Multimodal functional diagnosis in AMD helps recognise progression

Stefanie Petrou Binder MD in Berlin

FUNCTIONAL multimodal imaging of the macula provides a much improved visualisation of the functional macular alterations seen in non-exudative AMD, according to retinal specialist José Cunha-Vaz MD, University Coimbra Hospital, Coimbra, Portugal.

Dr Cunha-Vaz examined fellow eyes of patients with choroidal neovascularisation (CNV) secondary to age-related macular degeneration in the first eye and eyes with clinical choroidal neovascularisation. He used a variety of diagnostic tools, including ETDRS visual acuity tests, colour fundus imaging, fluorescein angiography, indocyanine green angiography, and measurements of retinal thickness (Optical Coherence Tomography + Retinal Thickness Analyzer), combined with confocal scanning laser ophthalmoscope (HRA, Heidelberg) imaging to evaluate both leakage and location of the lesions (HRA-RLA).

"The characterisation of early age-related macular degeneration phenotypes is challenging. By combining different imaging modalities of the macula and correlating the accrued information, such as changes in topography with information on leakage, we were better able to determine the presence of functional macular alterations in the fellow eye of patients with this disease," he reported at the Joint Meeting of the European Society of Ophthalmology and the German Ophthalmology Society (SOE/DOG).

Dr Cunha-Vaz determined the location and depth of topographic lesions with the use of confocal scanning microscopy. He combined this information from HRA with retinal leakage measurements to gain a much better understanding of the characterisation of the changes occurring at the level of retinal pigment epithelium and neural retina.

To determine retinal involvement he measured retinal thickness measurements using the Optical coherence Tomography (OCT), Retinal Thickness Analyzer (RTA) and mf (multifocal) ERG. Retinal leakage reflects changes in the blood-retina-barrier and is best measured using the Retinal Leakage Analyzer, he said.

Each imaging technique was instrumental in finding the pathologic retinal alterations characteristic for a certain form of the disease, he observed.

In patients showing classic CNV, the Retinal Leakage Analyzer very clearly revealed the characteristic leakage of fluid into the vitreous, associated with the area of CNV. OCT scans demonstrated changes in these classic CNV cases, corresponding to thickness changes in the retina.

Blood-retina barrier intact in occult and in-situ CNV

He diagnosed patients with RPE detachment and no signs of leakage as having occult CNV, or CNV in situ. He explained that there was no breakdown of the blood-retina barrier (BRB) in these cases and correspondingly no leakage. He noted minimal retinal involvement, mostly along the posterior pigment epithelium, with no invasion of the retinal pigment epithelium in these patients.

He used scanning laser ophthalmoscopy-RLA to show retinas with signs of disease evolution in drusen. These patients revealed no leakage at this stage, although at times there can be localised leakage, Dr Cunha-Vaz noted. He explained that mfERG imaging showed damage to the photoreceptors.

Dr Cunha-Vaz explained that deposits in Bruch's membrane and hyperpigmentation lead to drusen and RPE atrophy. Retinal atrophy can then become progressive and develop into geographic atrophy with localised BRB breakdown.

Alternatively, deposits and hyperpigmentation can also undergo a repair process that brings on the phenotypic picture of occult CNV 'in situ'. Occult CNV can subsequently undergo BRB breakdown, leading to either occult or classic CNV. The Retinal Leakage Analyzer instruments revealed the status of the BRB changes, either intact (with no leakage) or disrupted (with leakage).

Dr Cunha-Vaz said that he found that confocal scanning microscopy – HRA with Retinal Leakage Analyzer capabilities to be most useful in cases of geographical atrophy to determine topographic changes, while the retinal leakage analyzer was useful to study the BRB. He added that mfERG, RTA and OCT could be used to determine retinal involvement.

"We believe that by examining follow-up alterations and using a variety of these techniques we can have a better understanding of what happens on the retina and in the chorio-retinal interface, and decide on different treatment options," he said.

He noted that current research was concentrating on understanding the alteration in the blood-retina-barrier and leakage on the RPE level. Other studies are looking at photoreceptor function to determine how much of its function is altered and damaged before, after, or simultaneously with disease alterations. Dr Cunha-Vaz believes that studies such as these can help ophthalmologists understand more about the progression of this disease.

cunhavaz@aibili.pt

Jose Cunha-Vaz