

HYDROXYCHLOROQUINE AND CHLOROQUINE SCREENING (2016 AAO RECOMMENDATIONS)

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2500 Patients

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Mechanism of Action: Not Clear

Systemic Side Effects:

Renal

Hepatic

Storage: Melanine, Liver, Kidney

Low in Muscles, Fats

Ocular Toxicity:

Corneal Toxicity Epithelial Layer
Diffuse Punctuate Whorl-like

Retinal Toxicity:

Early:

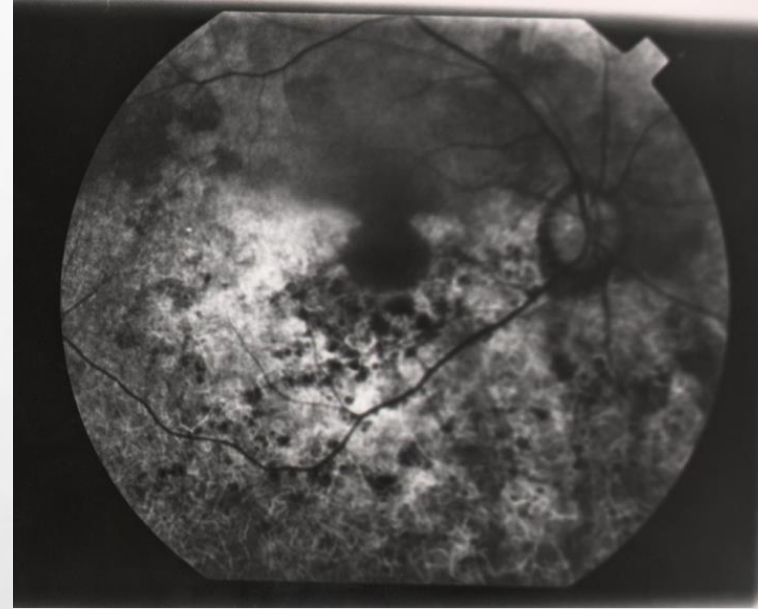
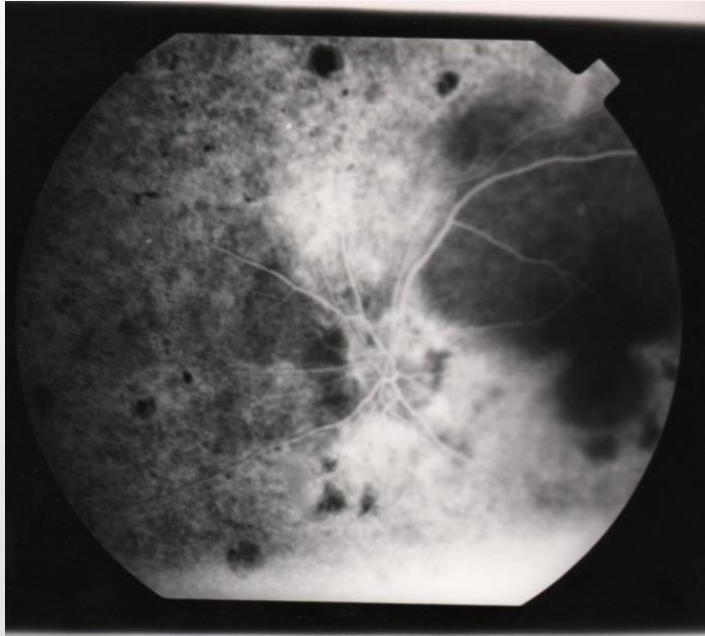
Loss of foveal Reflexes

