



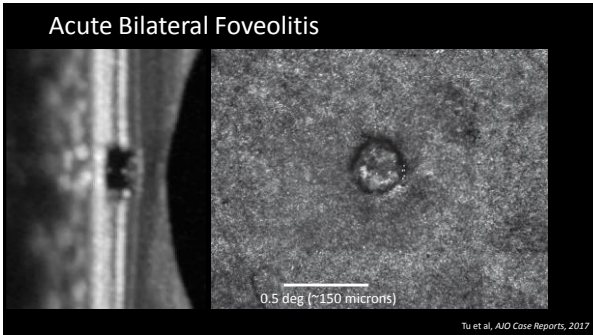
disclosures

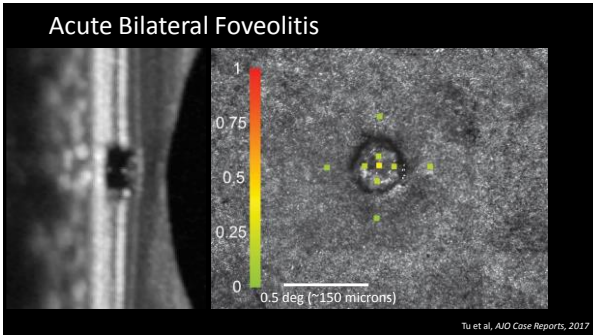
- (I) C.Light Technologies, Krypton Vision
- (P) UC Berkeley, U Rochester, U Houston

- We (and the FDA) will never be satisfied with even the finest images of retinal structure.
- We all want to know how the structure relates to function.

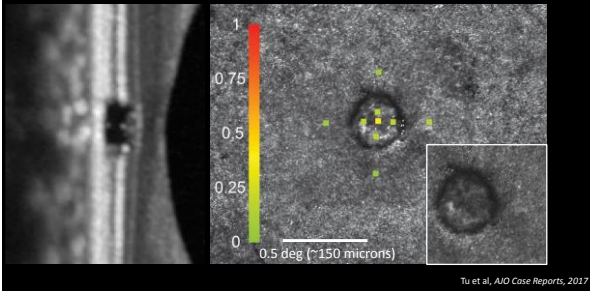
<https://webvision.med.utah.edu>
Anderson and Fisher, J Ultrastruct Res 1976

Example case

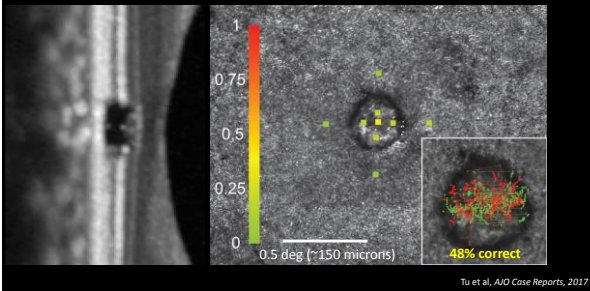




Acute Bilateral Foveolitis

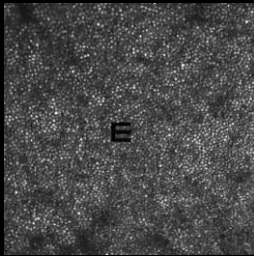


Acute Bilateral Foveolitis

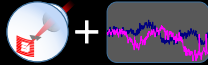


Subjective functional testing

The adaptive optics retinal microstimulator



- AO correction
- Stimulus Delivery
- Stabilization
- Targeted Stimulus Delivery

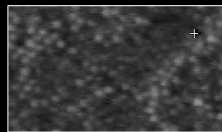


Yang et al Optics Express, 2010

The adaptive optics retinal microstimulator

background: imaging laser: 840 nm

stimulus laser: 550 nm



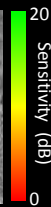
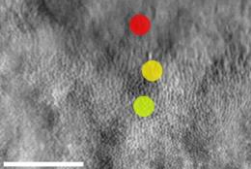
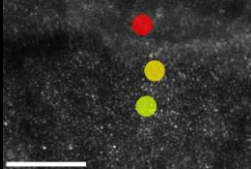
the white cross indicates the exact location of the 550 nm stimulus

correction of TCA: Harmening et al. *BOE*, 2012
Harmening*, Tuten*, Roorda, Sinich, *J Neurosci*, 2014

Microperimetry – Example 1: Choroideremia

confocal AOSLO

split-detector AOSLO

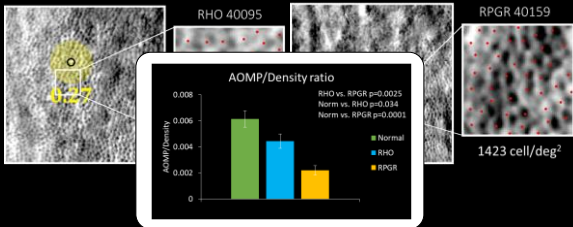


0.43 deg

CHM patient 13159, ~0.75 deg from the fovea

slides courtesy of Jessica Morgan (UPenn)
Tuten et al, in revision

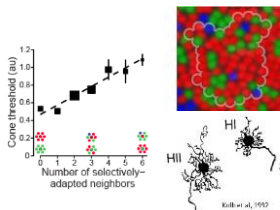
Microperimetry – Example 2: Retinitis Pigmentosa



Footz, Roorda, Duncan, unpublished data

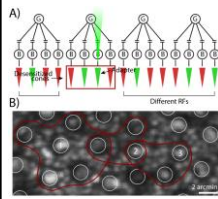
Assessing function of other retinal neurons

