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Dr. Hua Bai

Dept. of Genetics, Development & Cell Biology
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Title:
"Mechanisms of aging: From inter-organ communication to inter-organelle cross-talk"

DATE: Friday, March 19, 2021
TIME: 12:00 pm PST

MEETING ID: 963 2886 4096
PASSCODE: 929813

Host: Dr. Naoki Yamanaka

Abstract: Inter-organ and inter-organelle communication plays important role in cellular and tissue homeostasis. In this talk, I will present our recent and unpublished work on the novel roles of peroxisome in liver-heart communication and mitochondrial dynamics during animal aging. Peroxisomes are essential and yet least studied subcellular organelles of all eukaryotic cells. They play crucial roles in the regulation of cellular redox homeostasis, oxidation of very long chain fatty acids (VLCFAs), and biosynthesis of ether phospholipid. Because most of the peroxisomal matrix proteins are synthesized in the cytosol, all peroxisomal functions are dependent on the import of matrix proteins into the organelle. Disrupted peroxisomal import often leads to severe impairment of tissue functions. Despite the indispensable role of peroxisomes in cellular and metabolic homeostasis, we know very little about the role of peroxisome in tissue aging. We have recently performed genomics and genetic analyses to map the key components in cellular stress response to peroxisomal dysfunction and the causal role of peroxisome in aging control. Importantly, we found that peroxisomal import function declines with age, which leads to elevated inflammation and loss of tissue homeostasis. Intriguingly, hepatocyte-specific peroxisomal dysfunction is a major cause of age-dependent decline of cardiac function. Additionally, peroxisomes also contribute significantly to aging regulation through the maintenance of mitochondrial homeostasis and dynamics. Thus, our studies demonstrated that peroxisomal deficiency is a major cause of aging, and further investigation of the interplay between peroxisomes and other organelles (e.g., mitochondria) will likely yield insights into the novel molecular and cellular mechanisms of animal aging.