P-1.29

Role of Sumo1 in Phase Separation: More Than a Recognition Tag

Simran Arora [1], Sri Rama Koti Ainavarapu [1]

[1] Tata Institute of Fundamental Research, Mumbai, India

Liquid–liquid phase separation (LLPS) plays a crucial role in cellular organization, primarily driven by intrinsically disordered proteins (IDPs). A post-translational modifier protein, SUMO, has recently emerged as a regulator of LLPS. Given its compact structure and limited flexibility, the precise role of SUMO in condensate formation remains to be investigated. Here, we ask how SUMO protein having globular folded structure gets recruited into the liquid-like assemblies? Is this recruitment driven by their IDP substrates? Or do they possess an independent tendency to undergo weak interactions required for LLPS? Towards this, we study the phase-separation of SUMO1 protein in controlled crowded environment. We find that SUMO1 can rapidly and independently form liquid-like condensates in the absence of its IDP substrates or any SUMO-interacting motifs. The liquid condensates undergo time-dependent conformational changes and aggregation which are probed by label-free methods (tryptophan fluorescence and Raman spectroscopy). Remarkably, experiments on a SUMO1 variant lacking the N-terminal disordered region further corroborate the role of its structured part in phase transitions. Our findings highlight the potential of folded proteins to engage in LLPS and emphasize further investigation into the influence of the SUMO tag on IDPs associated with membraneless assemblies in cells.