FIGHT MND.


Dr Sophia Luikinga

Researcher.
DR SOPHIA LUIKINGA

IMPACT Project.
LIPIDOMIC SIGNATURES IN BLOOD AS A NOVEL BIOMARKER FOR MND

Priority Area.
DISEASE BIOMARKERS

Where do you work?

I work at the Florey Institute of Neuroscience and Mental Health in Melbourne.

What is your research experience and background?

I did my undergraduate science degree in the Netherlands after which I completed my honours in neuroscience at the Florey. After my honours I went back to the Netherlands where I worked on the effects of diabetes on muscle function and perfusion. My interest in neuroscience was too strong to keep working in the latter field, so I took the opportunity to complete my PhD in neuroscience.

What led you to pursue your research into MND?

After I finished my PhD an opportunity arose to join A/Prof Bradley Turner's MND laboratory at the Florey. For me this was the perfect way to combine my passion for muscle physiology and neuroscience. Most of all, it is extremely rewarding to be able to make a difference for people living with this terrible disease.

Can you comment on the novel biomarkers your project is developing?

These novel biomarkers were discovered using an exciting technique called Lipidomics, which we used to investigate the abundance of all different types of fats, called lipids, in the muscle and spinal cord of MND preclinical models. The lipids I identified are important in neuron to muscle stability, cellular energy and cellular survival. Apart from being abundantly expressed in the muscle and spinal cord, these lipids can be found circulating in the blood.

What excites you about these new biomarkers?

I am excited that the lipids we identified in muscle and the spinal cord are also abnormally expressed in the blood, meaning that this could reflect disease state. Classic biomarkers consist of a single molecule or metabolite, which I believe is insufficient for a multifaceted disease such as MND - the approach of putting all the eggs in one basket is just not enough. I will investigate the dynamic circulating expression of four different molecules across disease progression using preclinical MND models, to establish a unique lipid expression profile specific to MND. Most importantly, I have the ability to use patient blood samples to investigate the profile of these lipids and if the preclinical data translates to data obtained from MND patients.

This is the first time you have received funding from FightMND. Can you describe your thoughts when you received the news?

Once I read the news that my application was successful, I could not believe what I was reading, so I had to read the email 3 times over and cried. I am beyond grateful for the confidence and support that FightMND shows for my project.

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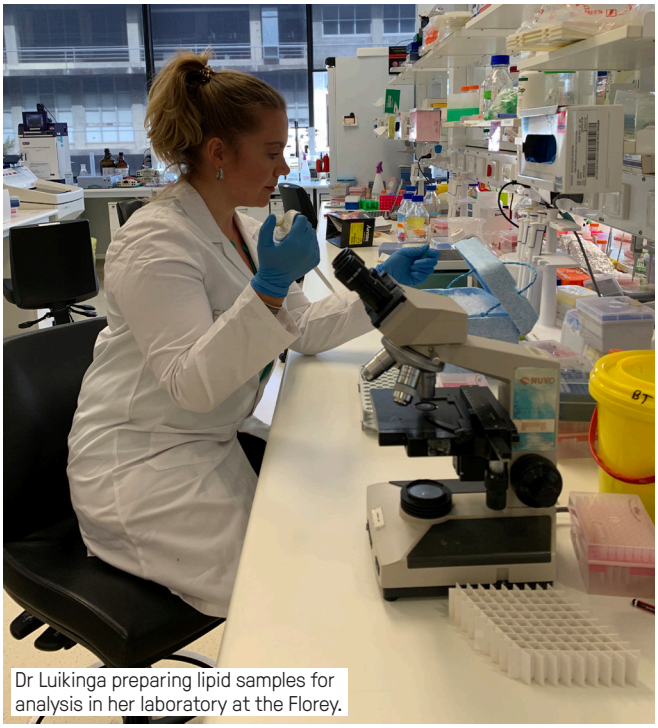
What difference will this funding make to your work?

Without the funding and support this project would most likely not go ahead. The generosity of FightMND will help me and my team to investigate the potential of this panel of lipids to function as a reliable biomarker to determine onset of MND, track progression, and ultimately test the effectiveness of drugs in clinical trials. If successful, this could be a future staple test in MND diagnosis and progression.



Dr Luikinga preparing lipid samples for analysis in her laboratory at the Florey.

The IMPACT Project

Diagnosis of MND is a lengthy and complicated process, and it can take 2 years to get a conclusive diagnosis after symptoms are first detected. So far, no biological marker that can shorten this process or predict the prognosis of MND is available. However, researchers are beginning to uncover links that may exist between the body's fat composition, metabolism and MND diagnosis and prognosis. Metabolic lipids, for example, which are essential for motor neuron function and their communication with muscles, are dysregulated in both preclinical MND models and MND patients. Because lipids can be detected in blood samples, they have the potential to be developed into specific MND biomarkers for accurate diagnosis and prognosis of the disease.

This project aims to develop a blood test that detects materials, called lipids, that are known to change in MND. Investigators will use a highly sensitive detection method to assess the levels of specific lipid metabolites in serum and plasma of both preclinical MND models and MND patients. The research team aims to validate that their panel of blood-based lipid biomarkers can accurately diagnose MND in people and, in preclinical models, test the prognostic ability of the blood-based lipid biomarkers. The investigators will also examine if the lipid biomarkers can measure the effectiveness of drugs used to treat MND.

OBJECTIVES

- Validate if blood-based lipid biomarkers correlate with distinct phenotypes in MND.
- Determine the response of lipid biomarkers to MND onset and progression in preclinical models.
- Test if lipid biomarkers can detect the effectiveness of MND treatments at a biochemical and molecular level.

OUTCOMES

- New lipid biological markers that detect MND, accurately predict the speed of disease progression, and quickly assess the effectiveness of potential treatments for MND patients during clinical trials.