



CHEMISTRY & CHEMICAL BIOLOGY SEMINAR:

Viscoadaptation: Cellular Control of Viscosity

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Abstract:

Cellular functioning requires the orchestration of thousands of molecular interactions in time and space. Yet most molecules in a cell move by diffusion, which is sensitive to external factors like temperature. How cells sustain complex, diffusion-based systems across wide temperature ranges is unknown. Here, we uncover a mechanism by which budding yeast modulate viscosity in response to temperature and energy availability. This “viscoadaptation” uses regulated synthesis of glycogen and trehalose to vary the viscosity of the cytosol. Viscoadaptation functions as a stress response and a homeostatic mechanism, allowing cells to maintain invariant diffusion across a 20°C temperature range. Perturbations to viscoadaptation affect solubility and phase separation, suggesting that viscoadaptation may have implications for multiple biophysical processes in the cell. Conditions that lower ATP trigger viscoadaptation, linking energy availability to rate regulation of diffusion-controlled processes. Viscoadaptation reveals viscosity to be a tunable property for regulating diffusion-controlled processes in a changing environment.

Date:

4/16/2021

Time:

12:30 PM – 2:00 PM

Link:

Please contact
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