PhD Project 1, 2023: Biomarkers of personalised therapy for multiple sclerosis

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Project background: Multiple sclerosis (MS) is the second most common cause of disability in young adults. The focus of multiple sclerosis management lies in preventing episodic inflammation and relapse-related disability accrual.

Prevention of disability in patients with multiple sclerosis has been suboptimal. The most effective of the available immunotherapies mitigate the short-term risk of disability progression by 30-42%. This imperfect result is mainly attributed to the large inter-individual variability in the clinical MS phenotype and the treatment response. From the patients' perspective, the time while exposed to MS disease modifying therapies with a suboptimal individual effect translates into ongoing loss of capacity.

We have recently shown that demographic, clinical and paraclinical information helps predict individual response to disease modifying therapies (Kalincik et al., Brain 2017, 140:2426). We have designed a prototype of predictive algorithm to help inform selection of therapies for individual patients in clinical practice.

Aim: This PhD project will further develop the prototype predictive algorithm (Crystal Ball 2.0) to improve the accuracy of our ability to predict individual response to MS therapies. It is built upon a composite cohort recruited across 7 collaborating sites in Australia, Sweden, Switzerland and the Czech Republic. The improved algorithm will incorporate promising biomarkers, such as neurofilament light chain, serum vitamin D concentration and volumetric MRI.

Impact: In completing this research, the PhD candidate will contribute to the evidence-based clinical management of MS. The results will be presented in scientific journals and at national and international conferences.

Availability: This PhD project is suitable for students with interest in statistics and research of treatment effectiveness. During the project, you will improve your statistical skills, learning some of the more complex statistical techniques. Knowledge of elementary statistics is a requisite. The offer of the project is conditional on a successful application for a University of Melbourne scholarship.