

Public Abstract

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Title:THE ROLE OF CYTOSOLIC PHOSPHOLIPASE A2 IN MICROGLIAL SIGNALING PATHWAYS DURING NEUROINFLAMMATION

Cellular stress responses play an important role in neurodegenerative diseases, such as Alzheimer's disease, Parkinson's disease, stroke, traumatic brain injury, and infections. Unfortunately, many of these diseases have no cure to this date. Microglia are one of the major cell types in the brain, and normally act as the first line of defense against invading bacteria in the brain tissues. Activated microglia can release a wide array of harmful factors, and further propagate the disease process and lead to the undesirable death of brain cells. Elucidation of the mechanism for microglial activation may help us identify new targets to intervene against neurodegenerative and neuroinflammatory diseases.

Cytosolic phospholipase A2 (cPLA2) is the major protein responsible for the production of arachidonic acid, an important lipid mediator in inflammation. Arachidonic acid can be converted to prostaglandins, prostacyclin and thromboxane which are involved in inflammatory activity. Commercially, well-known medications that target this process include aspirin and non-steroidal anti-inflammatory drugs, such as ibuprofen. Our study showed that cPLA2 plays an important role in mediating the cellular stress response, and that this process appears to involve another set of proteins named the lipoxygenase, instead of the cyclooxygenases as seen in immune cells in other parts of the body.

Plants form the basis of traditional medicine in different cultures throughout the history of human civilization. Recent incorporation of modern research methods to traditional medicinal investigation has shed light on the mechanism of action for many herbal products. Many medicinal plants and extracted compounds have been shown to ameliorate neurological conditions. In an experimental stroke model, mice were fed with diets supplemented with elderberry or Sutherlandia extracts for two months. In agreement with the neuroprotective effects of these botanicals seen in cell studies, mice fed with either elderberry or Sutherlandia diet showed improvement in motor impairments, fewer dead brain cells, and fewer activated microglial cells.