neuroglia

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Debris Clearance by Microglia in Health and Disease

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Message from the Guest Editors

Microglia are the brain's primary phagocytes. As such, a core function of microglia in maintaining tissue homeostasis, regulating inflammation and promoting regeneration involves the phagocytic clearance of apoptotic cells, cellular debris, myelin and protein aggregates. This clearance function is amplified in development, brain injury, aging and neurodegenerative diseases, including Alzheimer's, Parkinson's, Huntington's disease, amyotrophic lateral sclerosis, multiple sclerosis, frontotemporal dementia and Pick's disease. Furthermore, it can protect the brain from debris accumulation. The clearance potential of microglia declines with aging, and an insufficient clearance of microglia is thought to contribute to the pathology of several neurodegenerative diseases, most notably Alzheimer's disease. Microglial phagocytic clearance can also go awry during disease and aberrantly remove healthy neurons and synapses, exacerbating neurodegeneration. Therefore, elucidating the molecular mechanisms underlying microglial phagocytosis is critical in furthering our understanding of brain development, aging and diseases.