

Harnessing Astrogliosis: A Neuroprotective Strategy Against Excitotoxic Damage

Yi-Hsuan Lee

Department and Institute of Physiology, College of Medicine,
National Yang Ming Chiao Tung University (NYCU).

Astrocytes, the glial cells that envelop neurons and the neurovasculature, play a pivotal role in maintaining the dynamic balance of neuronal circuit activity and cerebral blood flow. Upon injury, astrocytes become reactive—marked by elevated GFAP expression—and often adopt detrimental features, including proinflammatory signaling and reduced expression of key functional proteins such as glutamate transporters, Kir4.1, and aquaporin-4. Preserving or restoring these proteins in reactive astrocytes has emerged as a promising neuroprotective strategy. Experimental approaches that integrate both in vitro and in vivo brain injury models have provided valuable insights into astrocyte-mediated neuroprotection. In this lecture, we will explore two candidate neuroprotective interventions—lipid mediator epoxyeicosatrienoic acids (EETs) and the aryl hydrocarbon receptor inhibition—highlighting their mechanisms of action in promoting astrocyte-dependent neuroprotection.