GEOGRAPHIC ATROPHY
New software helps track progression rates in geographic atrophy

by Dermot McGrath in London

Novel imaging modalities allied to new image processing software offers clinicians an accurate, reproducible and time-efficient quantification of geographic atrophy and progression rates in affected patients, according to Frank Holz MD.

"Advanced atrophic dry AMD or geographic atrophy is extremely common and is four times more common in the elderly over 80 years of age than the neovascular form of the disease, so it represents a huge unmet need. This means that we need tools not only to monitor natural history of disease progression but also to have sensible outcome measures for interventions that are employed in these patients," Dr Holz told delegates attending the 11th EURETINA Congress.

Dr Holz, director of the Department of Ophthalmology at the University of Bonn, Germany, said that the new software called RegionFinder, developed by Heidelberg Engineering, should prove useful on a clinical routine basis in tracking patients with geographic atrophy.

"Major components of the software are automated according to FDA requirements. The software tool facilitates geographic atrophy measurements in natural history studies and also in interventional trials of new agents aiming at slowing enlargement of geographic atrophy," he said.

Dr Holz said that in vivo probing by imaging tools allows physicians to identify areas of atrophy and measure growth of the atrophic lesions over time.

"Ideally we would like to have prognostic markers that tell us about the individual fate of the geographic atrophy. This should be highly reproducible and raises the question of whether in fact it might be more sensible in the future to use anatomical outcome parameters as the primary endpoint instead of the functional primary endpoint that we have seen in wet AMD studies," he said.

Dr Holz noted that autofluorescence imaging provides an easy and reliable means of identifying atrophic lesions.

"One of the interesting aspects of geographic atrophy is that it is not really a macular disease, but actually grows in an overall linear fashion for the whole lifespan of the patient after its first appearance. This makes it quite handy to study interventions to slow the progression and see whether they have any impact or not," he said.

When examining areas directly surrounding the atrophic patch, autofluorescence imaging obtained with a confocal scanning laser ophthalmoscope proved very helpful in defining certain patterns of abnormal autofluorescence surrounding atrophic patches that impact future growth, said Dr Holz.

"These are very important prognostic markers and this is not the case for other known AMD high-risk markers. The abnormal patterns can help us to identify if an individual patient is a slow or a fast progressor. This has been confirmed in another large-scale natural history multicentre study, the geographic atrophy progression (GAP-) trial. We have built up quite an extensive list of not just abnormal patterns but also other markers that give us an idea if the atrophy is slow or fast progressing and that can be put to effective use in clinical trials," he said.

Looking at the features of the software in more detail, Dr Holz said that it allows for direct export of autofluorescence images from its database, as well as semi-automated detection of atrophic areas by selection of seeding points.

"It is a very reliable tool which can detect differences from baseline to follow-up images and compensates for differences in rotation, alignment, and so forth. The software comes up with a report form including all the information which you might require for your patient or your clinical study," he said.

To assess the reproducibility of the results obtained using RegionFinder, a trial was conducted and recently published in IOVS using seven independent readers who looked at serial images of 30 patients with geographic atrophy. The images included not only autofluorescence images, but also near-infrared and blue reflectance images at baseline, and at six and 12 months.

One of the challenges often encountered in assessing macular atrophy images is the high prevalence of peripapillary atrophy, which may become confluent and may hinder precise measurements, said Dr Holz. He said that the RegionFinder software surmounts this hurdle by using a constraint tool to draw a limiting vertical line at the most narrow part of the confluent atrophy, and any atrophy located nasally to this line is disregarded for geographic atrophy quantification. The software then provides an automatic copy option for such constraint to ensure consequent grading at following visits.

The results of the trial showed a high level of agreement between the independent readers and also showed that corresponding reflectance images are helpful for lesion boundary discrimination eg, in the presence of luteal pigment.

Summing up, Dr Holz said that the image processing software offers an accurate reproducible and time-efficient identification and quantification method for looking at progression rates in geographic atrophy. It may also prove extremely useful at facilitating geographic atrophy measurements in natural history studies and in intervention trials of new agents aimed at slowing the progression of the disease.

"The modest aim so far is – similar to glaucoma – not to improve vision for these patients but to slow the progression of the geographic atrophy, so this technology may be highly clinically relevant if we consider that we might be able to spare the fovea for many more years and enable these patients to maintain their reading vision," he concluded.