



Infectious
Diseases Labs

A*STAR IDL



Dr Rajesh Narasimamurthy

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Thursday 20th March 2025

2:00 PM to 3:00 PM (SGT)

Venue: Codon A & B, Matrix Level 5

Mechanisms of Circadian Clock regulation by Casein Kinase 1 and Period 2 proteins

In today's 24/7 society, people often sacrifice sleep for extended study, work, or social hours, which can lead to consequences ranging from drowsiness in class room to severe workplace accidents. Sleep loss or deprivation disrupts our circadian clock, a ~24-hour biological system that regulates processes such as the sleep-wake cycle, feed-fast cycle, immune function, metabolism, and hormone secretion. Understanding the circadian clock molecular network and its interactions with other physiological processes is vital to addressing health issues such as diabetes, obesity, immune disorders, mood disorders, and cancer. We are particularly interested in the role of post-translational modifications in clock regulation. Here, I describe the critical role of the kinase, Casein Kinase 1 (CK1 δ/ϵ) in regulating the phosphorylation and stability of Period 2 (PER2) and how it affects circadian period using biochemical, proteomic, phospho-proteomic and genetic approaches. Furthermore, I demonstrate regulation of CK1's activity through phospho-substrate and auto-inhibition mechanisms. Finally, I show a molecular connection between the circadian clock and the inflammation. These findings offers novel insights into potential therapeutic targets for treating circadian disruptions and related health conditions.

Dr Rajesh Narasimamurthy completed his PhD at the University of Zurich, Switzerland, where he studied the signalling mechanisms of the Drosophila Tumour Necrosis Factor (TNF), Eiger. For his postdoctoral research at the Salk Institute, USA, he discovered a novel molecular interaction between the circadian clock and the inflammation system. He then worked as a Group Leader at Thermo Fisher Scientific in Bangalore, India, focusing on the development and production of recombinant antibodies. Later, Rajesh returned to academic research at Duke-NUS Medical School, Singapore, where his work centers on the dynamic role of CK1 (Casein Kinase) and PER2 (Period 2) in regulating the molecular mechanisms of the circadian clock.

Hosted by: Dr Stefan Oehlers

Seminar is open to all. No registration required.

Questions? Contact us at seminars@idlabs.a-star.edu.sg

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