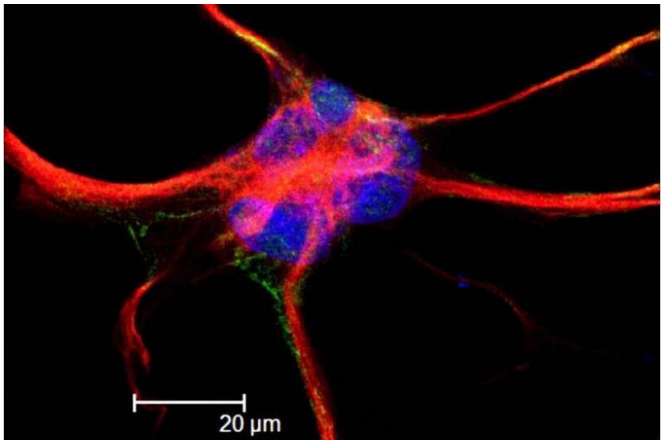
Astrocytes and epilepsy

16 September 2019, by Leigh MacMillan



This is an astrocyte, labeled with GFAP (red), Focal Adhesion Kinase (FAK) green, and nuclear stain To-Pro (blue). Credit: Nathan S. Ivey at TNPRC. Via Wikipedia.

The neurodevelopmental disorder Tuberous Sclerosis Complex (TSC) is characterized by often severe epilepsy, along with autism and psychiatric disorders. Astrocytes—star-shaped glial cells that serve multiple functions in the brain—are suspected to play a role in TSC.

Robert Carson, MD, Ph.D., and colleagues proposed that the water channel aquaporin-4 (AQP4), which is important to the functions of astrocytes, contributes to TSC disease pathology.

Reporting in *Neurobiology of Disease*, they found increased expression of AQP4 in cortical brain tissue removed from TSC patients during epilepsy surgery. Using mouse models and cultured astrocytes, they demonstrated that inactivation of the genes Tsc1 or Tsc2 (mutations in these genes cause TSC) resulted in increased AQP4 expression.

Increased AQP4 expression has been previously reported in temporal lobe epilepsy, supporting a broader role for this protein in astrocyte dysfunction that leads to seizure activity. AQP4 may represent a novel therapeutic target for the treatment of epilepsy in TSC and perhaps other seizure disorders.

More information: Brittany Short et al. Cerebral aquaporin-4 expression is independent of seizures in tuberous sclerosis complex, *Neurobiology of Disease* (2019). DOI: 10.1016/j.nbd.2019.05.003

Provided by Vanderbilt University