Nerve cell findings may aid understanding of movement disorders

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The findings relate to a type of cell connection that allows electrical and chemical messages to flow from nerve to muscle cells, enabling motion.

The results shed light into conditions where these connections break down, such as motor neurone disease, which can lead to severe problems with walking and reflexes.

Researchers used cutting-edge imaging to study 3000 of these cell connections - known as neuromuscular junctions (NMJ) - from tissue gifted by 20 donors undergoing unrelated leg surgery.

The study revealed details of the anatomy of human NMJs that had not been seen before.

It highlighted differences in the structure and make up of human NMJs compared with those of mice and rats, which are routinely used in studying neuromuscular diseases.

Surprisingly, human NMJs were much smaller and frailer than those found in other mammals.

The research team - led by the University of Edinburgh - also found that age had no effect on the health of NMJs. This finding could help doctors understand disease-related changes in the nervous system that affect older adults.

Tom Gillingwater, Professor of Anatomy at the University of Edinburgh's Centre for Discovery Brain Sciences, who co-led the study, said: "Together our findings provide unique insights into the structure of the human nervous system, identifying features that set us apart from other mammals.

"Our next steps will be to use these vital insights to understand how the NMJ breaks down in human patients with neuromuscular conditions such as motor neurone disease."

Christian Soeller, Professor of Physical Cell Biology at the University of Exeter's Physics department and Living Systems Institute, who co-led the study, said: "The age-old adage of 'seeing is believing' is particularly fitting for this study. The human nerve connections that we saw - using new microscopy methods crucial for this study - were very different from what was previously thought."

More information: Ross A. Jones et al, Cellular and Molecular Anatomy of the Human Neuromuscular Junction, *Cell Reports* (2017). DOI: 10.1016/j.celrep.2017.11.008

Provided by University of Edinburgh

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