STATE BOARD OF OPTOMETRY
2450 DEL PASO ROAD, SUITE 105, SACRAMENTO, CA 95834
P (916) 575-7170 F (916) 575-7292 www.optometry .ca.gov

Continuing Education Course Approval Checklist

Title: OCT & Findings in Retinal Degenerations/Uve

Provider Name: USC Roski Eye Institute c/o Ms. Marithel Tesoro

☑Completed Application
Open to all Optometrists? ☑Yes ☐No
Maintain Record Agreement? ☑Yes ☐No

☑Correct Application Fee

☑Detailed Course Summary

☑Detailed Course Outline

☑PowerPoint and/or other Presentation Materials

☑Advertising (optional)

☑CV for EACH Course Instructor

☑License Verification for Each Course Instructor
Disciplinary History? ☐Yes ☑No

CALIFORNIA STATE BOARD OF OPTOMETRY

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CONTINUING EDUCATION COURSE APPROVAL APPLICATION

$50 Mandatory Fee

Pursuant to California Code of Regulations (CCR) § 1536, the Board will approve continuing education (CE) courses after receiving the applicable fee, the requested information below and it has been determined that the course meets criteria specified in CCR § 1536(g).

In addition to the information requested below, please attach a copy of the course schedule, a detailed course outline and presentation materials (e.g., PowerPoint presentation). Applications must be submitted 45 days prior to the course presentation date.

Please type or print clearly.

Course Title	**Course Presentation Date**
OCT & Findings in Retinal Degenerations/Uve	02/13/2017

Course Provider Contact Information

Provider Name

Lina (First) Poyzner (Last) _____ (Middle)

Provider Mailing Address

Street 1450 San Pablo St **City** Los Angeles **State** CA **Zip** 90033

Provider Email Address lina.poyzner@med.usc.edu

Will the proposed course be open to all California licensed optometrists?	☑ YES ☐ NO
Do you agree to maintain and furnish to the Board and/or attending licensee such records of course content and attendance as the Board requires, for a period of at least three years from the date of course presentation?	☑ YES ☐ NO

Course Instructor Information

Please provide the information below and attach the curriculum vitae for each instructor or lecturer involved in the course. If there are more instructors in the course, please provide the requested information on a separate sheet of paper.

Instructor Name

Damien (First) Rodger (Last) C (Middle)

License Number 114719	**License Type** MD
Phone Number (323) 442-6383	**Email Address** lina.poyzner@med.usc.edu

I declare under penalty of perjury under the laws of the State of California that all the information submitted on this form and on any accompanying attachments submitted is true and correct.

Signature of Course Provider — Date: 02/01/2017

OCT and Important (and Sometimes Subtle) OCT Findings in Retinal Degenerations and Uveitis by

Damien Rodger, MD, PhD

Summary

This course is designed to review the mechanics and science behind OCT technology, and focus on the best, most fool proof way to read an OCT, systematically assessing all the retinal layers from top to bottom. The changes in optical coherence tomography images in cases of retinal degeneration and uveitis will then be discussed, focusing on 1. Ellipsoid zone disruption in autoimmune retinopathy/Cancer associated retinopathy, 2. Photoreceptor disruption in vitamin A deficiency, 3. Outer segment tip disruption in plaquenil toxicity and retinitis pigmentosa, 4. Cystoid macular edema and its implications in uveitic syndromes (e.g. Birdshot chorioretinopathy), 5. Subretinal fluid and intraretinal fluid in macular star/B. Henselae. We will then talk briefly about new OCT technology known as OCT-Angiography (OCTA). Suggestions for optometry referrals to general ophthalmologists and retinal surgeons will then be discussed, with time for optometry specific questions to be answered.

Optometric Course Outline

Important (and sometimes subtle) OCT Findings in Retinal Degenerations and Uveitis

February 13, 2017 7pm – 8pm

Sponsoring Organization
USC Roski Eye Institute Keck School of Medicine USC, Los Angeles, CA

Course Faculty
Damien Rodger MD, PhD, Assistant Professor of Clinical Ophthalmology (Vitreoretinal Surgery and Uveitis)

Program Overview
This course is designed to outline the changes in optical coherence tomography visible in cases of retinal degeneration and uveitis and discuss the implications of these findings

Target Audience
This course is designed for practicing optometrists

Educational Objectives
Upon completion of this course optometrists should be able to:

- Use OCT to identify disease in retinal degeneration and uveitis
- Identify patients who would benefit the most from treatment
- Hone OCT reading skills in unusual cases of vision loss

Course Outline

I. Ellipsoid zone disruption in autoimmune retinopathy/Cancer associated retinopathy
   a. Overview of findings
   b. Importance of detection for treatment

II. Photoreceptor disruption in vitamin A deficiency
   a. Discussion of clinical problem and difficulty in diagnosis
   b. Other associated symptoms

III. Outer segment tip disruption in plaquenil toxicity
   a. Overview of findings
   b. Significance in detection of disease
   c. Implications for altering treatment

IV. Cystoid macular edema and its implications in uveitic syndromes (e.g. Birdshot chorioretinopathy)
   a. Overview of findings
   b. Implications for treatment
   c. Treatment options

V. Subretinal fluid and intraretinal fluid in macular star/B. Henselae
   a. Overview of findings
   b. Treatment options

VI. Potpourri of optom selected cases

OCT and Important (and sometimes subtle) OCT Findings in Retinal Degenerations and Uveitis

DAMIEN C. RODGER, MD, PHD

ASSISTANT PROFESSOR OF OPHTHALMOLOGY AND BIOMEDICAL ENGINEERING

VITREORETINAL SURGERY AND UVEITIS (LOS ANGELES, BEVERLY HILLS OFFICES)

