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TEMASEK LIFESCIENCES LABORATORY

02 November 2017 (Thursday), 4pm
The Auditorium (Level 1)
Hosted by: Dr Jedd Gregory Jeremiah

Organizing living matter: the role of phase transitions in cell biology and disease



Simon Alberti is currently the Honorary Professor at the BIOTEC, Dresden in Germany, since year 2015. He is also the Group Leader of Max Planck Institute of Molecular Cell Biology and Genetics, Dresden in Germany since year 2010. He obtained PhD in Biology from University of Bonn, Germany in year 2004 and a postdoctoral fellowship with Susan Lindquist at the Whitehead Institute for Biomedical Research, Cambridge, USA from year 2005 to 2010. His research interests including orgnisation of the cytoplasm, adaptation to stress, proteostasis, aging and age-related protein misfolding diseases.

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My research group aims to elucidate the molecular principles underlying the spatiotemporal organization of the cytoplasm. We are particularly interested in understanding how the cytoplasm changes upon environmental perturbations and stress. Stressed cells undergo controlled changes on many levels to alter their physiology and metabolism. Many of these changes may directly result from alterations in the structure and organization of the cytoplasm. Indeed, our recent work shows that stressed cells form many membrane-less compartments in the cytoplasm via a biophysical/biochemical process known as phase separation. However, the initially beneficial ability to form compartments becomes detrimental with increasing age, because compartment-forming have a tendency to misfold and aggregate and thus are closely tied to aging and the pathogenesis associated with age-related diseases such as amyotrophic lateral sclerosis. Thus, recent efforts in the lab are focused on understanding the molecular links between subcellular organization, membrane-less compartments and age-related diseases.

Recent Publications:

1. D. Mateju, T. Franzmann, A. Patel, A. Kopach, H. O. Lee, S. Carra, A. A. Hyman, **S. Alberti** (2017). An aberrant phase transition of stress granules triggered by misfolded protein and prevented by chaperone function. **EMBO Journal**, e201695957.
2. M. C. Munder, D. Midtvedt, T. Franzmann, E. Nüske, O. Otto, M. Herbig, E. Ulbricht, P. Müller, A. Taubenberger, S. Maharana, L. Malinovska, D. Richter, J. Guck, V. Zaburdaev, **S. Alberti** (2016). A pH-driven transition of the cytoplasm from a fluid- to a solid-like state promotes entry into dormancy. **eLife**, 5:e09347.
3. A. Patel, H. K. Lee, L. Jawerth, S. Maharana, M. Jahnel, M. Y. Hein, S. Stoynov, J. Mahamid, S. Saha, T. Franzmann, A. Pozniakovski, I. Poser, N. Maghelli, L. Royer, M. Weigert, E. W. Myers, S. W. Grill, D. N. Drechsel, A. Hyman, **S. Alberti** (2015). A Liquid-to-Solid Phase Transition of the ALS Protein FUS Accelerated by Disease Mutation. **Cell**, 162(5), 1066-1077.