Achieve early diagnosis of ocular pathologies such as keratitis and macular degeneration

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Enlarge

This is a double-step image for a healthy eye (left) and a pathological eye (right) for a patient with unilateral age-related macular degeneration and a pupil diameter of 3mm. The image was obtained with an optical instrument based on the double-step technique for evaluating optical quality. A more widespread screening for the pathological eye can be seen due to a higher level of scattering as a consequence of the reflection of light in the damaged retina of this eye. Credit: University of Granada

Researchers from the University of Granada, Spain, have provided an early diagnosis of certain ocular diseases that are very common today, such as age-related macular degeneration and keratitis, by applying an existing optical technique that, nevertheless, had never before been used for this purpose.

Scientists from the UGR have studied the image quality in subjects affected by one of these two pathologies, finding a greater amount of ocular aberrations and a higher level of scattering (term associated with the dispersion that light suffers when passing through the various ocular media) in affected eyes compared with results in healthy eyes. This significantly affects visual performance.

This work has been performed by the researcher Carolina Herrera Ortiz, from the Optics Department at the University of Granada, and directed by professors José Ramón Jiménez Cuesta and Francisco Pérez Ocón.

Age-related macular degeneration (ARMD) is the leading cause of central vision loss in developed countries, and mainly affects people of over 50 years of age. As far as keratitis is concerned, this condition causes inflammation of the cornea and can cause blindness, due to the severe alterations that the corneal surface may suffer.

Optical instruments

To carry out this work, the scientists measured the image quality with two optical instruments and used a psychophysical test for assessing visual performance. Results from patients with ARMD were compared with those obtained from a control group of similar age without any ocular pathology. Thus, the researchers could verify that for individuals affected by this condition there is an increased level of ocular scattering that could be mainly due to the disruption suffered by the light reflected in the damaged retina of the ARMD eyes, because a priori optics are not expected to be altered, since it is a retinal pathology.

On the other hand, optical quality and visual performance have also been studied in patients affected by keratitis. Eyes affected by keratitis present a poorer optical quality and a reduced visual performance that improves significantly after the resolution of the pathology. Nevertheless, once medical treatment ends, eyes that suffered from keratitis still have a worse image quality compared to the contralateral healthy eye, a result that significantly influences visual performance even having reached the normal values of visual acuity.

Visual quality characterization

The results of this research carried out at the UGR will make a full and objective characterization of visual quality in patients affected by any of these ocular pathologies. So far, the use of new techniques for assessing objectively the optic quality of the eye has been limited to studies on refractive or cataract surgery. However, as Carolina Ortiz Herrera suggests, this work "may be of particular interest to establish an early diagnosis of certain ocular diseases such as age-related macular degeneration, the main cause of central vision loss in developed countries."

Furthermore, this technique allows researchers to carry out a monitoring of possible stages of both diseases. Ortiz Herrera stresses the importance of including "both in the clinical practice of optometry and ophthalmology" the use of new techniques that, objectively, could indicate deterioration in

vision even when the visual acuity values are normal, since "vision is not only seeing well, but providing quality and comfort."

More information: The results of this PhD research led to two publications in journals of international prestige such as *Journal of Modern Optics and Cornea*. They will be soon published in *Current Eye Research*.

Source: University of Granada

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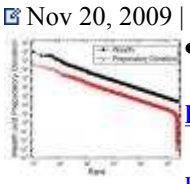

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