The Electrophysiology of ME/CFS: Advancing the Electrical Model of PBMCs for Aetiology and Diagnosis

Grant Amount	£76,989.50
Location	Brunel University
Research Field	Diagnostic markers
Lead Researcher/s	Dr Fatima Labeed and Dr Jacqueline Cliff
Start Date	01/08/2025
Duration	12 months
Status	In progress
Latest Update	https://meassociation.org.uk/2025/09/research-second-phase-funding-to-advance-the-development-of-a-diagnostic-test-for-me-cfs/

BACKGROUND

In 2019, Professor Ron Davis and his team in the United States developed a nanoelectronics test that detected an impedance in white blood cells taken from individuals with myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS). Their findings suggested the potential for a diagnostic marker, but further research in this area has been limited.

Recognising the importance of advancing this work, the ME Association and ME Research UK jointly funded an initial 12-month study in October 2023 to explore the electrical differences in blood cells from people with ME/CFS (see here).

The initial findings have shown:

- Blood cells (Peripheral Blood Mononuclear Cell) (PBMCs)) from people with ME/CFS showed distinct electrical properties compared to healthy controls.
- These differences suggest that the cells may have problems with how they handle ions - tiny, charged particles that help cells function properly (known as ion channel dysfunction and altered cellular ionic composition).
- If a cell is unable to function properly it could be causing or contributing to disease progression and functional impairments.
- Results demonstrated that the electrical signatures from blood cells could distinguish ME/CFS from other conditions, supporting their potential as a diagnostic tool.
- More information about the Electrophysiological Properties of Cells be found in Dr Krista Clarke's blog about the initial study, here.

PROJECT DETAILS

The new grant which has been awarded to Dr Fatima Labeed (United Arab Emirates University), who authored the initial research, and Dr Jacqueline Cliff, who will host the work in her laboratory at Brunel University of London, will:

- test a larger, more diverse cohort.
- improve how samples are prepared and tested to make results more accurate and easier to get, including the characterisation of differences between fresh and cryopreserved (frozen) samples.
- compare blood cells from people with ME/CFS, Long Covid, Multiple Sclerosis and healthy volunteers.
- explore how ion channels and plasma ions affect these electrical differences, and test whether a treatment called low-dose naltrexone (LDN) can help.

IMPORTANCE OF FUNDING

Funding this research is critical for several reasons:

- **Developing a reliable diagnostic test:** ME/CFS remains a poorly understood condition with no definitive diagnostic test. A validated electrical biomarker could revolutionize diagnosis, enabling earlier and more accurate identification of the disease.
- **Advancing scientific understanding:** by identifying cellular changes associated with ME/CFS, this study could provide valuable insights into disease mechanisms, paving the way for targeted treatments.
- **Improving patient outcomes:** a routine diagnostic test would reduce diagnostic uncertainty, allowing patients to access appropriate care and support more quickly.
- **Strengthening biomedical research:** this study builds upon previous findings and could serve as a foundation for future large-scale investigations into ME/CFS biomarkers and treatments.

The ME Association and ME Research UK's investment in this study reflects their commitment to advancing biomedical research that could lead to meaningful improvements in the diagnosis and treatment of ME/CFS. Funding this project will help accelerate progress toward a reliable diagnostic tool and potential therapeutic breakthroughs.

N.B. this project is jointly funded with ME Research UK for a total of £153,979.00