CELL: (323) 393-0169

EMAIL: DAMIEN.RODGER@MED.USC.EDU

Financial disclosure

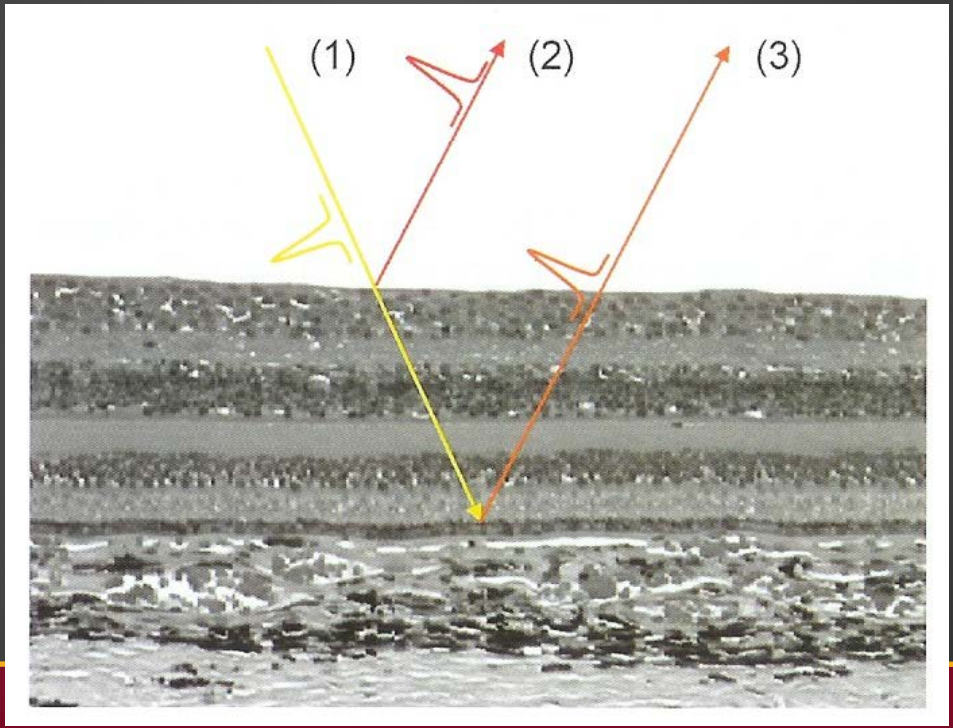
- No Relevant Financial Disclosures

Outline

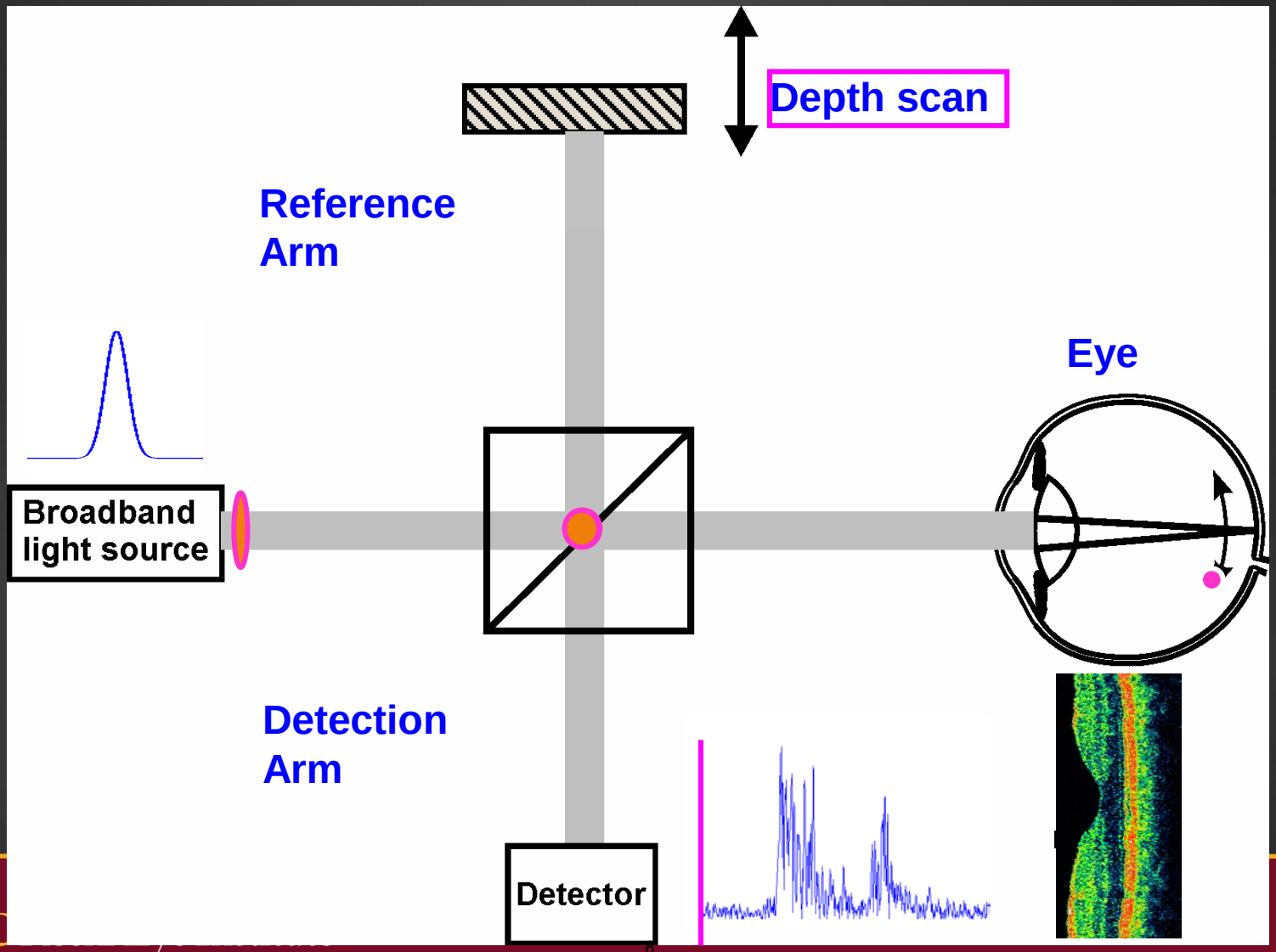
- OCT technology background
- Retinal anatomy as seen on various OCT systems
- OCT findings by depth
  - Vitreous & vitreoretinal interface
  - Intraretinal
  - Subretinal
  - Retinal pigment epithelium
- Interesting cases

