RESEARCH PROJECT FOR MASTERS THESIS in BIOLOGY/BIOCHEMISTRY

Working Title	Mechanisms regulating mitochondrial cristae formation
PI	Prof. Andreas Reichert and Dr. Arun Kondadi
Institute	Institute of Biochemistry and Molecular Biology I, Medical Faculty
methods to apply	Confocal microscopy, Super-resolution nanoscopy, Western blots, RT PCR and Molecular Biology techniques like cloning
short summary/exposé	Mitochondrial ultrastructure is highly diverse and undergoes dynamic alterations upon metabolic changes and induction of apoptosis. The mitochondrial outer membrane encloses the organelle whereas the inner membrane invaginates into the matrix forming the cristae membrane. Cristae connect to the inner boundary membrane (IBM) by a peculiar slot-like structure called crista junction (CJ). Crista junctions have a small diameter around 25 nm and therefore likely provide a diffusion barrier subdividing the mitochondrion into distinct subcompartments. Such an arrangement of the inner membrane may facilitate mitochondria to achieve a high efficiency in energy conversion and other crucial mitochondrial functions. Altered mitochondrial ultrastructure has been associated with several human disorders. Recently, a large oligomeric complex called MICOS (Mitochondrial contact site and cristae organizing system) was identified which was shown to be located at crista junctions and required for the formation of CJs. This complex is highly conserved and has a growing list of subunits in yeast and mammalian cells. In the mammalian system, so far there are eight subunits, Mic60/Mitofilin, Mic10, Mic13/Qil1, Mic19/CHCHD3, Mic25/CHCHD6, Mic26/APOO, Mic27/APOOL and CHCHD10 which are linked to numerous human disorders. We use a combination of biochemical, high-resolution STED fluorescence microscopy and electron microscopy to study the mechanisms of cristae formation. Several mutant cell lines lacking MICOS subunits are available and will be analyzed. Furthermore, it is planned to test a variety of compounds, e.g. known to inhibit distinct steps in oxidative phosphorylation, on cristae formation in our model system using mammalian cell lines.
special requirements (e.g. previous knowledge)	Prior experience of basic light microscopy, work with cell culture, and biochemical methods will be advantageous but not essential.
earliest start date	2nd January 2023
How to apply (e.g. written application and/or job interview)	Candidates will have to apply for the position by email to **kondadi@hhu.de** by providing a letter of motivation and a short CV. This will be followed by an interview.