

## Keynotes



**Simon ALBERTI** is a Professor at the Biotechnology Center (BIOTEC), Technische Universität Dresden in Germany. He received his PhD in 2004 in Cell Biology from the University of Bonn, Germany. From 2005-2009 he worked in the lab of Susan Lindquist at the Whitehead Institute for Biomedical Research (Cambridge, USA), where he worked on prions and amyloids in budding yeast. From 2010 to 2019 he was a research group leader at the Max Planck Institute of Molecular Cell Biology and Genetics (MPI-CBG) in Dresden, studying proteostasis and the molecular principles underlying cytoplasmic organization. His recent work shows that cells form many membraneless compartments via a biophysical process known as phase separation. Importantly, the ability to form such compartments becomes detrimental with increasing age, because compartment-forming proteins have a tendency to misfold and aggregate and thus are closely tied to the pathogenesis associated with age-related neurodegenerative diseases such as ALS.

**BIOMOLECULAR CONDENSATES AT THE NEXUS OF CELLULAR STRESS,  
AGING AND DISEASE**

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Biomolecular condensates formed by phase separation are membraneless compartments in the cytoplasm and nucleoplasm of cells, which have major roles in cellular organization and physiology. RNP granules are a specific type of condensate that assemble from RNA-binding proteins and RNA. In this talk, I will discuss how the concept of biomolecular condensates has expanded our view of RNP granules and their link to disease, aging and the cellular stress response. I will introduce in vitro reconstitution systems based on the concept of phase separation that now allow us to reconstruct RNP granules in the test tube. Using these reconstitution systems as well as cell biological and genetic approaches, we have gained important insights into the molecular rules of RNP granule assembly, such as the driving forces and amino acids that govern condensation, the conformational changes underlying assembly and molecular mechanisms of condensate regulation and control. I will further discuss how the concept of phase separation has allowed us to dissect the functions of RNP granules, and I will demonstrate how condensate formation can be used by cells to sense and respond to changes in the environment and regulate fundamental cellular processes such as protein synthesis.