Thinning of Outer Nuclear Layer

Early Break up of Ellipsoid Zone







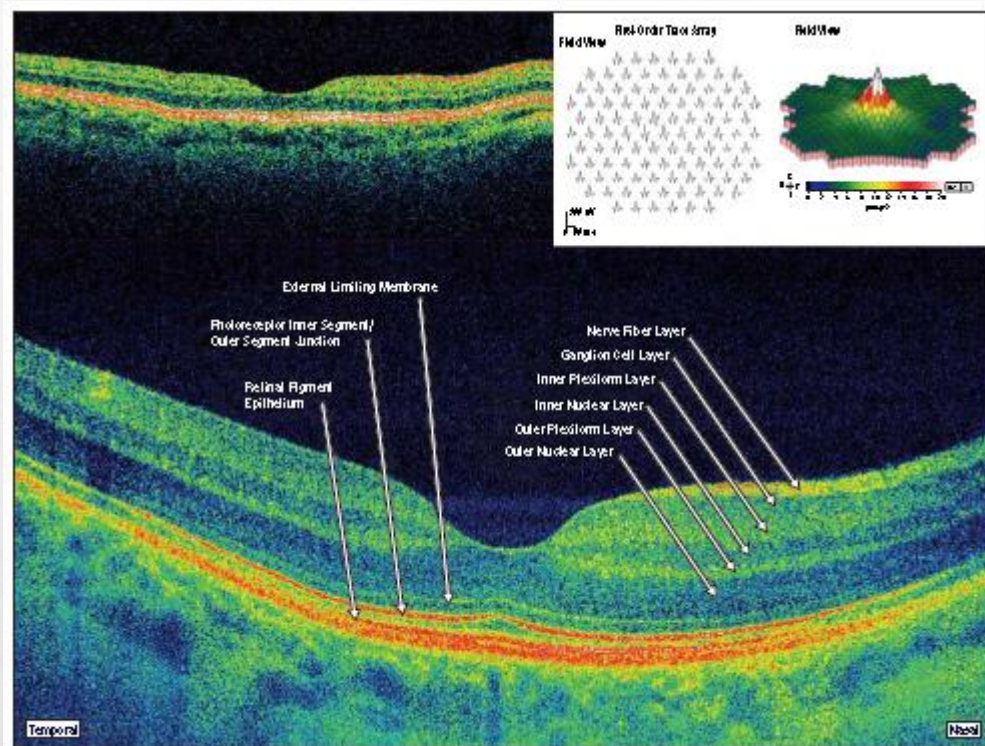


Figure 1. Case 11. Normal Stratus optical coherence tomographic image (upper left) and normal multifocal electroretinogram (upper right). High-speed ultra-high-resolution optical coherence tomography allows for detailed visualization of the retinal structure on the level of individual retinal layers.

