University of Basel
Department Biozentrum

SIB Swiss Institute of Bioinformatics

BIOZENTRUM
The Center for Molecular Life Sciences

Basel Computational Biology Seminar
21563 Current research in Bioinformatics II

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RNA regulation in neurons and neurodegeneration

My lab focuses on the molecular processes underlying subcellular RNA localization, translation, and stability in neurons and neurodegeneration, specifically the functions of RNA binding proteins and miRNAs. We apply a combination of systems biology, biochemical, and imaging techniques to study subcellular RNA localization within compartmentalized neuronal cultures (Zappulo et al., 2017; Ciolli Mattioli et al., 2019). This has shown that mRNA localization is a key protein localization mechanism, accounting for over half of the neurite-localized proteome (Zappulo et al., 2017), and different 3'UTR isoforms direct functionally unique protein isoforms to specific neuronal compartments (Ciolli Mattioli et al., 2019). We have also developed a method for identifying cis-acting elements in RNA localization (N-zip; Mendonsa et al., 2023) and underscored mRNA stability's critical role in mRNA localization (Loedige et al., 2023). Additionally, we explore how RNA metabolism is impacted in neurodegeneration, such as Charcot-Marie-Tooth (CMT) disease and amyotrophic lateral sclerosis. For example, we used high-resolution ribosome profiling to reveal how CMT-causing mutations affect translation (Mendonsa et al., 2021). In summary, our research investigates the molecular mechanisms of subcellular RNA localization and local translation in neurons and their ties to neurodegenerative diseases, leveraging a multifaceted approach with both stem cell-derived and primary neurons.

Date:	Monday, 04.03.2024
Time:	16:15 – 17:15 h
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