Optical Coherence Tomography (OCT)

- First reported in 1991 by Huang

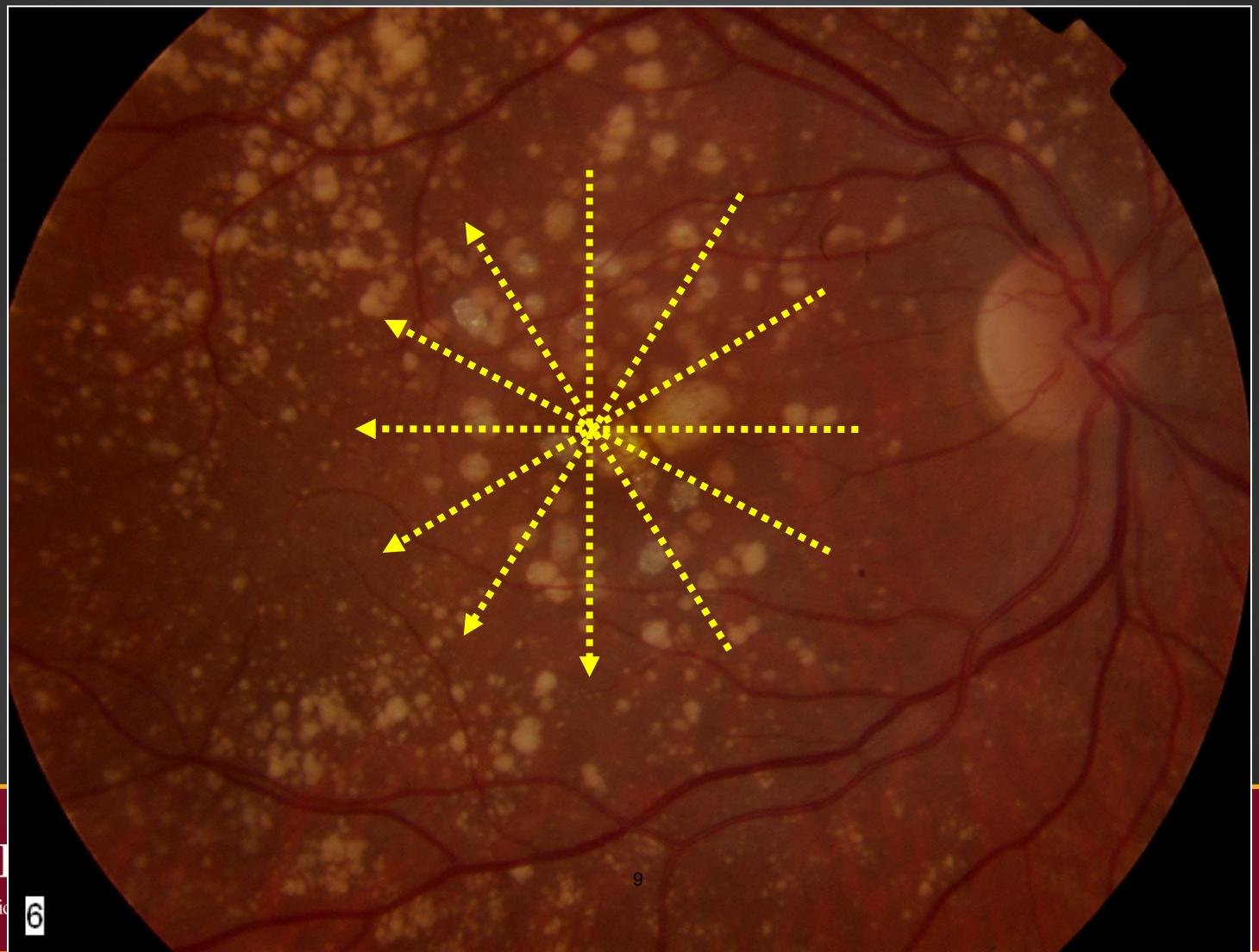


Mechanics of Time Domain OCT



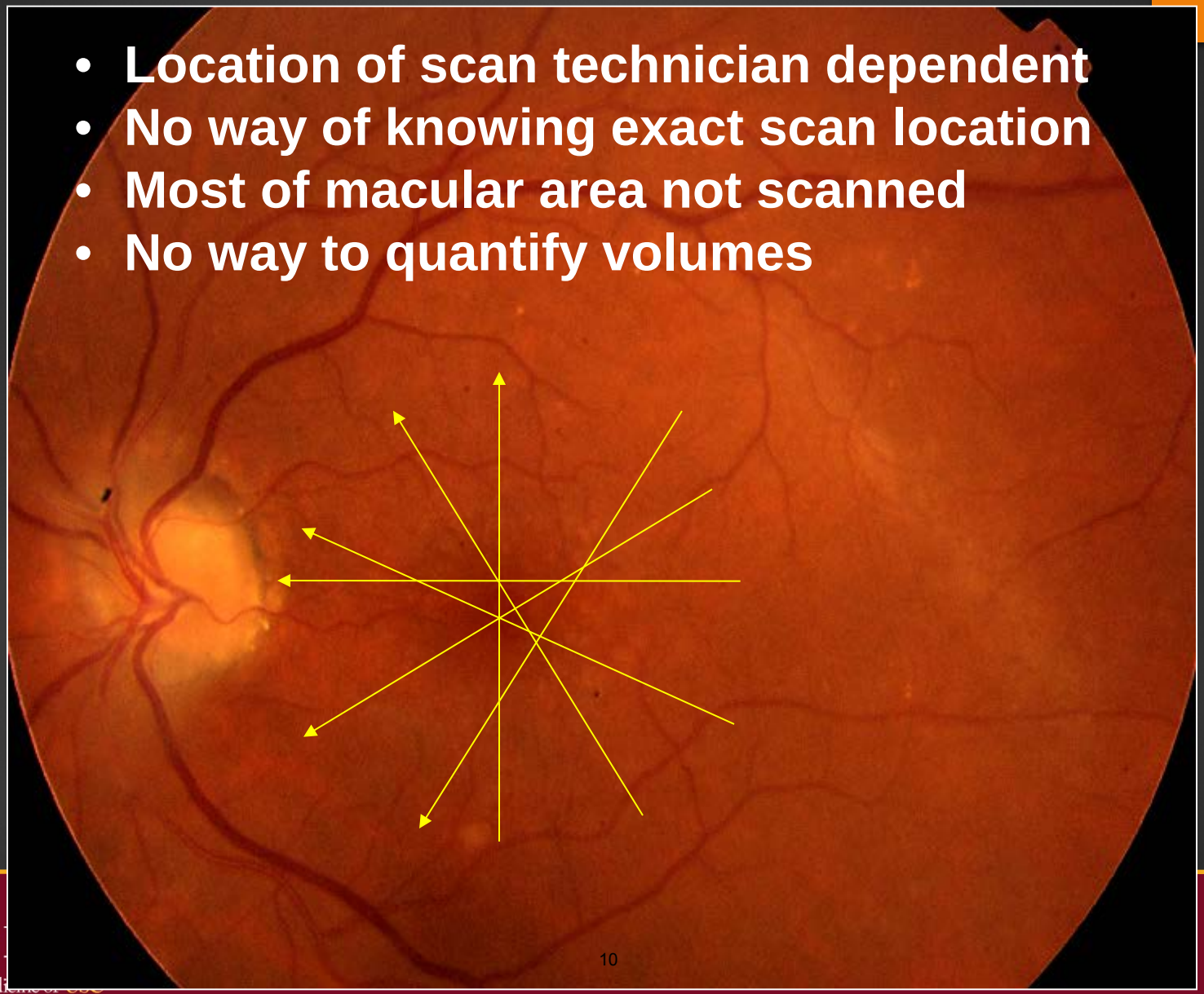
Stratus OCT Macular Scanning Strategy

6 diagonal scans centered on fovea

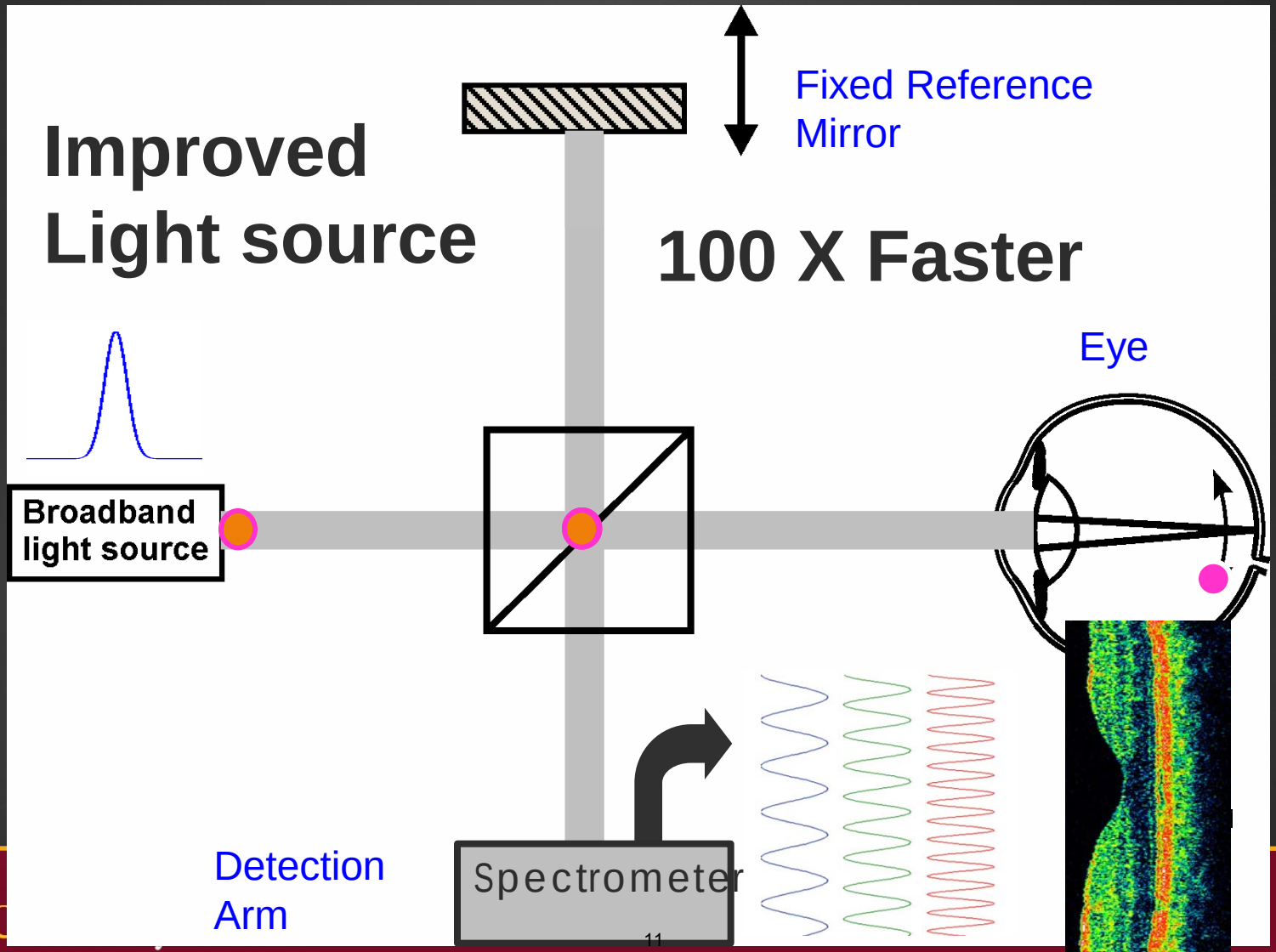


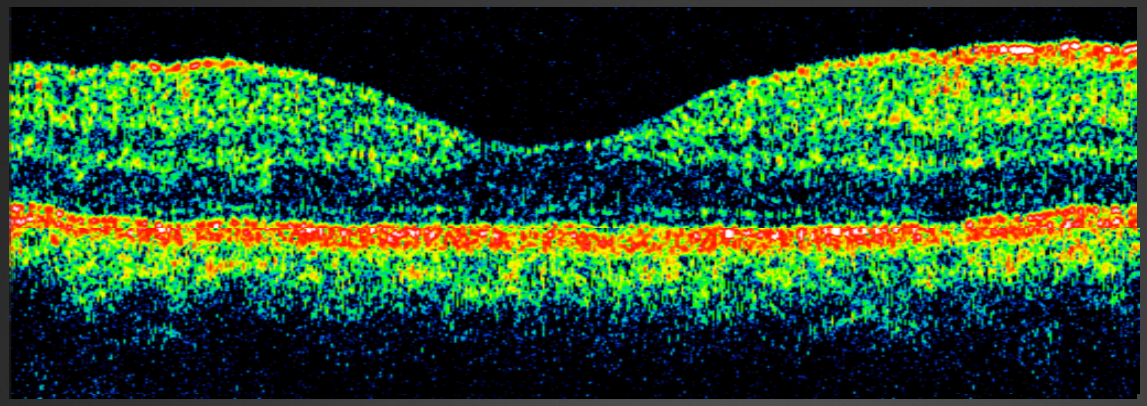
Limitations of Stratus OCT

- Location of scan technician dependent
- No way of knowing exact scan location
- Most of macular area not scanned
