Inherited retinal diseases (IRDs) cause severe visual loss in over 2 million patients worldwide. The last two decades have been marked by accelerated progress in the development of therapies for IRDs. Over the same period of time, advances in adaptive optics technology have enabled imaging the retina at a scale where individual cells are visible.

Clinical studies using the rtx1 Adaptive Optics Retina Camera in IRDs have resulted in several new findings:

- rtx1 images enabled quantifying the mosaic of cone photoreceptor cells using morphological metrics*. In groups of healthy volunteers, cone cell density findings were consistent with previous histological data in the parafoveal region of the retina.

- The rtx1 was used to investigate different types of IRDs and revealed microscopic retinal changes in every pathology under study.

- Publications reported abnormalities in the parafoveal cone mosaic such as reduced cone visibility, disorganized mosaic, and reduced cell density. Reduced cone density in the center of the fovea was also found in two studies.

- Outer retinal tubules, crystal deposits, microcysts, and retinal folds were visible in rtx1 images with a higher level of detail than in conventional imaging.

- Such microscopic signs of pathology could be detected even in patients with relatively good visual acuity as well as cases with almost normal findings from examinations with color fundus imaging, auto-fluorescence imaging, optical coherence tomography or electroretinography.

- In macular dystrophies, follow-up imaging with the rtx1 enabled tracking the same group of cells over time with micrometer precision.

In summary, adaptive optics fundus imaging is particularly suited for exploration of the healthy and dystrophic retinal structures, including photoreceptor detection and counting.

Prof. José Sahel, University of Pittsburg Medical School, USA

The quantitative assessment of photoreceptor survival or loss, based on analysis of adaptive optics retinal images, was valuable to monitor disease progression at a cellular level.

Adaptive optics imaging technology has revolutionized our understanding of structural changes in retinal disease

Gale et al. Retinal Degenerative Diseases, 2015

Abnormal cone mosaics and reduced cone density in Usher syndrome caused by CEP250 mutation. Credit: Kubota et al. 2018

we have seen that significant photoreceptor loss occurs before the development of visual symptoms

Palejwala et al. Retina, 2016

References


© 2018 Imagine Eyes S.A. All rights reserved. M RCS 003 a