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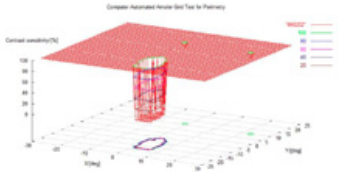
SECONDARY FEATURE

Retina
Adding a new dimension to AMD testing

by Maxine Lipner Senior EyeWorld Contributing Editor

3D computerized test distinguishes wet from dry AMD



The dry case has a central defect that is the same at all contrast levels representing an absolute scotoma Source: Craig Robison, M.D., Wolfgang Fink, Ph.D., and Alfredo Sadun, M.D., Ph.D.

For age-related macular degeneration (AMD) patients, a new test dubbed 3D-CTAG can help to differentiate wet from dry cases, according to J. Sebag, M.D., founding director, VMR Institute, Huntington Beach, and professor of clinical ophthalmology, University of Southern California, Los Angeles. Results published in the January issue of the British Journal of Ophthalmology indicated that 3D-CTAG picked up 100% of wet cases missed by traditional Amsler grid testing and 20% more dry cases.

Dr. Sebag described the concept of the 3D-CTAG test, first developed by Alfredo A. Sadun, M.D., Doheny Eye Institute, University of Southern California, as a self-administered one. "Traditional Amsler grid is a test that is performed in the office, and we ask patients to do that test at home to monitor for the transition from dry to wet AMD," Dr. Sebag said. "What we're doing with the 3D test is in addition to having an Amsler grid, we're changing the contrast between the lines and the background at five predetermined steps of contrast and repeating the Amsler grid at different contrast levels." Computerization of the process was the work of Wolfgang Fink, Ph.D., CalTech, Pasadena, Calif. in conjunction with Dr. Sadun.

Distinguishing types of AMD

The hypothesis for this particular study was that by using 3D-CTAG testing on AMD patients, investigators might be able to distinguish between dry and wet cases. "It may lend itself well to a screening or at least a home self-monitoring test for the onset of wet AMD," Dr. Sebag said. This test is done on a computer touch screen with an Amsler grid shown, and patients are asked to trace any area of abnormality. The same screen is shown five times at different contrast levels and the patient is asked to do this again. "That's assembled into a 3D plot, where the X and Y axes represent the Amsler grid and the Z axis represents contrast," Dr. Sebag said. "The different levels are stacked and a 3D plot of the abnormality at all five contrast levels is presented."

Dr. Sebag sees the approach as an interesting one for several reasons. "Not only will it provide a greater sensitivity to detect abnormalities, but it also gives us a quantitative measure of central visual function that should have more information in it than what we presently have available," he said.

Included in this study were 90 eyes from 70 subjects, 34 with dry and 29 with wet AMD, as well as 27 age-matched controls without AMD. Results with the 3D technology easily outstripped traditional testing. "We found that in both wet and dry patients, we were able to detect a higher percentage of abnormalities," Dr. Sebag said. In 74% of dry AMD cases and 21% of wet cases, patients showed no abnormalities on paper Amsler grid testing. However, in many of these cases defects were later found with the 3D technology. "Every one of the subjects who failed to have an abnormality on paper Amsler grid had one on the 3D threshold Amsler grid," Dr. Sebag said. "It increased our sensitivity for detecting these abnormalities in both wet and dry cases based on the contrast phenomenon."

In addition, investigators found that they were able to differentiate wet from dry AMD cases. When it came to detecting wet AMD, the test boasted a sensitivity of 89.7%, a specificity of 85.3%, a positive predictive value of 83.9%, and a negative one of 90.6%.

Considering clinical significance

Dr. Sebag sees this as particularly important in light of the fact that there is now effective treatment

for wet AMD. "What good is treatment if we can't get it to the people who need it," he said. "That makes it more important to be able to detect wet AMD so that we can institute these new therapies that we have." While patients could be identified in laboratory settings using optical coherence tomography (OCT) machines and fluorescein angiography apparatus, many patients do not make it to such facilities early on. "We have to have something that is inexpensive, easy-to-use, quick, and non-invasive," Dr. Sebag said. "In this context, we hope that this will be available to people perhaps over the internet and thereby achieve our objective of detecting wet AMD early in the natural history of the disease so that therapy can be instituted and vision can be preserved if not restored." Dr. Sebag and Dr. Sadun are now working with Dr. Rafat Ansari of NASA trying to transfer some of the laser nano-technologies originally developed for the space program to further improve the technology of ophthalmic diagnostics. "We believe that the eye is a window to the body and that this offers great opportunities to monitor and promote the health of astronauts in space, as well as people on earth," Dr. Sebag said.

Even as it stands, the clinical impact of the test could be considerable, Dr. Sebag thinks. "This will enhance our overall treatment for wet AMD by getting to a larger number of patients who need it," Dr. Sebag said. "It will also help by getting to these patients earlier in the natural history of the disease because our information today is that the current form of therapy can prevent vision loss in 95% of cases and can improve vision in 40% of cases."

Going forward, Dr. Sebag is hopeful that ophthalmologists will begin to place more emphasis on vision and quality of life. "I think that especially in my subspecialty of vitreoretinal diseases, we don't emphasize adequately visual function and quality of life," he said. "We think more in terms of structure and anatomy and reintegrating a normal structure rather than treating vision." Dr. Sebag thinks that it is important to start to develop ways to treat vision, not just the pathology found. To do so requires advanced nano-technologies, such as those being developed at USC and NASA.

Dr. Sebag sees the 3D-CTAG test as helping to do this. "It is my hope that the anticipated success of the threshold Amsler grid approach that integrates contrast sensitivity with central visual field testing will be followed by more advanced technologies to quantitate biological processes, as well as additional aspects of the visual phenomenon, so that we can achieve improvements not just in structure but in visual function in the future," he said.

***Editors' note**: Dr. Sebag has no financial interests related to his comments.*

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