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Asymmetrical Fundus Autofluorescence Findings in Parkinson's

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Introduction- Motor asymmetry is one of the criteria for the diagnosis of Parkinson's disease (PD) (1). A right-sided symptom onset is usually associated with a more favorable outcome in terms of cognitive impairment while a left-sided symptom onset appears to be associated with a better outcome in terms of motor progression. PD symptoms emerge more often on the dominant hand-side (2).

The mammalian retina contains dopaminergic neurons within the inner retinal layer. Visual alterations are associated with PD and seem to be caused by dysfunction of the intraretinal dopaminergic circuits (3).

Interocular asymmetry on spectral domain optical coherence tomography (SD-OCT) of the retina and possibly nerve fiber layer has also been documented (3). As the neurosensory retina is impacted in PD, it is plausible that the earliest changes are also asymmetrical and retina screening would thus be useful and be a good marker of disease presence and progression.

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Asymmetrical Fundus Autofluorescence Findings in Parkinson's

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I. INTRODUCTION

Motor asymmetry is one of the criteria for the diagnosis of Parkinson's disease (PD) (1). A right-sided symptom onset is usually associated with a more favorable outcome in terms of cognitive impairment while a left-sided symptom onset appears to be associated with a better outcome in terms of motor progression. PD symptoms emerge more often on the dominant hand-side (2).

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Interocular asymmetry on spectral domain optical coherence tomography (SD-OCT) of the retina and possibly nerve fiber layer has also been documented (3). As the neurosensory retina is impacted in PD, it is plausible that the earliest changes are also asymmetrical and retina screening would thus be useful and be a good marker of disease presence and progression.

II. METHODS

The files of 20 PD patients diagnosed at other neurology clinics were examined. Fundus autofluorescence (FAF) images of these patients were observed by two ophthalmologists in a masked fashion. Hyper or hypofluorescent lesions which suggested neurodegeneration were taken into consideration. The mean age of the patients was 69. 16 patients were right-handed while 4 were left-handed.

III. RESULTS

In 15 patients hypo and hyperfluorescent lesions were on the nasal side of the retina. (Figures 1, 2) In 14 R-handed patients who had early PD, degenerative lesions were on the nasal side. 1 L-handed patient had changes in the temporal retina.(Figure 3) None of the R-handed patients had neurodegeneration on the temporal side. Diffuse degeneration on FAF was detected in the middle-late stages of the disease. 4 patients had this kind of distribution. The early asymmetric appearance was in parallel with the asymmetric findings in motor functions.

The possibility to detect hemi-retinal neurodegeneration in patients with unilateral motor findings was statistically significant. (P: 0,001)

IV. DISCUSSION

Since FAF detects lipofuscin in the retina, the images were consistent with retinal damage. Lipofuscin gives damage to the tissues by mechanically obstructing the flow into and out of the cells and slowing down the elimination of waste materials. Photoreceptor degeneration unmasks the autofluorescent signal of the underlying RPE and thus creates hyper-autofluorescent images. In contrast, hypo-autofluorescence arises from decreased lipofuscin or blockage by material anterior to the RPE and photoreceptors (4).

In the brain there is an important component of hemispheric lateralization over the course of PD. The motor asymmetry is associated with severe contralateral nigrostriatal degeneration (5). Some studies suggest increased "left hemisphere susceptibility," in that the left nigrostriatal pathway is more affected than the right (6). Some suggest this may be an effect of handedness, but handedness does not seem to account for this observation entirely. The etiology of this left hemisphere-predominant atrophy across the spectrum of neurodegenerative disease remains unclear, although there are several hypotheses involving genetics, lateralized vulnerability, and disease-specific factors (6).

Similar to the brain, the retina is also affected asymmetrically. FAF detected neurodegenerative changes seem to affect one side of the retina early in the disease. In our study, the nasal retina was more affected than the temporal part. The predilection of neurodegeneration for one side of the retina and the asymmetric appearance on FAF was not reported before, to the best of our knowledge. Studies with larger series may give important information about the early detection of PD by ophthalmological examination.

V. CONCLUSION

Our study suggests that imaging of the retina by FAF may reveal findings consistent with the asymmetric nature of PD.

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Figure Legends

Figure 1: Nasal retinal degeneration on FAF.

Figure 2: Nasal neurodegeneration on FAF.

Figure 3: Temporal changes on FAF.

