# MBG FOCUS TALK

hosted by Erik Østergaard Jensen

MBG Focus Talks in Molecular Biology

**Friday June 12 at 9:15 - 10:00**

The Conference room, building 3130-303, Gustav Wieds Vej 10c


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## Circadian RNA biology: How post-transcriptional mechanisms contribute to biological timekeeping

Virtually all organisms posses endogenous timekeepers – known as circadian clocks – to anticipate daily changes in their environment and to synchronise their behaviour, physiology, metabolism and gene expression with geophysical time. In most mammalian organs, 10-20% of gene expression undergoes daily oscillations. According to current models, the majority of these oscillations is driven by daily rhythms in transcription. However, it is becoming increasingly clear that post-transcriptional mechanisms make important contributions as well. In particular recent findings that a substantial proportion of the rhythmically accumulating mRNAs does not appear to depend on transcriptional rhythmicity, and that many rhythmic proteins are specified by constantly abundant mRNAs, indicate a post-transcriptional dimension of circadian regulation that has been largely overlooked so far.

In my talk, I shall give an overview of our recent efforts to identify players and mechanisms that shape rhythmic transcriptomes and proteomes and that act at the mRNA level, with a specific focus on the activity of microRNAs and on translational control. Using comprehensive approaches (e.g. ribosome profiling) in mammalian organs and around-the-clock, we have identified many exciting examples of rhythmic regulation, and we have begun to dissect the molecular underpinnings and to evaluate the physiological significance of selected cases using a variety of molecular biological, biochemical, genetic, and imaging-based techniques in the animal and in cells.

Our research addresses important unresolved questions in the chronobiology field. However, I view our approaches also as a way to discover general regulatory principles that may be of importance beyond biological timekeeping. The circadian system thus provides for an excellent paradigm of differential gene expression (i.e., a naturally occurring and minimally invasive experimental setting with distinct physiological states just spaced by a few hours) that is amenable to investigations all the way from the molecular to the behavioural level.