

# Neuronal injury

Neuronal activity is closely associated with [energy metabolism](#). In addition to [glucose](#), astrocyte-derived [lactate](#) serves as an energy source for [neurons](#). Chronic [inflammation](#) is a common pathological event that is associated with aging and [neurodegenerative diseases](#). However, the mechanisms underlying [inflammation](#)-induced [neuronal injury](#) are not fully understood. Both [microglia](#) and [astrocytes](#) participate in the regulation of [neuronal functions](#); therefore, Wang et al. used [astrocyte-neuron co-cultures](#) to investigate the effects of chronic microglial activation on neuronal [lactate metabolism](#). Chronic low-grade [inflammation](#) was induced by repeated stimulation of primary rat [microglia](#) with low-dose [lipopolysaccharide](#) (LPS, 10 ng/mL). The medium from the LPS-activated microglia was collected and used to mimic the inflammatory environment in primary cultures. In monocultures exposed to an inflammatory environment, intracellular [lactate](#) decreased in neurons but increased in astrocytes. However, astrocyte-neuron co-cultures exhibited increased lactate levels in neurons and decreased lactate levels in astrocytes when exposed to an inflammatory environment. Inhibition of lactate transporters expressed on neurons or astrocytes reduced the intracellular lactate in co-cultured neurons exposed to inflammation, but not in those exposed to physiological conditions. [Adenosine triphosphate](#) (ATP) production was reduced in both mono-cultured and co-cultured neurons. These results indicate that a chronic inflammatory environment increases neuronal lactate supply by promoting the astrocyte-neuron lactate shuttle, but it impairs lactate oxidation in neurons. Additionally, chronic inflammation disrupts the neuronal [cytoskeleton](#). This study highlights the importance of [glial](#) cells in regulating neuroenergetics and neuronal function and provides a comprehensive explanation for the neurotoxic effects of [neuroinflammation](#) <sup>1)</sup>.

<sup>1)</sup>

Wang Y, Li J, Wang MY, Pan ZY, Li ZQ, Wang ZF. Chronic [microglial](#) inflammation promotes neuronal [lactate](#) supply but impairs its utilization in primary rat astrocyte-neuron co-cultures. *Biochem Biophys Res Commun*. 2022 Mar 26;607:28-35. doi: 10.1016/j.bbrc.2022.03.122. Epub ahead of print. PMID: 35366540.

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