Ottica adattiva nella patologia maculare: applicazioni cliniche

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Outline

1 – Adaptive optics (AO) retinal imaging

2 – Role of AO imaging to detect and track macular diseases

3 – TAKE HOME MESSAGE

Disclosure: no financial or commercial interest
An AO retinal imaging device consists of four main components:

1) **Wavefront sensor** to measure the optical distortions of the eye;
2) **Wavefront corrector** to compensate for these distortions;
3) **High-resolution camera**;
4) **Integrated computer**.

AO corrects for the eye’s optical distortions improving the spatial resolution of fundus images.
AO retinal imaging of AMD

Multimodal imaging of the left eye of a 62-year-old man with microdrusen
AO retinal imaging of AMD

The cones overlying drusen show normal morphology.

The hyper-reflectivity of the cones overlying drusen may be caused by both optical and biological phenomena.
The cone mosaic shows normal structure and morphology at early stages of AMD

The mosaic immediately overlying the drusen is regularly arranged, consistent with no significant cone loss.
Variable disruption of the central photoreceptor mosaic was observed via AO-SLO. The photoreceptor phenotype associated with OPN1LW and OPN1MW mutations has been shown to be highly variable.

11 subjects with OPN1LW and OPN1MW mutations (six mutant opsins)

These mutations have been associated with a wide range of visual defects including:
- red-green color vision deficiency,
- blue cone monochromacy,
- X-linked cone dystrophy,
- X-linked cone dysfunction
- ...


* foveal pit - Scale bar: 100 um

Courtesy of Joe Carroll, PhD
Female, 23 yrs-old, Occult Macular Dystrophy, RP1L1 mutation

AO retinal imaging of inherited retinal diseases

Age-matched healthy mosaic - 1.5° temporal eccentricity
Cone density: 33.789 cones/mm²

Photoreceptor mosaic in IRD - 1.5° temporal eccentricity
Cone density: 19.922 cones/mm²
AO retinal imaging of epiretinal membranes

AO retinal imaging of epiretinal membranes

Adaptive optics (AO) generates images with cellular resolution of the retina \textit{in vivo}. 

AO imaging gives new insights into how macular diseases may affect the photoreceptors and other retinal microstructures \textit{in vivo}.

The opportunity to detect pathological variations of the retina at early stage of the disease and monitor them at a cellular level might represent the basis for designing \textbf{new diagnostic and treatment protocols} to preserve the normal integrity and function of the macula.

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