Zhou Lab

The Zhou lab uses budding yeast, human cells, and fruit fly as the main model organism to study the cell biology of aging with an emphasis on proteostasis and mitochondria. We use cutting edge systematic biology approaches, robotics, high-throughput imaging screening, cryo-EM, as well as traditional biochemistry, proteomics, and genetics etc. We also have a broad interest in other cellular structures and aim to discover new inter-organellar communications/interactions. Proteostasis defects and mitochondrial dysfunction are two conserved hallmarks of aging and many neurodegenerative diseases, including AD.

Budding yeast is an ideal model to study cellular aging and rejuvenation processes: both happen at the same time along the axis of asymmetric cell division, which generates an aging mother cell and a rejuvenated daughter cell. This amazing model organism is great for high-throughput screening to crack the fundamental mechanism of aging. We use multiple cutting-edge imaging methods, high-throughput screening, biochemistry, bioinformatics, and machine learning to address systematically the response of cellular proteome towards stress, aging and AD-related proteins.

We carry out parallel research on human cells with an emphasis on cellular senescence, as it is very similar to the yeast replicative aging and allows us to translate what we learned from yeast to human.

We use fruit fly to test how the molecular cellular mechanism of aging discovered in yeast and human cells be applied to understand the animal aging across different tissues. We have projects on gut and neuroscience related to mechanosensation and aging.

We are interested in questions related to protein folding, protein misfolding/aggregation, phase separation, mitochondrial biogenesis and dysfunctions, as well as other cell biological questions, in response to stress, aging, and AD.

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