Popular science abstract

“Mapping disability in myelin oligodendrocyte glycoprotein-antibody disease using advanced neuroimaging”

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Myelin oligodendrocyte glycoprotein (MOG)-antibody disease (MOGAD) is a newly recognized autoimmune inflammatory disease of the brain, spinal cord and the optic nerve caused by antibodies directed against the MOG peptide present on myelin sheaths. While initial prevalence was estimated at 2.5/100,000, MOGAD has been increasingly diagnosed in the last few years in both children and adults thanks to the advancements in antibody detection and the publication of first diagnostic criteria in 2023. MOGAD occurs with similar frequency in males and females, regardless of the ethnicity, and typically presents with severe attacks of inflammation to the nervous system causing loss of vision, weakness, loss of sensation, altered mental state or inability to pass urine. While the response to early anti-inflammatory treatment is often beneficial, many patients are left with long-term problems related to vision, sensation, bladder, bowel and sexual function. Due to the recent recognition of MOGAD as a separate disease the underlying cause of disability in MOGAD is not yet fully understood. For example, it is unclear whether bladder symptoms result from lesion to the conus terminalis, which is the lowest part of the spinal cord including centers for passing urine, or from the lesion located above the conus affecting nerve tracts controlling these centers. It is also unclear whether disability results only from the local damage during the acute disease attack because the recovery is incomplete or is a consequence of a more extensive process spreading along the nerves or from one nerve fibre to another through a synaptic junction. Finally it is not known whether disability in MOGAD patients may progress in patients who appear to be clinically stable and do not have new attacks of inflammation. We are planning a research study that will help fill in these knowledge gaps about MOGAD. We will include 45 patients with MOGAD and 30 healthy controls matched according to age and sex, who will be studied at the project start and then after 24 months with dedicated disability questionnaires related to bladder, bowel and sexual function and with high-detail 3-Tesla magnetic resonance imaging (MRI) of the brain and the spinal cord. We will also use some information related to disease course and the vision from patient’s clinical files. Using advanced imaging methods which are currently not in clinical use we will be able to measure the density of nerve fibres and myelin sheaths in different parts of the brain and the spinal cord to study in detail the real consequences of MOGAD for the patients’ nervous system. In particular we want to know (1) whether MOGAD patients who had attacks of inflammation in the optic nerve also lose their nerve fibers further in the visual pathway in the brain and in the visual cortex, (2) those who had attack in the spinal cord with weakness and loss of sensation in the arms and legs do they also have changes which spread to the brain and to the parts of the cortex responsible for movements or sensations (3) which parts of the spinal cord and the brain responsible for bladder, bowel control and sexual function are damaged in MOGAD patients who have problems with these functions, (4) do we see progressive loss of neurons or myelin in MOGAD patients who are stable and do not have new disease attacks. We believe that answering these questions is extremely important as it can help us identify MRI parameters that correlate best with patients’ problems, such as lack of bladder control, and therefore could be used in the near future in clinical trials with new drugs repairing damaged nervous system in MOGAD patients. We will also learn what type of treatment strategy would be most suitable for MOGAD patients – only limited to when the disease is active or also supporting the later stages of the disease to block a more progressive element. We therefore hope to inspire approaches that will help maximise recovery in this often devastating and increasingly diagnosed disease.