes acting as transcriptional regulators. The light-resetting mechanism of the SCN molecular clock involves the activation of kinases and transcription factors and the expression of clock genes such as the periods (Per). This Special Issue is devoted to the various mechanisms of the synchronization of rhythmic behaviour and physiology.

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