Lateral Inhibition of Horizontal Cells



Tuten et al. J Neuro. 2017

Receptive Fields of Ganglion Cells



Objective functional testing

Multidisciplinary Ophthalmic Imaging

In Vivo Imaging of the Human Retinal Pigment Epithelial Mosaic Using Adaptive Optics Enhanced Indocyanine Green Ophthalmoscopy

Johnny Tam,¹ Binfao Liu,¹ Alfredo Dubler,^{2,3} and Robert Barabak³

Classifying cone photoreceptors in the living human eye using their unique phase response to light

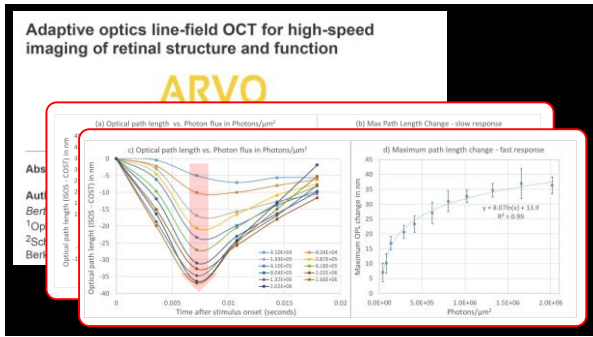
PROCEEDINGS OF SPIE

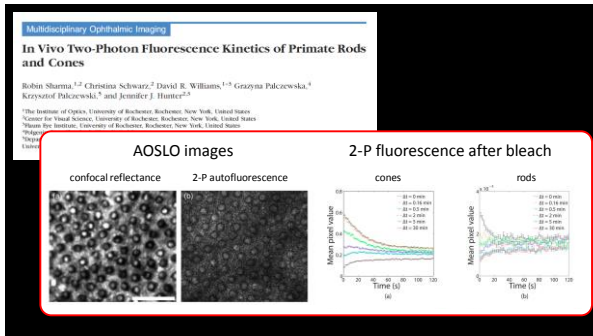
Letter

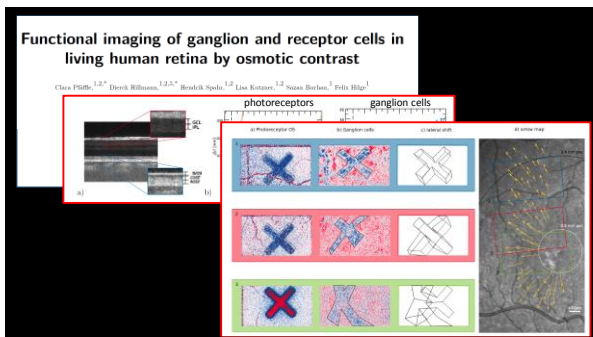
optica

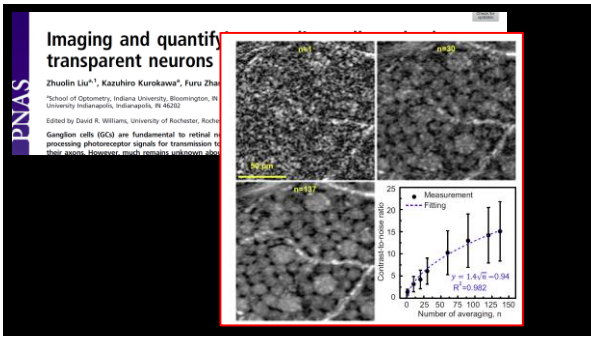
Functional retinal imaging using adaptive optics swept-source OCT at 1.6 MHz

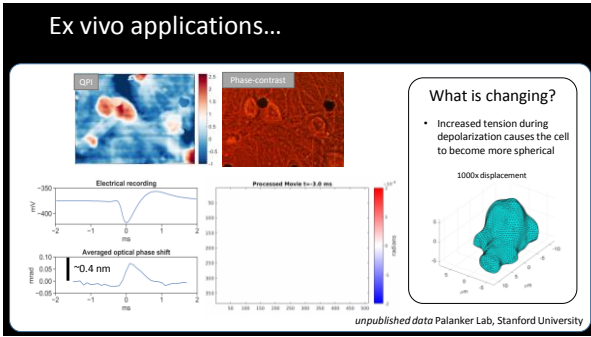
Mehdi Ashrafian,^{1*} Afsin V. Moizy,¹ Robert J. Zamboni,¹ John S. Werner, and Raj S. Jonnal

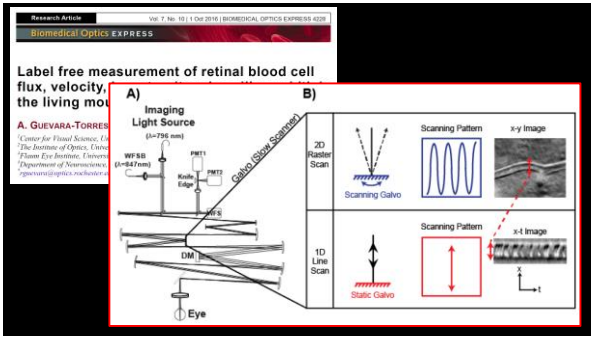












Summary

- Cellular-level access through the use of adaptive optics is driving a paradigm shift in how we use ophthalmoscopy to study eye disease.
- Systems that measure structure/function on a cellular scale continue to yield new results.
- There are an expanding set of technologies that enable subjective and objective structure/function measurements on a cellular scale.
