

Master's Thesis Position

Targeting Senescence: Investigating the Protective Effects of Short- and Medium-Chain Fatty Acids on Cardiac and Blood-Brain Barrier Aging

Project Background

Aging increases vulnerability to stress, frailty, and disease. Cellular senescence is an irreversible growth arrest accompanied by metabolic dysfunction and chronic inflammation, a hallmark of aging. Mitochondria, central regulators of energy and cell fate, show impaired fusion and fission dynamics in senescent cells, leading to dysfunction. Removing or modulating senescent cells has been shown to delay age-related damage in several model systems.

Fatty acids (FAs) of different chain lengths affect these processes. Short-chain fatty acids (SCFAs), produced by gut microbiota, and medium-chain fatty acids (MCFAs), derived from diet, can influence transcription, histone acetylation, and mitochondrial metabolism. Declining SCFA levels correlate with worse cardiovascular and neurological outcomes. Nutritional interventions such as medium-chain triglyceride (MCT) supplementation have shown promise in preserving mitochondrial and cellular function.

Project Aim

This thesis will explore how SCFAs and MCFAs influence cellular senescence pathways in cardiac-like cells and astrocytes, focusing on mitochondrial function, inflammatory signaling, and gene expression.

The project is conducted jointly between the Department of Nutritional Sciences and the Department of Pharmaceutical Sciences under the supervision of Dr. Sternberg and Prof. Zille.

Candidate Profile

Enrolled Master student in Nutritional Sciences, Molecular Biology, or related field

Basic experience with mammalian cell culture and molecular biology techniques

Strong motivation to investigate molecular mechanisms of diet–gene interaction

A successful applicant can start from early December 2025

Supervisor:

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