"Engineering Cellular Degradation: from Targeted Control of Protein Depletion to Modulation of Clearance Pathways"

171 Durham, March 23, 2017 at 11:00 a.m.

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The chemical and energetic properties specified by a protein's amino acid sequence and encoded by our genome, while determining the protein folding energy landscape, are only part of what shapes how proteins evolve their function. A sophisticated network of macromolecular assistants is needed to induce protein synthesis, promote folding and localization, and mediate degradation of aberrant proteins – functions achieved through completely different and independent mechanisms balanced extrinsically by chemical feedback agents. We seek to develop novel biotechnologies to manipulate these mechanisms for applications ranging from systems-level investigations of protein function to development of therapeutic approaches for restoring cellular homeostasis. We recently developed a technology for degrading a target protein with high specificity and selectivity that provides dynamic control over protein accumulation and that can be customized to target any cellular protein and post-translational modifications. We also employ synthetic biology tools to develop genetic circuits that interface with the ubiquitin-proteasome system to monitor and manipulate protein degradation. We also investigate clearance of intracellular material through the lysosome-autophagy system using nanoparticles. These tunable cell-based platforms to monitor and engineer protein degradation in cells will be useful for deciphering the mechanisms of protein degradation and discovering natural and synthetic modulators of protein degradation for therapeutic and industrial applications.

Refreshments will be provided in 2061 Sweeney Hall at 10:30 a.m.

If you plan to attend, ***email a question*** *to bellinda@iastate.edu and the speaker will answer your question!*

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