Multiple sclerosis brain atlas could pave way for personalized treatments

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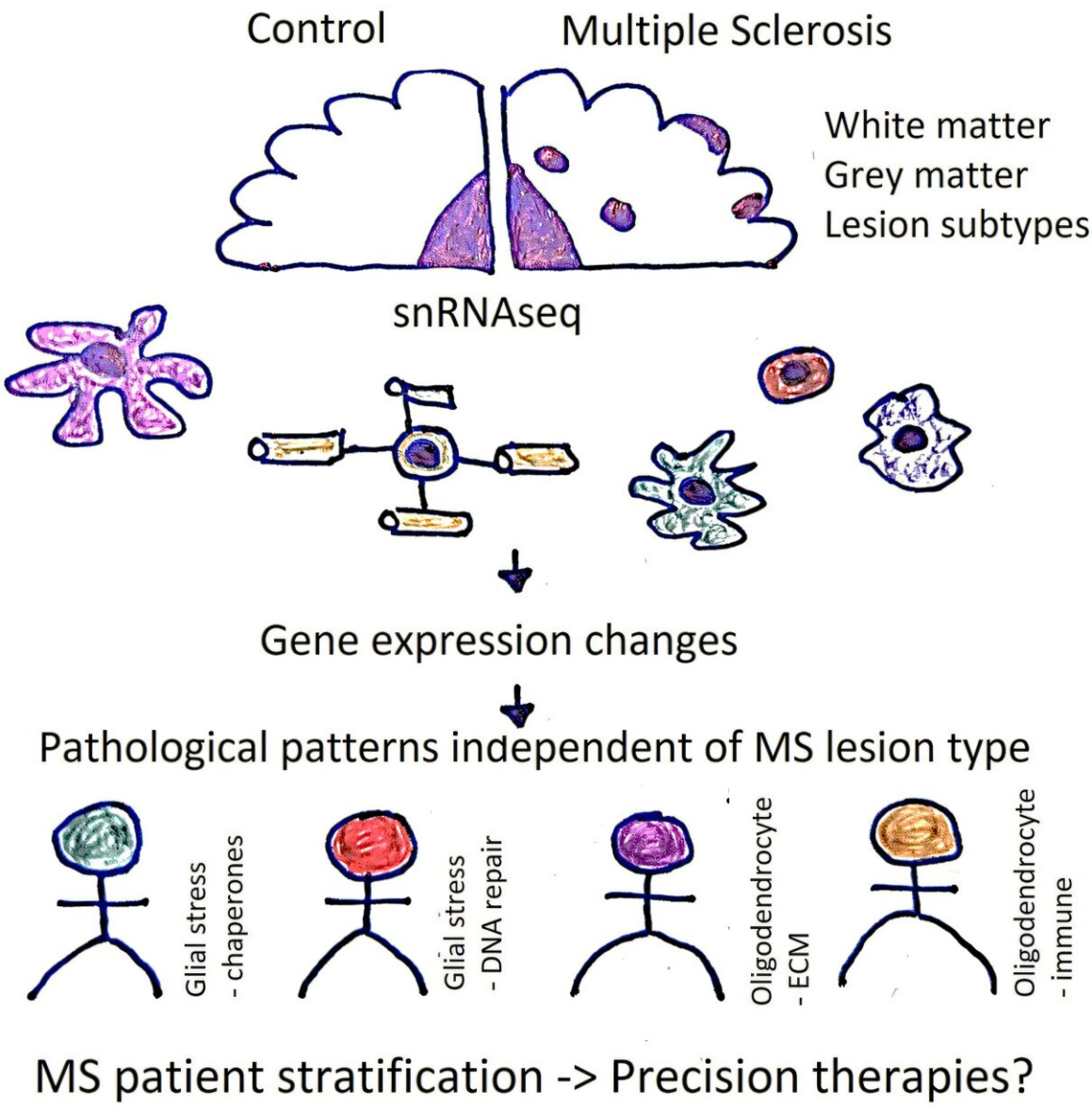

Graphical abstract. Credit: *Neuron* (2024). DOI: 10.1016/j.neuron.2024.11.016

An international research team, including researchers at Karolinska Institutet, has mapped the genes expressed in the brain cells of people with multiple sclerosis (MS). The atlas, which is presented in the journal *Neuron*, is hoped to contribute to more personalized treatment of MS in the future.

MS is a chronic inflammatory disease that affects the brain and spinal cord and usually affects people in their 30s and 40s. Symptoms vary, and some people have much more disability than others.

Currently, MS treatments target immune cells in the blood, stopping them from reaching the brain and causing damage. These are very effective in the early phase of MS. But to help treat patients when their MS is more progressive, researchers need to find treatments that act on the brain cells themselves.

However, there is limited understanding of how brain cells are affected in people with MS over their lives or why there is a huge diversity in how the condition affects people.

Now, an international research team including researchers at KI, Edinburgh University and Hoffmann-La Roche in Basel, among other institutions, has created an "atlas of MS brain cells" at an individual cell resolution, by examining the largest ever number of brains from deceased people with MS, comprising more than half a million brain cells.

Four groups with different brain cell profiles

Using information on which genes are expressed in the brain cells of people with MS, the researchers were able to categorize them into four groups with different brain cell profiles.

"Since each patient group presented different signatures regarding the genes that are active in cells in the brain, they might respond to treatments differently, which highlights the need for more personalized treatment of MS," says Gonçalo Castelo-Branco, professor at the Department of Medical Biochemistry and Biophysics, Karolinska Institutet and one of the main authors of the paper.

So far, researchers have observed these subgroups using post-mortem brain tissue.

"To help treat MS, we need to work out how to group people with MS using blood tests," says Anna Williams, professor at the University of Edinburgh who led the study. "We could then design clinical trials specifically for these subgroups, which could help us get the right drugs to the right people."

More information: snRNAseq stratifies multiple sclerosis patients into distinct white matter glial responses, *Neuron* (2024). DOI: 10.1016/j.neuron.2024.11.016. www.cell.com/neuron/fulltext/S0896-6273(24)00873-0

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