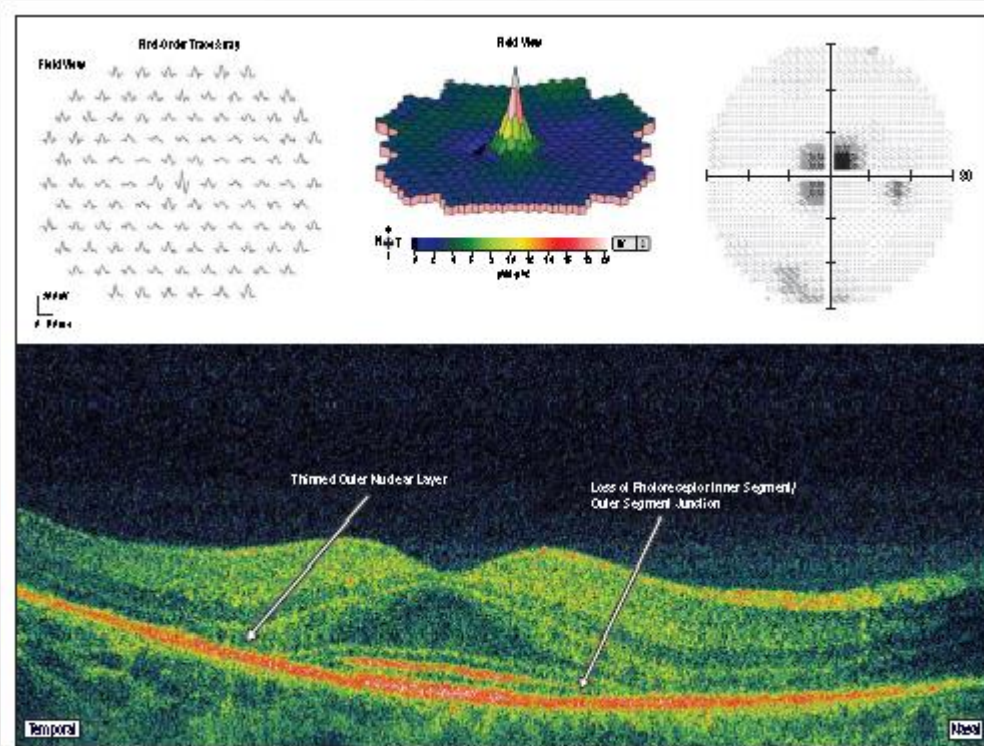


Figure 2. Case 1. Multifocal electroretinogram (upper left) shows perifoveal depression with preserved central peak. Visual field shows central scotoma. High-speed ultra-high-resolution optical coherence tomography shows thinning of the outer nuclear layer and loss of the photoreceptor inner segment/outer segment junction.

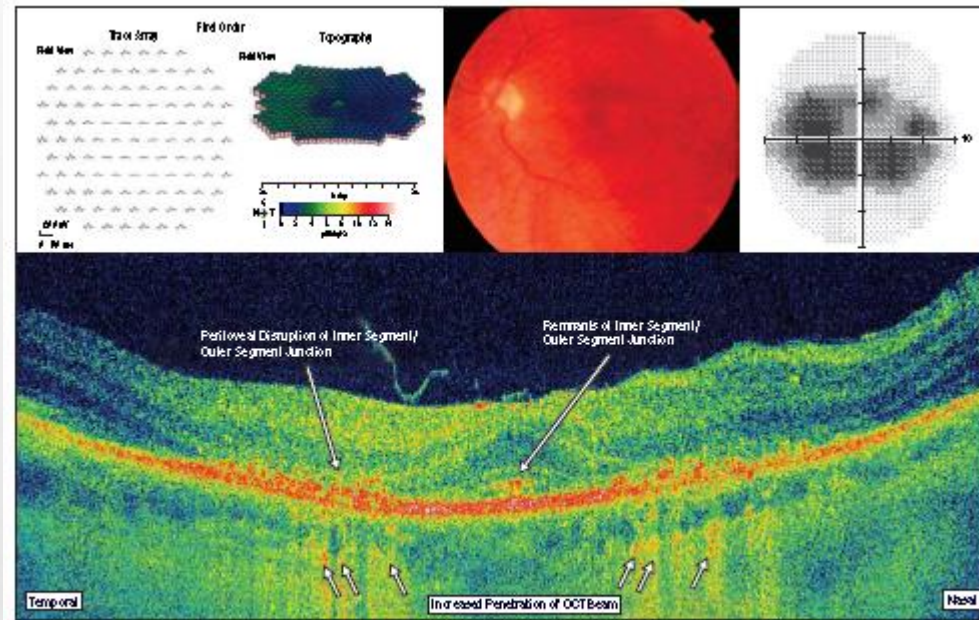


Figure 3. Case 12. Bull's-eye maculopathy, multifocal electroretinogram with foveal depression, and central scotoma in central 10°. High-speed ultra-high-resolution optical coherence tomography (OCT) shows severe loss of the photoreceptor inner segment/outer segment junction layer, thinned outer nuclear layer, and perifoveal hyperscattering as well as increased penetration of the optical coherence tomography beams into the choroid.

Retinal Toxicity:

Late:

Fine Pigmentary changes

Bull's Eye

Extensive Retinal Atrophy

Dosage > 5 mg/kg Real Weights

Prevalence of Toxicity:

< 1%	5 Years
< 2%	10 Years
20%	20 Years

Risk Factors:

Dosage

Duration

Renal Disease

Tamoxifen 5 folds

Dosage: > 5mg/kg R Wt. HCQ

> 2.3 mg/kg R Wt. CQ

Lesser Factors:

Elderly

Liver Diseases

Genetics?

