

# Can the OCT Replace Functional Tests Such as the mfERG?

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Patients with retinal problems are increasingly examined with morphologic measurements such as optic coherence imaging (OCT), which is quick and easy to administer. This might give the impression that more time-consuming functional assessments, such as electrophysiological examinations, are unnecessary.

However, these tests measure different things—as Dhamdhere et al.<sup>1</sup> showed in patients with diabetes. They examined 45 patients without clinically apparent retinopathy, using the multifocal ERG (mfERG) and Stratus OCT. There was no correlation between retinal thickness and either amplitude or implicit time of the mfERG, even in areas where the mfERG detected abnormal retinal function.

For neuro-ophthalmological patients, it was shown that these examinations are not interchangeable but provide additional information. Using the frequency domain OCT (fdOCT), Dale et al.<sup>2</sup> compared OCT findings to mfERG in 198 eyes from patients with a pathological result from a visual field examination that were referred by a neuro-ophthalmologist. Of these, 26% had a retinal problem based on mfERG and/or fdOCT. Of these eyes, both mfERG and OCT findings were abnormal in 48%. However, in about 38.5% of the eyes the mfERG was abnormal, but the fdOCT was normal. On the other hand, mfERG was normal with an abnormal fdOCT in 13.5%.

A drawback of these studies was that total retinal thickness was measured. Talamini et al.<sup>3</sup> studied 25 patients with abnormal mfERG and abnormal visual fields but normal appearing OCT. When the OCT was segmented further to allow analysis of different retinal layers, the sensitivity to detect retinal damage on fdOCT was increased from 0% to 60%. However, even with such a segmentation, 40% of eyes with an abnormal mfERG and abnormal visual fields still appeared normal on fdOCT.

Thus these papers are important contributions in clarifying that at present functional retinal tests such as the mfERG cannot be replaced by morphometric tests such as the OCT—or vice versa.

## References

1. Dhamdhere KP, Bearnse MA Jr, Harrison W, Barez S, Schneck ME, Adams AJ. Associations between local retinal thickness and function in early diabetes. *Invest Ophthalmol Vis Sci.* 2012;53:6122-6128.
2. Dale EA, Hood DC, Greenstein VC, Odel JG. A comparison of multifocal ERG and frequency domain OCT changes in patients with abnormalities of the retina. *Doc Ophthalmol.* 2010;120:175-186.
3. Talamini CL, Raza AS, Dale EA, Greenstein VC, Odel JG, Hood DC. Abnormal multifocal ERG findings in patients with normal-appearing retinal anatomy. *Doc Ophthalmol.* 2011;123(3):187-192.