ME-CFS26-005 - Simultaneous assessment of muscle perfusion and mitochondrial function in ME/CFS

Abstract

31P Magnetic Resonance Spectroscopy (31P MRS) is a well-established, non-invasive technique for quantifying skeletal muscle mitochondrial function. 31P MRS enables quantification of enzymatic flux and dynamic metabolite kinetics that directly reflect mitochondrial respiration. Despite successful application across a wide range of physiological and pathological contexts, 31P MRS has not yet translated into clinic. This has largely been driven by reliance on dedicated hardware, specialist expertise, and complex, bespoke post-processing pipelines that limit scalability and multi-site application.

Recently, significant progress has been made toward addressing these barriers through the development of expert consensus recommendations and validated quality control (QC) workflows designed to standardise acquisition, processing, and analysis of muscle ^{31}P MRS data. Initial application of these workflows has demonstrated improved data quality and reproducibility. However, further validation in larger, more heterogeneous cohorts with limited ability or compliance to exercise are required to enable widespread clinical translation.

The aim of this fellowship is to apply and refine established 31P MRS QC workflows through application to existing and newly acquired datasets, including targeted investigation within ME/CFS, where the contribution of muscle decline to exercise intolerance and post-exertional malaise remains poorly understood. By applying harmonised 31P MRS methodologies, this work will provide a comprehensive assessment of muscle metabolic decline and support the development of a curated 31P MRS data repository between the Medical University of Vienna and the University of Oxford.

This fellowship will also lay the foundations for future multi-site ME/CFS studies, facilitating harmonised data acquisition and enabling translation of 31P MRS-derived measures of mitochondrial function toward clinically meaningful outcome measures.

Scientific disciplines:
Metabolic diseases (100%)

Keywords:
31P MRSPerformance fatigueMitochondrial metabolism

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Further links to the persons involved and to the project can be found under
https://www.gmbh.wwtf.at/funding/programmes/ei/ME-CFS26-005/