Advances in imaging technology are opening up whole new perspectives for clinicians in terms of identifying and tracking pathologies of the ocular surface, according to Christophe Baudouin MD, PhD.

“The latest generation in vivo confocal microscopy provides a non-invasive means of studying the ocular surface at the cellular level. With this technology, normal or metaplastic epithelial cells, inflammatory infiltrates or goblet cells can be identified without requiring more invasive techniques for cell collection. Such in vivo imaging gives us a promising way to investigate ocular surface involvement in complex diseases and may provide new insights into corneal and conjunctival disorders in the future,” he told delegates attending the World Ophthalmology Congress.

Dr Baudouin, professor and chairman of ophthalmology at the Quinze-Vingts National Ophthalmology Hospital, Paris, noted that while confocal microscopy is not a new technique and has been used for corneal examinations since the early 1990s, the real breakthrough has been in terms of the resolution and quality of images achieved with the latest-generation Heidelberg Retina Tomograph (HRT) Rostock Cornea Module.

“The earlier systems were expensive and were difficult to handle and use. The resolution was quite poor so they were only useful for more superficial or peripheral structures. By contrast the HRT Rostock Cornea Module gives us high-resolution, fully digital images of the entire ocular surface. The technique is also painless and minimally invasive,” he said.

Dr Baudouin said that the HRT has a wide range of potentially useful applications to view corneal structure and pathology. As well as helping to differentiate bacterial, viral, parasitic and fungal infections, it can also be used to help image LASIK flaps, filtering blebs and to count endothelial cells for post-surgical follow-up.

To illustrate its utility in a clinical setting, Dr Baudouin discussed a number of case studies where the HRT helped to make a differential diagnosis or to assess the effectiveness of particular treatments.

“It is very useful in inflammatory conditions of the ocular surface because it can give us information that was only available before using corneal biopsy, which may be difficult to obtain in ocular surface disease,” he said.

In studies carried out by Dr Baudouin, confocal microscopy images of the corneal epithelium revealed significant changes in dry eye syndrome, limbal stem cell deficiency and chronic inflammatory impairment. The images also enabled clinicians to follow different cases of acute alterations of corneal epithelium.

Looking to the future, Dr Baudouin said that further improvements can be expected in the resolution and quality of in vivo images obtained by the next generation of confocal microscopes. However, he noted that while the technical advances are all very well and good, they must also be accompanied by parallel progress in terms of image interpretation if clinicians are to be able to fully exploit the potential of this technology to help their patients.

“We will need to be able to understand and interpret the new information we are obtaining from these images and this process will take some time,” he said.

Dr Baudouin has no financial interest in the technology mentioned in his presentation.

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