- No way to quantify volumes



Spectral Domain OCT Mechanic

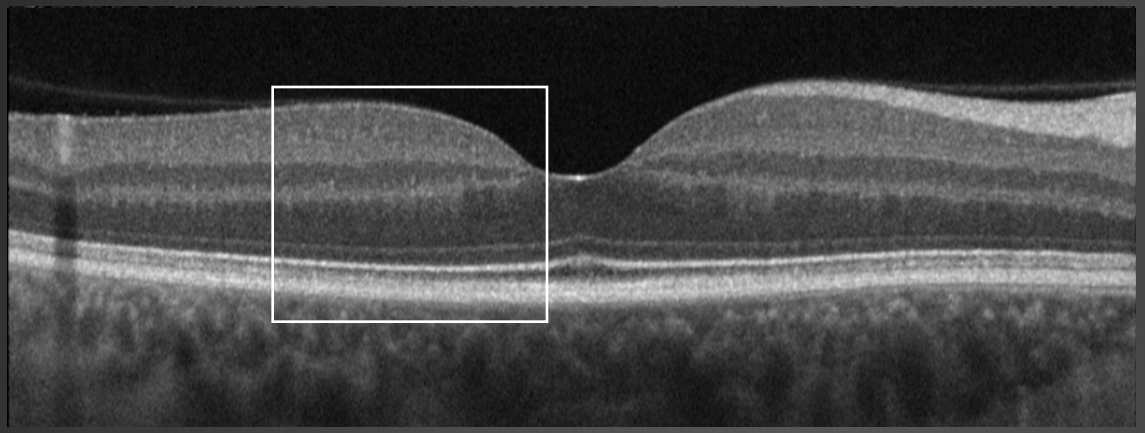




Zeiss Stratus (OCT 3)

(10µm axial resolution)

Time Domain

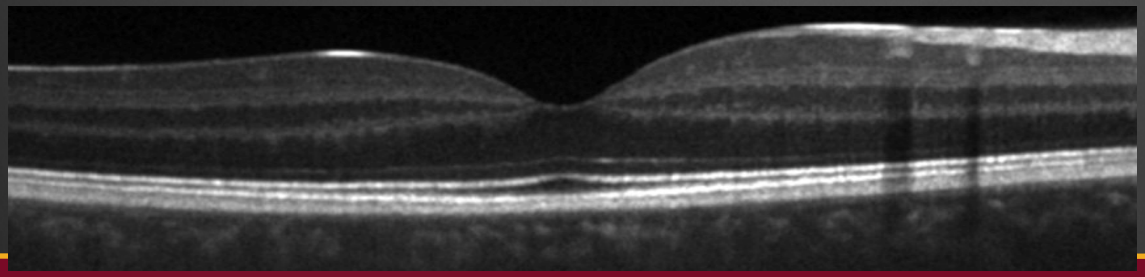


Zeiss Cirrus

(5 µm axial resolution)

Spectral Domain

Frame Averaged



Heidelberg Spectralis

(4 µm axial resolution*)

Spectral Domain

Frame Averaged

Normative Values

	Spectralis	Cirrus	Stratus
Central subfield	**270.2 + 22.5**	**220.5 – 294.8**	**168 - 239**
Superior inner macula	336.0 + 20.6	295.2 – 344.6	243 - 296
Nasal inner macula	335.0 + 19.3	296.9 – 347.7	240 - 297
Inferior inner macula	334.9 + 16.7	292.4 – 342.3	246 - 297
Temporal inner macula	322.6 + 16.5	285.1 – 333.0	240 - 294
Superior outer macula	329.6 + 16.4	254.1 – 293.8	207 - 256
Nasal outer macula	339.5 + 16.9	263.8 – 312.5	198 - 274
Inferior outer macula	325.4 + 16.6	245.7 – 286.4	207 - 256
Temporal outer	320.1 + 15.4	239.3 – 278.6	199 - 276