Fundus Distribution:

Caucasians

Asians

Parafoveal

Near Arcade

Vision is Not Disturbed at the Beginning
Toxicity Cannot be Prevented
Retinopathy is Bilateral;
Not Reversible;
Not Treatable

Screening:

Baseline Examination

Mainly Clinical

Then after 5 years

Then every year

Screening tests:

Visual field

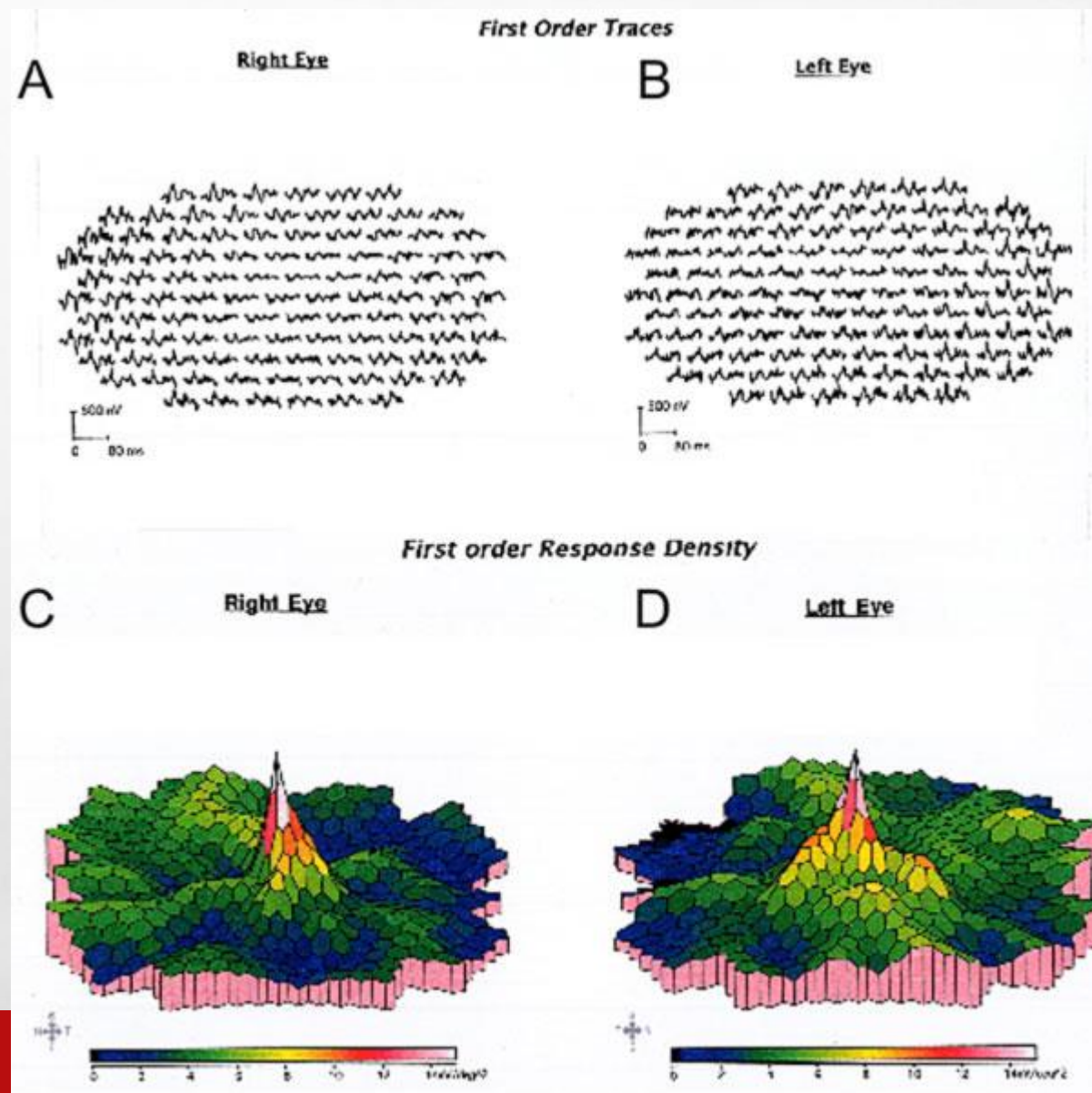
Automated fields

White SiTa Protocol

10-2 field

24-2 field

Multifocal ERG



Special Domain Optic Coherence Tomography (SDOCT)

