The Morten Group – Hub for ME/CFS Research into Biomarker Research and Understanding the Biology of ME/CFS

Grant Amount	£101,531.62
Location	University of Oxford
Research Field	Diagnostic markers
Lead Researcher/s	Professor Karl Morten
Start Date	01/11/2019
Duration	12 Months
Status	In progress
Latest Update	Raman research set to continue thanks to Ramsay Research funding from the ME Association
Publication	See below

BACKGROUND

Since 2016, the ME Association has funded various projects at the University of Oxford under the leadership of Karl Morten. The Morten Group at the University of Oxford has been at the forefront of investigating the biological mechanisms underlying ME/CFS, with a particular focus on mitochondrial dysfunction, oxidative stress, and metabolic abnormalities.

PROJECT DETAILS

The current activity project at the University of Oxford is titled: "Investigating factors present in plasma that modulate mitochondrial function in patients".

The research aims to identify biomarkers for ME/CFS, develop reliable diagnostic tests, and explore potential therapeutic interventions. Key areas of investigation include:

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- **Biomarker Discovery:** Using Raman spectroscopy and metabolic profiling to identify biological markers that distinguish ME/CFS patients from healthy individuals.
- **Mitochondrial Dysfunction:** Studying the role of mitochondria in energy metabolism and how dysfunction contributes to fatigue and post-exertional malaise.
- **L-Form Bacteria:** Investigating the presence of cell-wall-deficient bacteria as potential causal agents in ME/CFS.
- **Diagnostic Test Development:** Applying machine learning techniques to analyze blood extracellular vesicles and microRNA profiles, aiming to create a reliable diagnostic tool.

Within the Morten group there are three PhD studies actively working on these aims above:

- **Miss Edie Guo's** project is exploring diagnostic markers in ME/CFS using Raman microscopy. This is looking at peripheral Blood Mononuclear cells (PMBC) but now starting to explore plasma with our new Raman microscope installed earlier this year (2025). Edie is also looking at serum factors and their impact on endothelial models and looking at lines from the Fisher group in Melbourne exploring the use of Raman.
- **Dr Inga William's** is looking at gut leak and blood barrier function and the role of low level infection. This project has a clinical component within the study which is starting in June 2025.
- **Miss Aleyna Lumsden's** project is a discovery metabolomics project looking to identify the plasma factors in ME/CFS which are currently unknown and very different from ME/CFS and heathy controls. This project could identify causal factors and potential treatment pathways. Aleyna's PhD is funded specifically through an MEA grant "Using advanced informatics strategies to identify key disease-associated metabolites" https://meassociation.org.uk/wp-content/uploads/2025/08/PhD-1-Using-advanced-informatics-strategies-to-identify-key-disease-associated-metabolites.pdf

IMPORTANCE OF FUNDING

- **Accelerating Diagnostic & Treatment Development:** Funding enables biomarker discovery and machine-learning-based diagnostic tools, reducing misdiagnosis and paving the way for targeted therapies.

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- **Understanding Mitochondrial & Metabolic Dysfunction:** Research into plasma factors, mitochondrial impairment, and gut barrier function helps unravel disease mechanisms and potential interventions.
- **Strengthening Research Infrastructure & Expertise:** Supporting PhD projects fosters the next generation of ME/CFS researchers, ensuring long-term scientific progress.
- **Translating Findings into Clinical Applications:** Clinical studies, such as those in gut permeability and infection, bridge the gap between research and patient care, improving outcomes.

TITLES OF PREVIOUSLY FUNDED PROJECTS BY THIS RESEARCH GROUP

- Establishing protocols to assess mitochondrial function in Neutrophils and Monocytes from ME/CFS patients
- Investigating altered metabolism in ME/CFS using comprehensive metabolic profiling by mass spectrometry and Raman microscopy

PUBLICATIONS FROM THIS RESEARCH GROUP

- Dysregulation of lipid metabolism, energy production, and oxidative stress in myalgic encephalomyelitis/chronic fatigue syndrome, Gulf War Syndrome and fibromyalgia
- Using Single-Cell Raman Microspectroscopy to Profile Human Peripheral Blood Mononuclear Cells
- Raman micro-spectroscopy as a tool to study immunometabolism
- Developing a Blood Cell-Based Diagnostic Test for Myalgic Encephalomyelitis/Chronic Fatigue Syndrome Using Peripheral Blood Mononuclear Cells
- Long COVID: mechanisms, risk factors and recovery
- Diagnosis of Myalgic Encephalomyelitis/Chronic Fatigue Syndrome With Partial Least Squares Discriminant Analysis: Relevance of Blood Extracellular Vesicles
- Induced pluripotent stem cells as suitable sensors for fibromyalgia and myalgic encephalomyelitis/chronic fatigue syndrome

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- Relationship between Cardiopulmonary, Mitochondrial and Autonomic Nervous System Function Improvement after an Individualised Activity Programme upon Chronic Fatigue Syndrome Patients
- Autonomic Phenotypes in Chronic Fatigue Syndrome (CFS) Are Associated with Illness Severity: A Cluster Analysis
- Impact of pharmacological agents on mitochondrial function: a growing opportunity?
- The Impact of a Structured Exercise Programme upon Cognitive Function in Chronic Fatigue Syndrome Patients
- Assessing cellular energy dysfunction in CFS/ME using a commercially available laboratory test
- A new approach to find biomarkers in chronic fatigue syndrome/myalgic encephalomyelitis (CFS/ME) by single-cell Raman micro-spectroscopy
- Potential clinical usefulness of gut microbiome testing in a variety of clinical conditions

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