Though the cause of Parkinson’s disease (PD) remains unknown, many suspect its etiology includes both genetic mutations and exposures to environmental factors (e.g., microbial infections, heavy metals, pesticides, air pollution). This work attempted to understand the immunological roles of astrocytes and microglia, two brain cell types with innate immune properties, when exposed to the Gram-negative bacterial endotoxin lipopolysaccharide (LPS) in a mouse model of PD. This study found the immunoreactivity of astrocytes to LPS was attributed to the presence of microglia in ‘enriched’ astrocyte cultures. Reconstituting microglia back into a novel highly-enriched astrocyte culture (with <0.001% microglia) showed less than 0.5-1% microglia can account for the erroneous detection of proinflammatory factors by LPS-treated ‘enriched’ astrocytes. LPS was found to activate astrocytes via TNF-α produced by microglia, stimulating cytotoxic and neurotrophic factors release. Nonetheless, activated astrocytes protected neurons from microglial-derived bystander damage in this neuroinflammation-induced model of PD.

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