

Open position for the LSM call of applications

Department/Institute: LMU Faculty of Biology, Cell Biology

Subject areas/Research fields: Molecular biology, Cell biology and Genetics.

Keywords: mitochondria, mtDNA, fluorescence microscopy

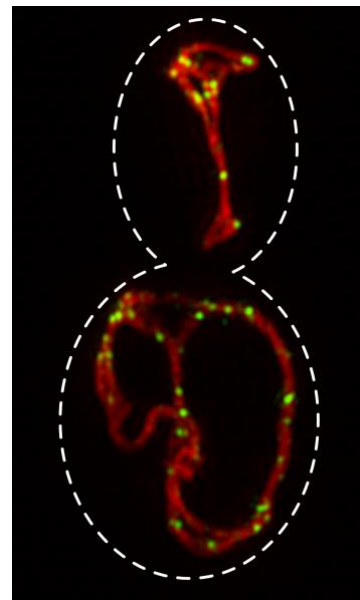
Name of supervisor: Prof. Christof Osman

Project title: Quality control of the mitochondrial genome

Project description:

Mitochondria are known as the power plants of the cell because they supply the cell with energy through a process known as oxidative phosphorylation. Essential subunits of the complexes responsible for this process are encoded by the mitochondrial genome (mtDNA). mtDNA is present in multiple copies within cells and these copies are distributed throughout the mitochondrial network. Given the fundamental importance of mtDNA in cellular energy supply, it is not surprising that mtDNA mutations have been linked to a variety of diseases and also the ageing process.

Currently, it is unclear how cells combat accumulation of mutant mtDNA copies to ensure maintenance of a healthy pool of mtDNA copies. Strikingly, we could previously show that the single-celled model organism *S. cerevisiae* can intracellularly distinguish between intact and mutant mtDNA copies and promote generation of progeny containing predominantly intact mtDNA. However, it remains unknown, how cells determine mtDNA quality to eventually facilitate propagation of intact over mutant mtDNA copies.



Mitochondria and mtDNA in budding yeast. The white dashed line indicates the cell outline. Mitochondria and mtDNA are shown in red and green, respectively.

Within this project, we aim to harness the power of cutting-edge microscopy techniques and sophisticated image analysis to pioneer a dynamic live-cell imaging methodology that will illuminate the ongoing competition between mutant and intact mtDNA copies over successive generations in the yeast *S. cerevisiae*. This tool will provide insight into mtDNA quality control with unprecedented temporal detail. We will then apply this methodology to understand the cellular mechanisms that underlie mtDNA quality control.

By joining our team, you will become an integral force in this voyage, contributing to deciphering the intricate web of cellular strategies that safeguard the integrity of mtDNA, thereby securing energy supply of cells.

**Qualifications:**

Experience with molecular and cell biological techniques, microscopy and basic programming.

References:

Roussou R., Metzler D., Padovani F., Thoma F., Schwarz R., Shraiman B, Schmoller KM. & Osman C. (2024) [Real-time assessment of mitochondrial DNA heteroplasmy dynamics at the single-cell level](#), The EMBO Journal (published online)

Jakubke C.*, Roussou R.*, Maiser A., Schug C., Thoma F., Bunk D., Hörl D., Leonhardt H., Walter P., Klecker T. & Osman C. (2021) [Cristae-dependent quality control of the mitochondrial genome](#). Science Advances, Vol 7, Issue 36

For further information, please contact: Christof Osman, osman@bio.lmu.de

Research group website:

https://www.cellbiology.bio.lmu.de/research_groups/osman/index.html

Apply: Please send your application through the [online portal](#) of the Graduate School Life Science Munich (LSM).

Movie: <https://www.youtube.com/watch?v=RLOHfVCfRdU>

Legend for Movie:

A yeast cell is shown. The mitochondria are labeled in blue. Intact and mutant mtDNA are labeled in green and red, respectively.