Lay Summary

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Leveraging Human Cell Atlas technologies to shed light on the immune aetiology of chronic inflammatory demyelinating polyradiculoneuropathy

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Chronic inflammatory demyelinating polyradiculoneuropathy (CIDP) is a rare neurological condition characterised by inflammation of the patient's peripheral nerves (nerves that lie outside the brain and spinal cord) and destruction of their protective covering (myelin). The number of new cases per year of CIDP is 1-10 per 100,000 people – but this is likely to be an underestimate, due to difficulties in diagnosing the condition. CIDP is an autoimmune disease. That is, it is caused by the person's own immune system mistakenly attacking their own myelin and peripheral nerves. Why this should happen, and what types of immune cells drive the disease is not known. General immunosuppressive drugs are used to treat CIDP, but these come with side-effects and are often ineffective. Therefore, there is an unmet clinical need to understand the disease better and develop more targeted and effective treatments. To date, basic laboratory work on understanding the immunology of CIDP has been limited, and typically looks at small aspects of the immune system based on a prior hypothesis. Here, we will use state-of-the-art Human Cell Atlas technologies to provide a highly detailed view of the healthy and diseased nerve in one "snap-shot".

Specifically, we will unveil the expression of genes in individual cells located in specific areas of the nerve tissue, and how they are altered in CIDP. We will characterise the activation states of these cells (whether they are switched on) and how they are communicating with their neighbours. In the longer term, this information will enable us to identify new, disease specific targets for therapeutic intervention.