Early thinning of the outer nuclear layer

Early Breakup of Ellipsoid Zone

Late RPE damage and Progression

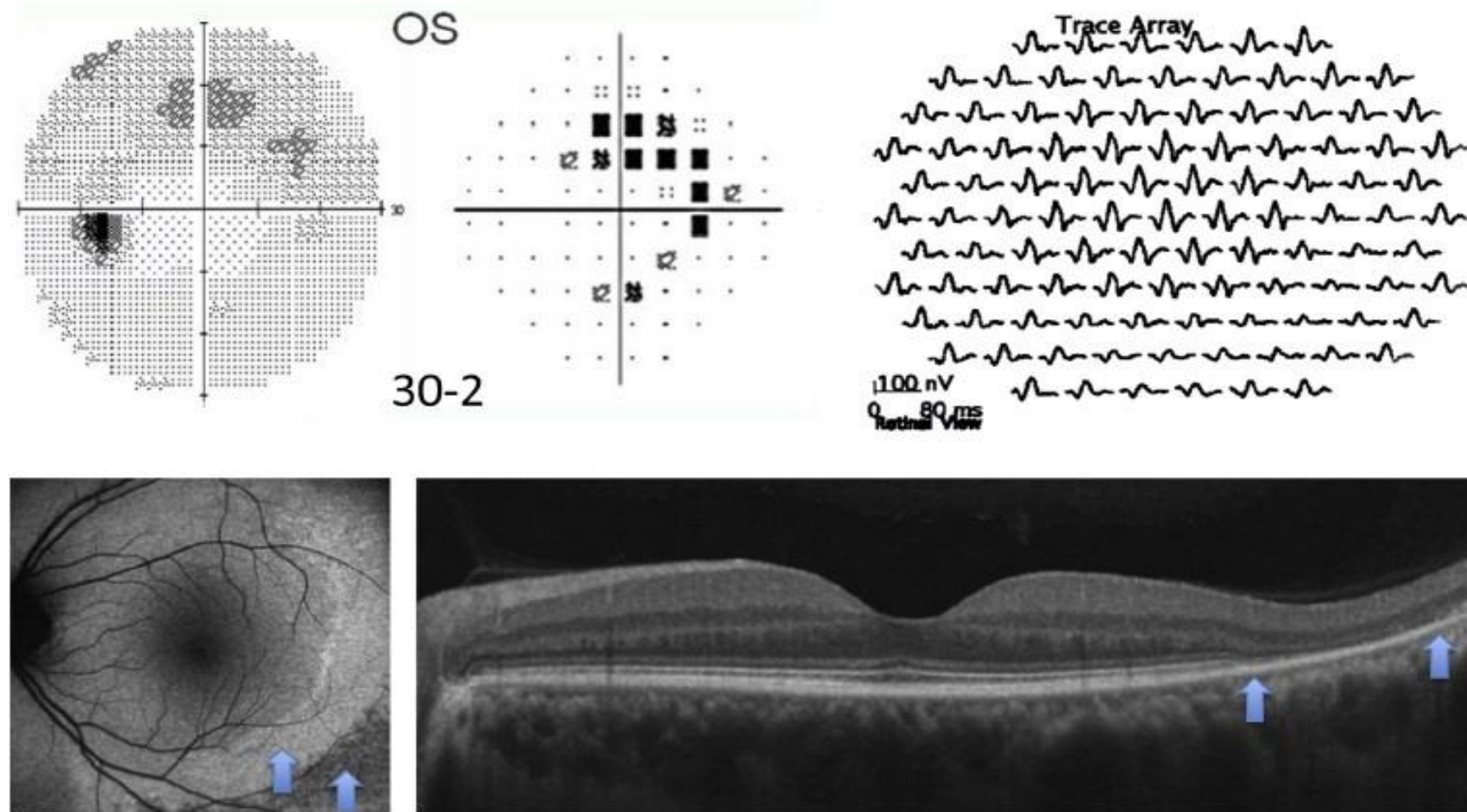
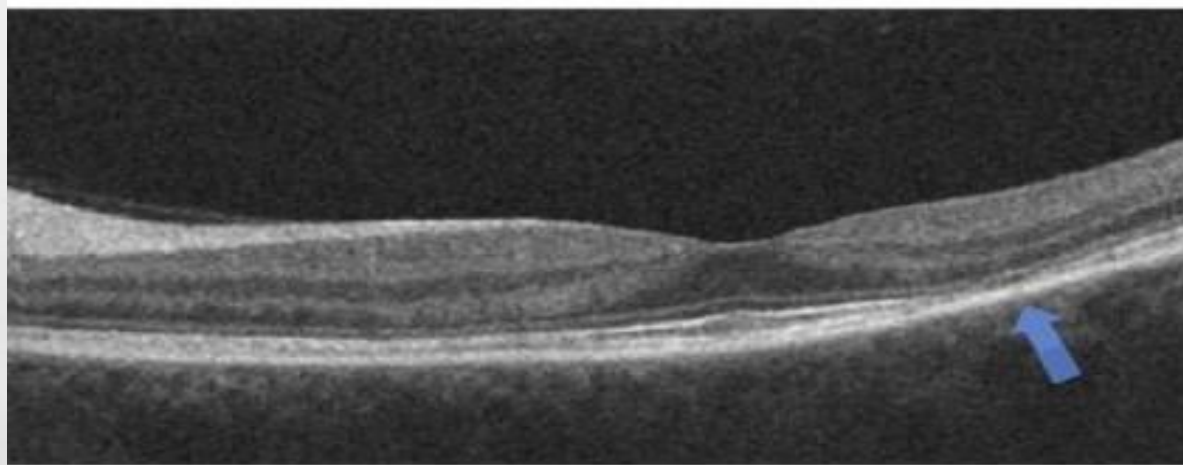