Reading the OCT

- Zeiss Stratus

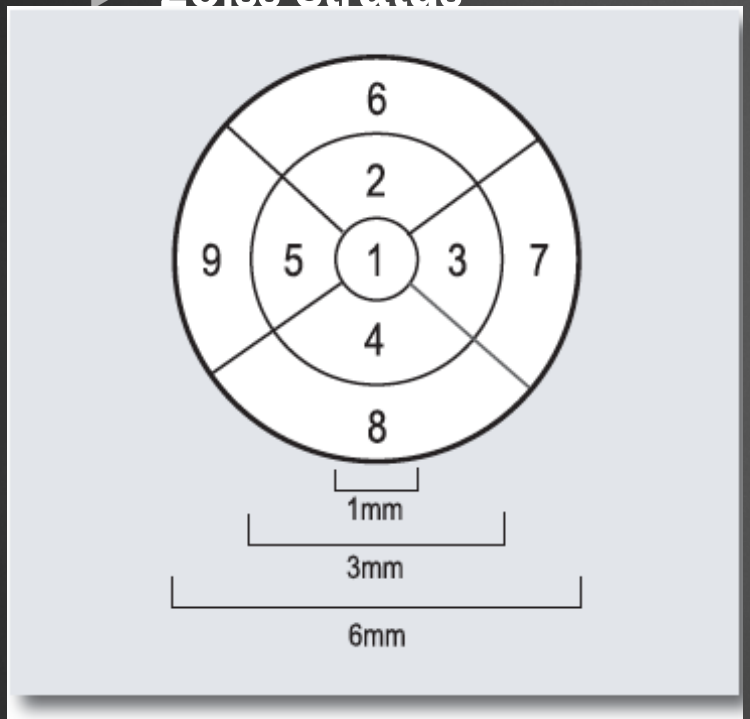


Fig. 1 *AREDS grid used for reporting retinal thickness in both Cirrus and Stratus OCT systems.*

Signal Strength

Signal Strength (Max 10)	5
Analysis Confidence Low	

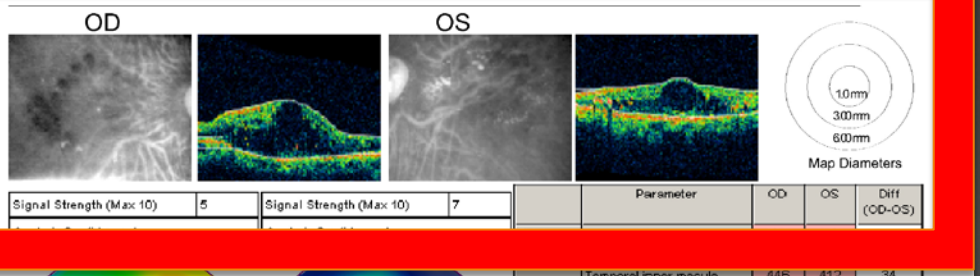
Signal Strength (Max 10)	7
Analysis Confidence Low	

- 0 (weak)
- 10 (strong)
- Analysis algorithm may fail if signal strength is less than 5

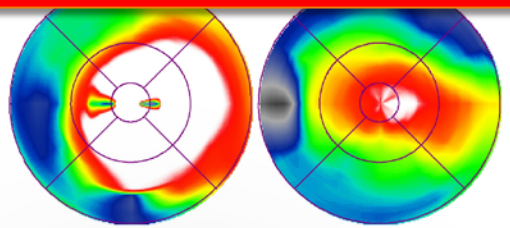
STRATUS OCT
Retinal Thickness Tabular Output Report - 4.0.1 (0056)

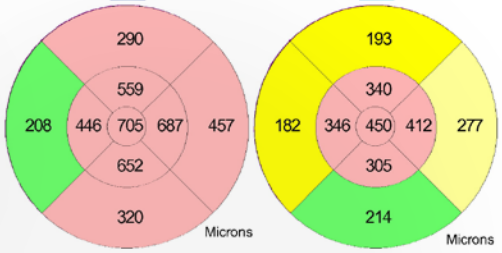
JOSEPH, GEORGE A

Scan Type: Fast Macular Thickness Map



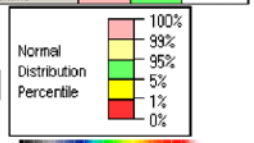
Signal Strength (Max 10)	5	Signal Strength (Max 10)	7

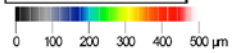




	Parameter	OD	OS	Diff (OD-OS)
Average Retinal Thickness (microns)	Temporal inner macula	446	412	34
	Superior inner macula	559	340	219
	Nasal inner macula	687	346	341
	Inferior inner macula	652	305	347
	Temporal outer macula	208	277	-69
	Superior outer macula	290	193	97
	Nasal outer macula	457	162	275
	Inferior outer macula	320	214	106
	Superior/Inferior outer	0.906	0.902	0.004
	Temporal/Nasal inner	0.649	1.191	-0.542
	Temporal/Nasal outer	0.455	1.522	-1.067
Volume (cubic mm)	Fovea	0.554	0.353	0.201
	Temporal inner macula	0.702	0.647	0.055
	Superior inner macula	0.878	0.534	0.344
	Nasal inner macula	1.08	0.544	0.536
	Inferior inner macula	1.025	0.479	0.546
	Temporal outer macula	1.105	1.473	-0.368
	Superior outer macula	1.541	1.027	0.514
	Nasal outer macula	2.423	0.965	1.458
	Inferior outer macula	1.701	1.134	0.567
	Total macula volume	11.013	7.160	3.853

