JHU BIOLOGY DEPARMENT SPECIAL SEMINAR

Dynamics and disruption of human translation initiation

Guest Speaker

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Host: Christian Kaiser

Abstract:

My research examines how messenger RNA (mRNA) is controlled to define when, where, and how much of a protein is synthesized. Properly regulated translation is a pillar of cellular function and plays an outsized role in early development, the nervous system, and the immune response. Dysregulated translation is broadly implicated in disease. Yet, the molecular mechanisms that underlie how mRNAs and translation are controlled remain unclear. As a graduate student, I therefore defined principles for how yeast mRNA regulatory networks form and function using biochemical, molecular biology, and systems-level analyses. Inspired by that experience, my postdoctoral research examined how the human protein synthesis machinery assembles on mRNA – a critical, multi-step process choreographed by a dozen factors that occurs within about a minute. I established the first assays to monitor human translation initiation as it occurs in real time, using purified components and single-molecule spectroscopy. Iteration between single-molecule and high-resolution structural approaches enabled me to reveal the elusive molecular model for how the ribosomal subunits join together at a translation start site on an mRNA. I also uncovered how a SARS-CoV-2 protein disrupts translation initiation in a distinct manner. Moving forward, my vision is to combine single-molecule, structural, and transcriptome-wide analyses to elucidate high-resolution molecular models for how human translation is controlled by essential regulatory complexes that bind mRNA

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4pm - Mudd 100