Combined OCT-SLO device offers best of both worlds for detecting retinal pathologies

A NEW system that combines optical coherence tomography (OCT) and confocal ophthalmoscopy offers clinicians very accurate localisation of choroidal and retinal pathologies, as well as real-time, ultrahigh-resolution capability and multiplanar imaging of the anterior segment, according to Richard B Rosen MD.

The system can be used to create accurate and detailed 3-D OCT images, volume and area maps, retinal thickness maps and topographic maps. Furthermore, data acquisition is non-invasive and can be accomplished in a time-efficient manner, said Dr Rosen.

“The OCT ophthalmoscope offers the best of both worlds – true multiplanar imaging that produces both the surface detail of the scanning laser ophthalmoscope as well as the internal detail of the OCT,” he told the World Congress of Ophthalmology.

Dr Rosen explained that the OCT-SLO is unique in its ability to simultaneously produce a confocal scanning laser ophthalmoscope (SLO) image and an OCT image using a single source. The OCT images are collected in coronal or “C” sections, and allow an exact pixel-to-pixel correlation to the corresponding SLO image.

“Dermot McGrath
in Sao Paulo

The clinical applications of the combined OCT-SLO are extremely varied, noted Dr Rosen, who demonstrated its versatility at the World Congress of Ophthalmology.

Richard B Rosen MD

The optical coherence tomography ophthalmoscope (OCT-SLO, Ophthalmic Technologies Inc., Toronto, Canada) offers multiple views from a single scan with perfect registration of images, said Dr Rosen, New York Eye and Ear Infirmary, New York, US.

“The fact is that all imaging systems are not created equally – it does matter how you slice it,” he explained. “The OCT ophthalmoscope developed by Adrian Podoleanu offers the best of both worlds – true multiplanar imaging that produces both the surface detail of the scanning laser ophthalmoscope as well as the internal detail of the OCT;” he told the World Congress of Ophthalmology.

Dr Rosen emphasised the point by reference to a patient with a macular hole, subsequent to retinal detachment surgery. An initial OCT 3 scan suggested that the macular hole was quite large and might necessitate further surgical intervention. However, another scan with the OCT-SLO showed that the hole was not nearly as large as had been suggested by the OCT 3 image.

“One of the problems with this technology is that you move a little bit to the side, the patient fixates differently and you lose the pathology. With the coronal scan, however, it is possible to see the whole expanse of the macula at the one time. So this enables us to pick up in this instance the small retinal cyst and then redirect the B-scan to find that image,” he said.

Dr Rosen emphasised that OCT-SLO remains extremely useful in cases of two patients with diabetes and some distortion in their OCT-3 scans.

“With the OCT-SLO, in fact, shows clearly that the patient had vitreo-macular traction.”

The second diabetic patient had been referred to Dr Rosen for laser treatment for what was believed to be clinically significant macular oedema.

“This particular patient had an OCT-3 scan with him and it definitely looks to be consistent with macular oedema. But in fact with the OCT-SLO device we are able to pick up very fine lines in both the vertical and horizontal images to demonstrate that in fact the real problem is vitreo-macular traction.”

Dr Rosen emphasised that OCT-SLO imaging offers very accurate localisation of pathology with enhancement of the vitreoretinal interface. Its ability to align serial topographies and to fuse other modalities, with real-time, ultrahigh resolution capability and multi-planar anterior segment imaging should make it an invaluable addition to the diagnostic arsenal of the vitreoretinal surgeon.

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These images form planar slices of retina called coronal or C-scans, which can then be stacked together to form 3-D volumes, he said. This allows either singular planes to be evaluated for longitudinal images or entire en face images at varying depths to be evaluated.

The fact that the system can produce both en-face C-scan OCT images as well as cross-sectional (B-Scan) OCT images similar to the Zeiss OCT 3 gives it a big advantage over the latter device, said Dr Rosen.

“One of the problems with B-scan imaging is that even if the images are exquisite, unfortunately the image slices are only 20 microns thick, so occasionally if you have a patient who has good vision and a small defect, it may not be picked up by the scan,” he said.

Dr Rosen illustrated the utility of the SLO-OCT system using the example of a patient with a small retinal cyst.

“In this instance we can see a patient with an apparently normal OCT B-scan. One of the problems with this technology is that you move a little bit to the side, the patient fixates differently and you lose the pathology. With the coronal scan, however, it is possible to see the whole expanse of the macula at the one time. So this enables us to pick up in this instance the small retinal cyst and then redirect the B-scan to find that image,” he said.

Dr Rosen added that by obtaining matching SLO and OCT scans, the clinician can then superimpose the two images and bring up the internal detail within the surface image. This device also allows the ability to fuse other types of modality such as fluorescein angiography, indocyanine green (ICG) angiography, microperimetry and electroretinography (ERG).

The clinical applications of the combined SLO-OCT are extremely varied, noted Dr Rosen, who demonstrated its versatility in picking up and tracking a wide range of retinal disorders including vitreoretinal traction, epiretinal membrane and choroidal neovascularisation, among others.

The fact that T-scans run parallel to the layers of the retina means that they preserve the lateral connections between the points better than combined A-scans, said Dr Rosen.

“As a result we get better lateral continuity in these images. So with the same light source, you actually see more detail,” he said.

Dr Rosen emphasised the point by reference to a patient with a macular hole, subsequent to retinal detachment surgery. An initial OCT 3 scan suggested that the macular hole was quite large and might necessitate further surgical intervention. However, another scan with the OCT-SLO showed that the hole was not nearly as large as had been suggested by the OCT 3 image.

“Given such conflicting data, Dr Rosen said the advantage of the OCT-SLO is that it gives clinicians the option to consult the C-scans in order to verify the true size of the macular hole. In this particular instance, the C-scan correlated 100% with the OCT-SLO image. Dr Rosen said T-scans are also useful because they enhance imaging of the vitreoretinal surface.”