OD	Scans used	1, 2, 3, 4, 5, 6	OS	Scans used	1, 2, 3, 4, 5, 6



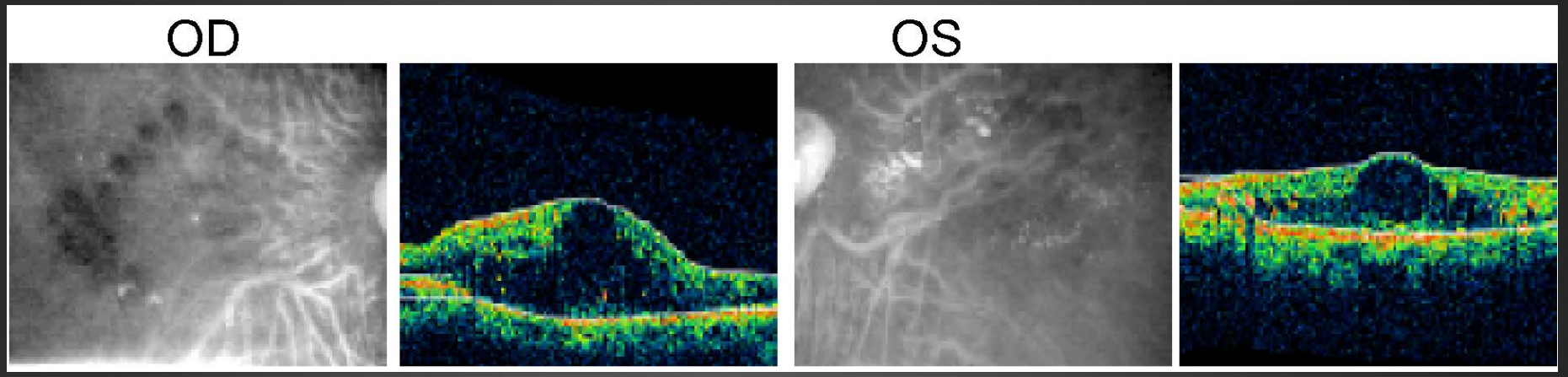


Signature: _____

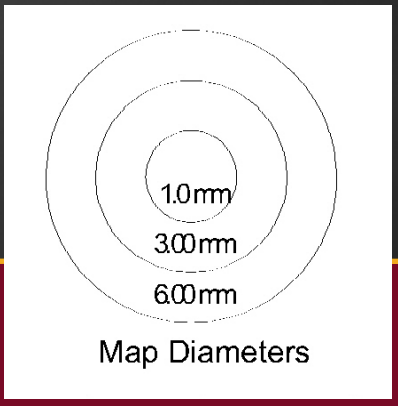
_____

Physician: HARRY FLYNN BASCOM PALMER EYE INSITUTE #2-3932

Fundus and Scan Image



- Should be centered on the fovea



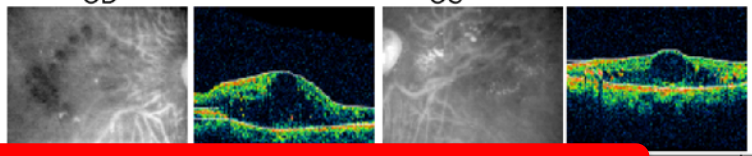
STRATUS OCT
Retinal Thickness Tabular Output Report - 4.0.1 (0056)

JOSEPH, GEORGE A

DOB: 11/8/1937, ID: 848753, Male

Scan Type: Fast Macular Thickness Map
Scan Date: 1/10/2007
Scan Length: 6.0 mm

OD OS



Map Diameters

			OD	OS	Diff (OD-OS)
Signal Strength (Max 10)	5	Signal Strength (Max 10)	7			
Analysis Confidence Low		Analysis Confidence Low				
Thickness	Foveal r		791	459	332
Average Retinal Thickness (microns)	Fovea		705	450	255
	Tempor	er macula	446	412	34
	Superio	er macula	559	340	219
	Nasal in	macula	687	346	341
	Inferior	macula	652	305	347
	Tempor	er macula	208	277	-69
	Superio	er macula	290	193	97
	Nasal o	macula	457	102	275
	Inferior	macula	320	214	106
	Superio	erior outer	0.906	0.902	0.004
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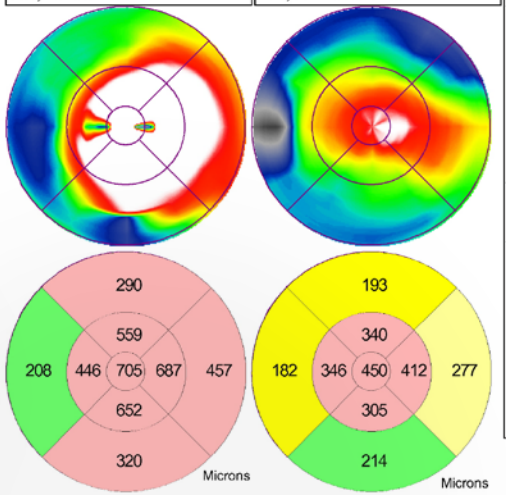
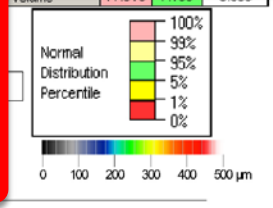
	Superio	er macula	1.541	1.027	0.514
	Nasal o	macula	2.423	0.965	1.458
	Inf				
	Tot	volume	11.013	7.160	3.853





