UNIQUE PATHOPHYSIOLOGY OF THE OPTIC NERVEHEAD: RELEVANCE TO GLAUCOMA

This presentation highlights the unique structural andfunctional biology that constitutes the mammalianoptic nerve head. Multifactorial processes contributeto the pathogenesis of glaucoma, with a major recentemphasis on the role of astrocytes and the bloodvessels of the ONH. The challenge confronting the fieldis to understand the changes in the functional capabil-ities of astrocytes and pericytes with ageing and howthis relates to glaucoma pathology. Our earlier studiesinvestigated changes in astrocyte density, morphology,proliferation and apoptosis occurring in the retinaduring ‘physiological aging’. The density and totalnumber of parenchymal astrocytes in the retinaincreased between 3 and 9 months of age butdecreased markedly between 9 and 12 months in rats.Proliferation of astrocytes was detected at 3 monthsbut virtually ceased beyond that age, whereas the pro-portion of astrocytes that were apoptotic increasedprogressively with aging. In addition, in aged retinasastrocytes exhibited gliosis-like morphology and loss ofPax2 reactivity. A small population of Pax2+/GFAP?cells was detected in both young adult and agedretinas. Pericyte-endothelial ratio is also significantlyreduced in aging, likely affecting blood flow regulation.Taken together, the reduction in the availability ofastrocytes and pericytes in aged retinas may have a significant impact on the ability of supporting cells inthe region of the optic nerve head to maintain homeo-stasis and support neuronal function in old age. Wewill also detail our current studies of the changes inpericytes, astrocytes and blood vessels of the humanONH during ‘physiological aging’.