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**Abstract (146 words/limit 150 words)**

White matter damage is an important part of cerebrovascular disease and may be a significant contributing factor in vascular mechanisms of cognitive dysfunction and dementia. It is well accepted that white matter homeostasis involves multifactorial interactions between all cells in the axon-glia-vascular unit. But more recently, it has been proposed that beyond cell-cell signaling within the brain per se, dynamic crosstalk between brain and systemic responses such as circulating immune cells and stem/progenitor cells may also be important. In this review, we explore the hypothesis that peripheral cells contribute to damage and repair after white matter damage. Depending on timing, phenotype and context, monocyte/macrophage can possess both detrimental and beneficial effects on oligodendrogenesis and white matter remodeling. Endothelial progenitor cells (EPCs) can be activated after CNS injury and the response may also influence white matter repair process. These emerging findings support the hypothesis that peripheral-derived cells can be both detrimental or beneficial in white matter pathology in cerebrovascular disease.

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