Optic nerve and macula morphology in patients with Parkinson's disease using optical coherence tomography

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Purpose: To investigate optic nerve and macular morphology in patients with Parkinson's disease (PD) using spectral-domain optical coherence tomography (SD-OCT). Methods: 25 participants with PD (19-males and 6-females; mean age 60.79; SD ± 9.24) and 25 gender-, age-, ethnicity- and refraction-matched healthy controls where enrolled in a prospective, cross-sectional, observational study. High-resolution SD OCT (Copernicus, 3µm resolution) was used to acquire scans centred on the optic disc and fovea. Main outcome measures: Optic nerve head parameters (disc/cup diameters/areas, cup/rim volumes, cup depth, cup/disc ratio; peripapillary retinal nerve fibre layer (ppRNFL) thickness, retinal thickness and thickness of individual retinal layers. Results: Our study showed significant ppRNFL thinning in PD patients in all quadrants (p0.05) associated with a shallower optic cup (p=0.03) as compared to healthy controls. Foveal remodelling with retinal thinning (nasal and temporal segments in both annuli; and superior segment in outer annulus; p0.05), foveal pit widening (p=0.05), central OPL thickening (p0.001) and nasal RPE thinning (p0.001) was also found in PD. Changes were more pronounced in advanced stages of PD and with longer diseases duration. Conclusions: Optic nerve changes in PD are likely to be caused by primary neurodegeneration and are different to ON changes described in glaucoma. Central retinal thinning, pit widening, central OPL thickening and RPE thinning indicate that remodelling of the fovea occurs. Specific changes of the fovea and thinning of individual retinal layers, correlating with disease severity and duration indicate that ON and retinal changes have potential to be used as biomarkers for PD.