Ischemic oligodendrocyte death



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Oligodendrocyte (OL) is a myelin-forming glia in central nervous system. Besides its role in producing compact myelin and thereby facilitating axonal conduction, OL plays an important role in maintaining metabolic homeostasis in the white matter. Furthermore, there is mounting evidence that proliferation and differentiation of OL lineage cells in mature CNS greatly contribute to so called "white matter plasticity", activity-dependent changes in the extent and thickness of myelin sheath. Therefore, degeneration of OLs in the white matter would entail a variety of grave consequences in brain functions. Degeneration of OLs frequently occurs in white matter strokes encompassing lacunes, leukoaraiosis, and Binswanger's subcortical ischemic arteriopathy. Unlike abrupt infarctions due to occlusion of major arteries, these subcortical ischemic injuries slowly aggravate owing to modest but chronic reduction of cerebral blood flow, potentially providing a wide therapeutic window. However, it remains to be studied on why chronic ischemia leads to degeneration of OLs and how ischemic OL death can be prevented. This lecture will summarize recent research efforts on ischemic OL degeneration in the context of white matter stroke and propose future directions to develop novel therapeutic opportunities to halt ischemic OL death and resultant demyelination in white matter stroke.