Figure 2. Findings in the left eye of a 42-year-old Chinese woman showing extramacular retinopathy. She had used 8 mg/kg hydroxychloroquine (HCQ) for 8 years and 4 mg/kg for another 2 years. **Top:** 30-2 fields in grey scale and pattern deviation, showing partial ring scotoma outside the parafoveal region; multifocal electroretinogram (mfERG) showing signal weakness most strikingly in an inferotemporal arc of extramacular responses (traces extend to 20° eccentricity). **Bottom:** Autofluorescence image showing increased autofluorescence near the arcades (*left arrow*) and decreased autofluorescence that signals early RPE loss more peripherally (*right arrow*); Spectral-domain optical coherence tomography (SD OCT) cross-section showing marked loss of outer nuclear layer and ellipsoid zone corresponding to the increased autofluorescence (*left arrow*), and beginning retinal pigment epithelium (RPE) disruption at the outer edge of the scan (*right arrow*). There is no parafoveal damage. Modified with permission from Melles RB, Marmor MF. Pericentral retinopathy and racial differences in hydroxychloroquine toxicity. *Ophthalmology* 2015;122:110–6.³ OS = left eye.

SDOCT:

**Less Sensitive Compared VF, and MfERG,
But Definitive**



the left eye of a 48-year-old woman of European descent using hy
from HCQ. Top: 10-2 visual fields over a 4-year period showing
more comprehensive testing. These could have triggered specialty
gram (mfERG) shows weak responses in the parafoveal region (

Tests Not Recommended:

Full Field ERG

EOG

Color Test

Amsler Grid

Message to Take Home:

Dosage below 5 mg/kg R Wt.

Renal Disease

Tamoxifen

Ocular Exam