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EYE-TO-VISUAL-PATHWAY INTEGRITY OF GLAUCOMATOUS NEURODEGENERATION

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Glaucoma represents a group of neurodegenerative diseases characterized by structural damage to the optic nerve and the slow, progressive death of retinal ganglion cells. On the other hand, impacts of glaucoma on the optic nerve (ON), corpus geniculatum laterale (CGL) and visual cortex became increasingly evident. Initial studies conducted with conventional magnetic resonance imaging (MRI) and occipital proton MR spectroscopy. The techniques that the first functional and structural findings have been obtained are functional MRI (fMRI) and diffusion-tensor MRI (DTI), respectively. fMRI detects increased neuronal activity via changes in blood oxygenation, DTI is based on the movement principle of fluids in a plane connected to the nerve. In consecutive studies from 2006 to 2014, we aimed to evaluate the structural and functional extent of glaucomatous neurodegeneration in an attempt to develop techniques feasible for routine clinical application. In previous studies, we observed statistically significant correlation of glaucomatous neurodegeneration between eye and visual pathways with our original techniques developed with 1,5T MRI. ON, CGL damage and cortical hypofunction were shown with DTI and fMRI, respectively. Our last cross-sectional DTI study, which is yet to be published, included 130 eyes with glaucoma. Statistically significant correlations were found between ganglion cell complex and apparent diffusion coefficient, λ1, λ of optic nerves. Strategies independent from IOP, concerning the area beyond the optic nerve head, are needed in the evaluation and treatment of glaucoma. As our studies showed, clinical instruments that are largely in use are also adequate for clinical trials to reveal the glaucoma-brain connection; however, more sophisticated techniques are being developed to illuminate that relation further. A more comprehensive understanding of retrobulbar glaucomatous damage will enable us to determine more efficient diagnosis, follow-up and treatment strategies and facilitate to answer important questions which remain unknown about this disease.

BIOGRAPHY

Engin K N is an Ophthalmologist and PhD holder in Biochemistry. He has a strong focus on optic nerve and his areas of interest are glaucomatous neurodegeneration, oxidative stress, neuroprotection and vitamin E. Currently, his review article Alpha Tocopherol: Looking beyond an antioxidant has been cited over 90 times. Along with other academic activities, he is author of 39 publications, seven special lectures, more than 70 presentations, and he received six awards. He is Member of ARVO, EVER, Society of Free Radicals and Antioxidants Research (Turkey). Since 2005, he has been serving as an active Member of glaucoma division of Turkish Ophthalmology Society.

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