Dual roles of astrocytes in plasticity and reconstruction after traumatic brain injury

Yunxiang Zhou
Anwen Shao
Yihan Yao
Sheng Tu
Yongchuan Deng
Jianmin Zhang

Video Byte

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Abstract

Traumatic brain injury (TBI) is a leading cause of fatality and disability worldwide. Despite immense clinical efforts, treatments for TBI remain limited, and better understanding is needed. While most treatments have targeted neuronal cells, another cell type may also have an important role in TBI. Astrocytes, a subtype of brain-resident glial cells, help to control blood flow and maintain homeostasis in the central nervous system. These important cells have dual roles after TBI which must be better understood to improve treatment. During TBI, mechanical damage to neurons and blood vessels occurs instantly. This is followed by pathological processes - neuroinflammation and cell stress - mediated by astrocytes, among others. The astrocyte response is initiated to protect the central nervous system and promote wound healing but may become maladaptive over time as astrocytes can play bidirectional roles in plasticity and reconstruction after TBI. Understanding this dual role will allow scientists to better target the neuroprotective effects of astrocytes, helping to design targeted therapies to treat traumatic brain injury.