

Scientists discover a new set of cells that control the blood-brain barrier

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Astrocytes transfer mitochondria and alleviate oxidative stress of endothelial cells. Credit: *Science Advances* (2024). DOI: 10.1126/sciadv.adk2913

Researchers at the Perron Institute and The University of Western Australia have discovered a new set of cells that can protect blood vessel



structure in the central nervous system (CNS) known as the blood-brain barrier. Their findings have been <u>published</u> in the journal *Science Advances*.

"We identified a new set of astrocytes (type of brain cells) that can control the integrity of the blood-brain barrier," said one of the senior first authors, Professor Minghao Zheng, head of Brain and Bone Axis Research at the Perron Institute and UWA.

"The blood-brain barrier is a network of blood vessels that supplies <u>essential nutrients</u> to the brain and protects it from circulating toxins and pathogens. With age, or in brain disorders, the function of the blood-brain barrier is reduced.

"This newly discovered subset of astrocytes expressed a protein found in <u>bone tissue</u> called dentin matrix protein 1 (DMP-1).

"These cells generate 'endfeet' and transfer mitochondria (energy generating cells) to <u>endothelial cells</u> which line the blood vessels of the CNS.



Representative TEM image shows the perivascular mitochondria (yellow) of astrocytes outside the endothelial plasma membrane and the mitochondria (yellow) within capillary. Credit: *Science Advances* (2024). DOI:



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"Reduction in the function of these astrocytes inhibited mitochondrial transfer and caused leakage of the blood-brain barrier. Mitochondrial transfer from astrocytes to blood vessel cells was identified as crucial to the maintenance of the blood-brain barrier.

"Our findings give new insights into the cellular framework that underpins the breakdown of the <u>blood-brain barrier</u> that occurs in aging and disease, and provide a target for the development of treatment regimes."

More information: Delin Liu et al, Regulation of blood-brain barrier integrity by Dmp1 -expressing astrocytes through mitochondrial transfer, *Science Advances* (2024). DOI: 10.1126/sciadv.adk2913

Provided by University of Western Australia

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