Graduate School of Life Sciences Center for Bioinformatics Education Seminar

The biophysical properties of the cytoplasm in yeast cells: Two case studies on dormancy and excessive cell growth

Illustrated by Hiroko Uchida

13:30-15:00, November 25 (Mon) 2024

Seminar Room C/D, Building G

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The cytoplasm is a complex and crowded environment, which influences a wide range of cellular processes such as biochemical reactions and protein folding. Recent studies have reported that cells adjust the biophysical properties of the cytoplasm in response to environmental changes for homeostasis and adaptation. We used yeast cells to investigate how the cytoplasmic properties change and what the molecular mechanisms underlie the two phenomena; dormancy and excessive cell growth. Dormancy is a physiological state in which cells stop growing and proliferating reversibly under harsh environmental conditions. Also, excessive cell growth impairs cell-cycle progression and cell signaling in cells that have grown too large. To visualize cytoplasmic fluidity in these cellular states, we used genetically encoded multimeric nanoparticles (GEMs), which self-assemble and form a spherical particle of 40 nm diameter. By tracking GEMs, we found that cytoplasmic fluidity is reduced during dormancy and increased during excessive cell growth. In this seminar, I will discuss the biophysical properties of the cytoplasm during dormancy and excessive cell growth and the molecular pathway involved in these processes.

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