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Poster Presentation

Astrocyte Dysfunction in Epilepsy

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Abstract

Introduction: Astrocytes play a pivotal role in epilepsy because of their malfunction in abnormal network excitability. Reactive astrocytes boost chemical signaling and interrupt equilibrium between water and potassium, which together increase local synchrony in microcircuits of hippocampus. Astrocytes play an important role in the processing of neural data and astrocyte processes enwrap the synapses to modulate neural activity by controlling neurotransmitter levels. neural activity is associated with rapid changes in the extracellular potassium concentration. Seizure activity results in increased concentrations of potassium out of the cell. The reduction of Kir channel expression in astrocytes was observed in human and experimental epilepsy. Reduced expression of EAAT1, EAAT2 transfer channels in the astrocytes of the human epileptic hippocampus has been reported. these channels control glutamate transferring and increasing the extracellular glutamate reduces the seizure threshold. Another factor that probably contributes to the increase in extracellular potassium concentration is astrocyte gap junction. Glutamate is converted to glutamine via glutamine synthase. In chronic epileptic hippocampus; reducing the activity of this enzyme reduces the secretion of glutamine, which leads to a decrease in the gamma-aminobutyric acid (GABA) in the interneurons and hyperactivity. AQP4 along with Kir channel in astrocytes also contribute to the regulation of extracellular potassium. It has been suggested that in mesial temporal lobe epilepsy, displacement of AQP4 channels along with decreasing the expression of kir channels in astrocytes may interfere with the regulation of extracellular potassium concentration and increase the tendency to seizure. It has been suggested that in mesial temporal lobe epilepsy, displacement of AQP4 channels along with decreasing the expression of kir channels in astrocytes may interfere with the regulation of extracellular potassium concentration and increase the tendency to seizure. According to what was said, disturbance in astrocyte causes hyperexcitation, neurotoxicity and the development or spread of seizure activity. **Conclusion:** Due to the central role of astrocytes in regulating normal brain function, the causative agent of epilepsy can be attributed to astrocyte dysfunction. Also, new findings suggest that astrocytes can be considered as a therapeutic goal for epilepsy.

Keywords: Astrocyte, Epilepsy, Aquaporin, Channel.

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