Inflammation is associated with an increased expression of cyclooxygenases (COX) and elevated levels of prostaglandins. Inflammation has been implicated in a variety of acute as well as chronic neurologic and neurodegenerative disorders. Neuroinflammation is mediated by microglial activation and subsequent release of pro-inflammatory mediators such as prostaglandins, cytokines and reactive oxygen species, establishing a status of oxidative stress. Arachidonic acid derivatives such as prostaglandins play an important role in the inflammatory response mediated by COX. The existence of two different COX isozymes, COX-1 and COX-2, has been now well established. COX-1 is constitutively and ubiquitously expressed, whereas COX-2 is constitutively expressed to a limited extent only in certain cells, including neurons in the brain. Inflammatory pathways involving the COX enzymes and subsequent generation of prostaglandins are the potential target sites for treatment of neuroinflammatory conditions. Both COX-1 and COX-2 have been shown to play important role in the inflammatory response. However, the exact role and preference of COX isoform in neuroinflammation is unclear. With this background the aim of the present study is to explore the effect of selective / non selective COX inhibitors in preventing the neuroinflammation induced by LPS.
Peripheral injection of the bacterial endotoxin component lipopolysaccharide (LPS) that models systemic infection has been widely used to induce neuroinflammation. LPS activates Toll-like receptor 4 (TLR-4) in the circumventricular organs and results in NFKappaB-dependent induction of proinflammatory mediators. These inflammatory mediators, in turn, appear central in driving behavioral modifications, as in the case of the behavioral responses to LPS, known as sickness behavior, which is the acute consequence of cytokine elevation. Such behaviors include a reduction in activity and exploration, decreased social interaction, fever, a reduction in consumption of food and drink, hypersomnia, activation of the hypothalamic–pituitary–adrenal axis. A single LPS administration results in delayed loss of neurons and cholinergic innervations, leading to enduring behavioral alterations characterized by memory deficits and changes in exploratory patterns and central neurotransmitter release.

The effect of COX inhibitors has preferential activity. Among the three drugs studied the non-selective COX inhibitor was found to have significant neuroprotective role than selective COX-2 though COX-2 inhibitors have been indicated as anti inflammatory drug. The resveratrol selective COX-1 was found to be the best in controlling oxidative stress. COX inhibitors had differential effect in controlling neuroinflammation and among the studied drugs aspirin was found to be a better medicine in controlling neuroinflammation induced by peripheral administration of LPS.