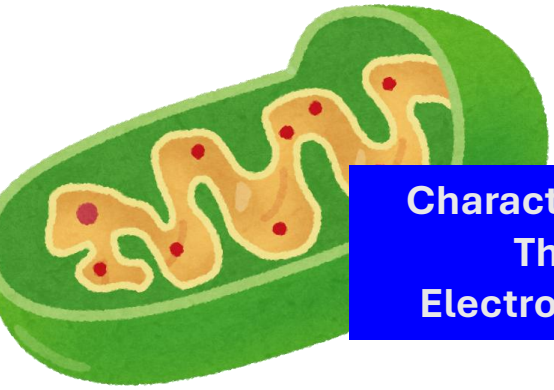
Open Bachelor/Master Thesis Position in Molecular Biology and Biotechnology



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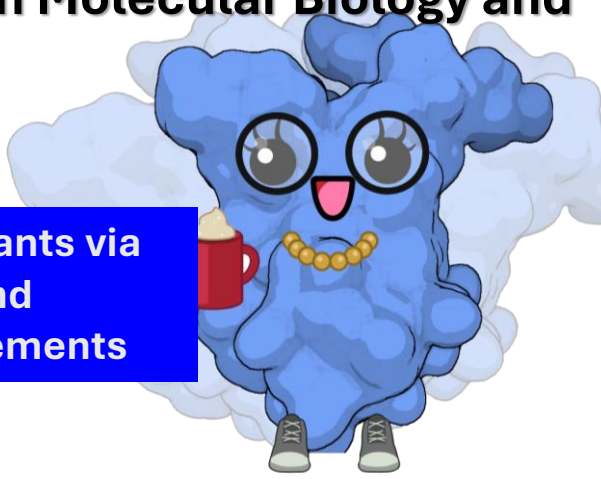

Characterization of UCP1 Mutants via Thermal Denaturation and Electrophysiological Measurements

Scientific Background

Mitochondria are essential organelles responsible for cellular energy production through oxidative phosphorylation. Embedded within the inner mitochondrial membrane (IMM), a series of protein complexes generate a proton gradient that drives ATP synthesis.

Beyond their central role in metabolism, mitochondria are also key regulators of heat production, apoptosis, and reactive oxygen species balance, making them crucial for cellular homeostasis and energy regulation.

Uncoupling protein 1 (UCP1, SLC25A7) is a mitochondrial carrier protein uniquely expressed in brown adipose tissue (BAT). It enables adaptive thermogenesis by increasing the IMM's proton conductance, thereby dissipating the proton motive force as heat instead of producing ATP, hence its original name, thermogenin.

UCP1 activity is stimulated by long-chain free fatty acids (LCFAs), generated in brown adipocytes through lipolysis following adrenergic stimulation, and is inhibited by purine nucleotides such as ATP. To better understand the molecular mechanisms underlying proton transport and regulation, we employ site-directed mutagenesis to introduce specific amino acid substitutions in UCP1 and study how these mutations affect its function under different biochemical conditions.

Student Tasks

We are seeking a motivated Bachelor or Master student to participate in the functional characterization of UCP1 mutants. The student will be trained in: Mitochondrial protein expression in *E. coli* and refolding protocols, thermal denaturation assays to assess protein stability, electrophysiological measurements (patch-clamp) to analyze proton transport, supporting techniques including SDS-PAGE and Western blot analysis

This project offers a unique opportunity to combine biochemical, biophysical, and electrophysiological methods to investigate the structure, function relationship of a key mitochondrial protein.

Application

Please send your application, including a motivation letter, CV, and transcript of records, to: Giorgia.Roticiani@vetmeduni.ac.at or Elena.Pohl@vetmeduni.ac.at

Location

Institute of Physiology and Biophysics, Department of Biomedical Sciences, University of Veterinary Medicine, Veterinärplatz 1, 1210 Vienna

Duration

Minimum 6 months, starting as soon as possible

Literature

V. Beck, M. Jabůrek, E. P. Breen, R. K. Porter, P. Ježek, and E. E. Pohl, "A New Automated Technique for the Reconstitution of Hydro phobic Proteins Into Planar Bilayer Membranes. Studies of Human Re combinant Uncoupling Protein 1," Biochimica et Biophysica Acta 1757 (2006): 474–479, https://doi. org/ 10. 1016/j. bbabio. 2006. 03. 006

S. Vojvodić, G. Roticiani, M. Vazdar, and E. E. Pohl "Molecular Dynamics Simulations of a Putative Novel Mechanism for UCP1-Assisted FA Anion Transport" Acta Physiologica (2025): 241:e70068, https://doi.org/10.1111/apha.7006