RNA Biogenesis and Metabolism

Torben Heick Jensen Lab

RNA metabolism and function

In THJ lab we focus our research on the regulation and fidelity of gene expression, which is of paramount importance for the maintenance and differentiation of all living organisms. Our laboratory studies the production and quality control of RNA in eukaryotic cells (S. cerevisiae, mouse and human) and its contribution to gene expression regulation. A main focus of the laboratory is to understand the molecular principles dictating the sorting of newly transcribed RNA into a productive pathway involving its packaging with protein and cellular transport vs. a destructive pathway leading to RNA turnover. We believe that a thorough understanding of these relationships will also position us to better understand any putative function of the pervasive transcription of eukaryotic genomes.

RNA exosome adaptors dictates RNA fate

The RNA exosome adaptor protein YTHDC1 acts as a nuclear RNA retention factor in the absence of YTHDC1, exosome targets are exported to the cytoplasm in a AlyREF-RNA retention factor. In the absence of ZFC3H1, exosome transport kinetics contributes to RNA sorting. Indeed, 3’end sequencing of newly transcribed genomes.

Alternative splicing regulated by a co-acting snoRNA

The human intron-hosted box C/D snoRNA snoRD86 acts in cis as a sensor and master switch controlling levels of the limiting snoRNP core protein NOP56. snoRD86 adopts different RNP conformations that dictate the usage of nearby alternative splice donors in the NOP56 pre-mRNA. A snoRD86-derived lncRNA containing NOP56-derived snoRNP core proteins and global snoRNA levels.

Ribo-regulation in stem cell pluripotency and differentiation

Embryonic stem cells (ESCs) hold great promise for regenerative medicine as they can be propagated in culture and induced to differentiate into specialized cell types and tissues. They are distinguished by their self-renewal capability and their differentiation potential, both of which require tight regulatory control mechanisms. We aim to address the role of nuclear regulation of stem cell pluripotency and differentiation.

RNA sequencing:

Exosome turnover contributes to loop RNA levels in differentiation

RNA levels in embryonic bodies differentiated for 3 days versus ESC.

Members of THJ lab

- 1 professor
- 2 team leaders
- 11 postdocs
- 5 PhD students
- 3 technicians

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AARHUS UNIVERSITY

William Garland, project in progress

Maria Gockert, project in progress

Toomas Silla et al. 2018

Marta Lloret et al. 2018