ME-CFS24-018 - Investigating Cerebral Oxygen Metabolism Dysfunction as a pathomechanism of Myalgic Encephalomyelitis/Chronic Fatigue Syndrome

Zusammenfassung

Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS) is a debilitating condition with profound fatigue, cognitive impairment, and neurological symptoms. The underlying pathophysiological mechanisms remain poorly understood, hindering effective treatment development. This study aims to elucidate the potential roles of oxygen utilisation dysfunction, white matter integrity impairment, and cerebrovascular dysregulation in ME/CFS symptoms.

Taking advantage of multimodal neuroimaging, we will investigate cerebral metabolism, glymphatic clearance, and perfusion dynamics in ME/CFS patients vs. healthy controls. Proton magnetic resonance spectroscopy (MRS) will quantify metabolic markers to assess mitochondrial function and cellular energy metabolism. Diffusion tensor imaging (DTI) with DTI-ALPS will evaluate white matter integrity and glymphatic pathway function for brain waste removal. Arterial spin labeling (ASL) perfusion imaging will map cerebral blood flow under normoxic, hypoxic, and hyperoxic conditions.

A unique aspect is integrating physiological oxygen level challenges to unmask vulnerabilities in metabolic, glymphatic, and vascular responses. By correlating neuroimaging markers with clinical fatigue, cognitive function, and disease severity, we aim to establish biomarker profiles stratifying ME/CFS patients exhibiting predominant mitochondrial, glymphatic, or cerebrovascular impairments.

This innovative multimodal approach addresses critical pathophysiology knowledge gaps, offering insights into cellular metabolism, brain waste clearance, and vascular function interplay. Identifying underlying mechanisms and biomarkers could accelerate targeted therapy development and enable precise patient selection for future clinical trials, improving quality of life for ME/CFS patients.

Wissenschaftliche Disziplinen:
Magnetic resonance imaging (MRI) | Metabolomics (25%) | Neurology (25%)

Schlagworte:
Myalgic Encephalomyelitis/Chronic Fatigue Syndrome, FatigueCerebral oxygen metabolism, Hypoxia, Neuroimaging, Multimodal MRIASLMRSDTI, Cerebrovascular dysfunction

---

Principal Investigator:	Lukas Haider
Institution:	Medical University of Vienna
Co-Principal Investigator(s):	Tobias Zrzavy (Medical University of Vienna) Kathrin Kollndorfer (Medical University of Vienna



Status: Abgeschlossen (01.01.2025 – 28.02.2026)

GrantID: 10.47379/MECFS24018

Weiterführende Links zu den beteiligten Personen und zum Projekt finden Sie unter
https://www.wwtf.at/funding/programmes/ei/ME-CFS24-018/

Wiener Wissenschafts-,
Forschungs- und Technologiefonds
Vienna Science and Technology Fund