Study the mechanism of gene PCP1 in longevity of yeast cells

Rutherford, gupta, Hong Qin

Mitochondria play a central role in life span extension effects of calorie restriction (CR). PCP1, a mitochondrial rhomboid serine protease, participates in mitochondrial dynamics and the processing of cytochrome c peroxidase (CCP1) which is involved in degradation of ROS such as peroxides. Additionally PCP1 partakes in the processing of MGM1 a dynamin- like GTPase involved in mitochondrial fusion, fission and cristae formation. Deletion of PCP1 leads to extended replicative life span (RLS) and lower growth fitness. Therefore, we focused on the role of PCP1 to better understand the role of mitochondria in CR. We hypothesize that the effect of PCP1 on life span is due to its influences on the endogenous levels of superoxide. We test this hypothesis by comparing the superoxide levels between cells grown in normal conditions and calorie-restricted media, and then monitored the superoxide levels by dihydroethidium staining. Using flow cytometer, we found that CR induced higher superoxide levels in wild type cells during exponential growth. In contrast, cells of PCP1 deletion mutant show extremely low superoxide levels in both normal and CR media. These preliminary results suggest that the long RLS of pcp1∆ is due to its low levels of O2·-, and also suggest that CR would have no effect on the lifespan of pcp1∆. This study can potentially lead to more insights on ageing-related diseases in humans.