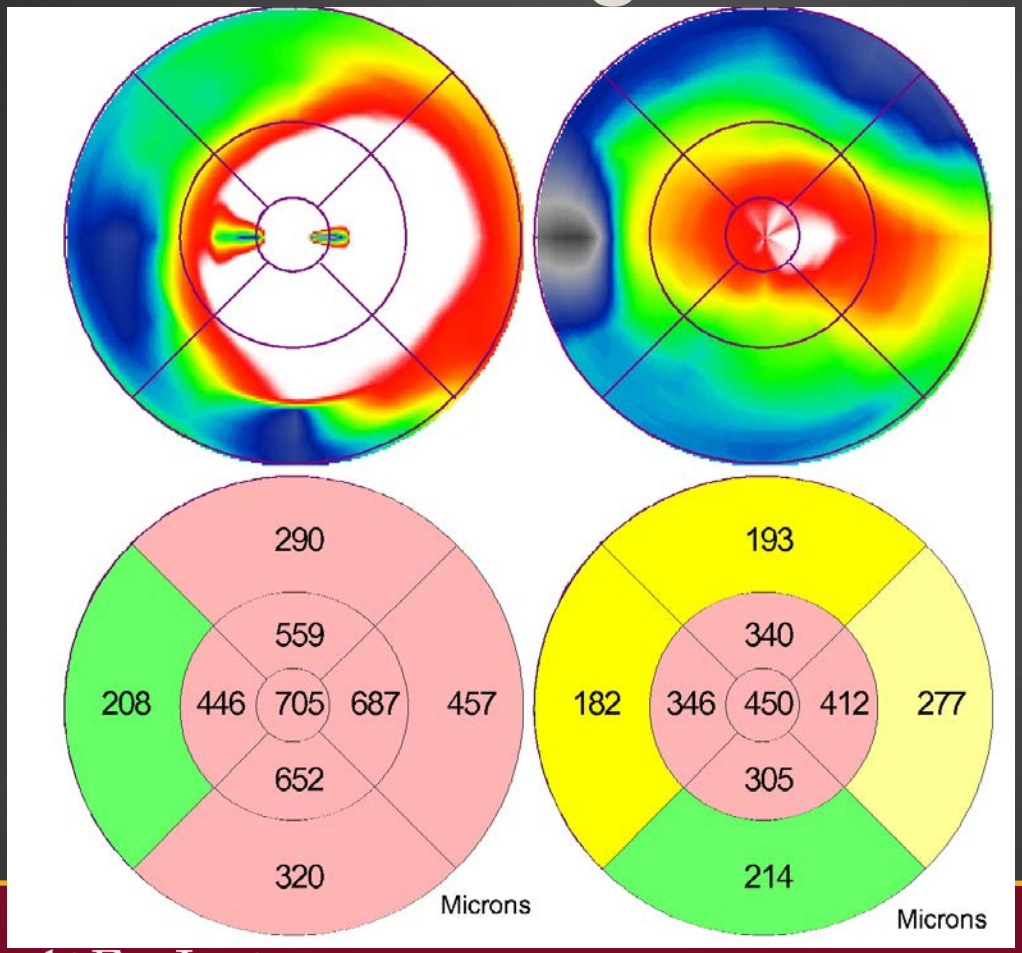
OD	Scans used	1, 2, 3, 4, 5, 6	OS	Scans used	1, 2, 3, 4, 5, 6

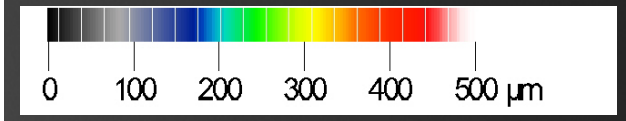
Signature:

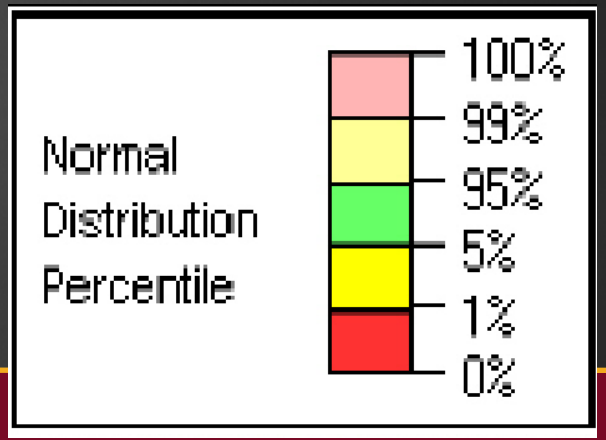
Physician: HARRY FLYNN

BASCOM PALMER EYE INSITUTE #2-3932

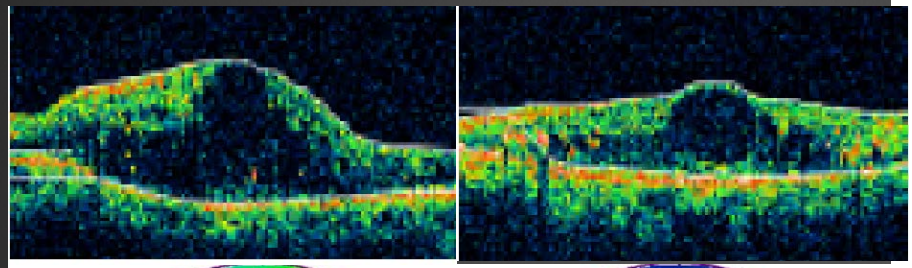
Macular Thickness Map Sector Averages

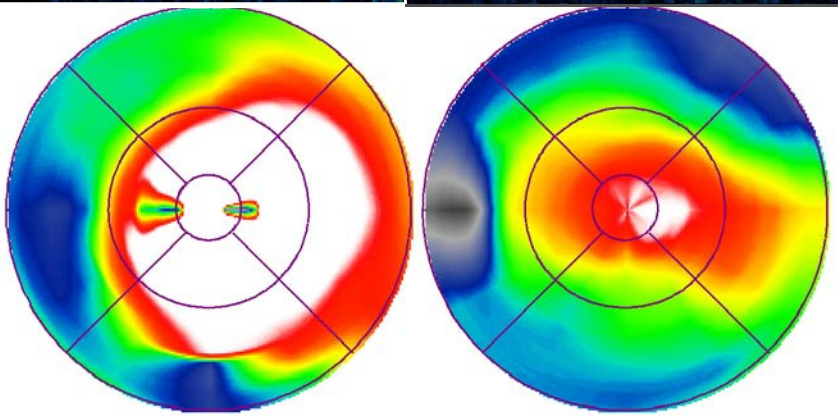


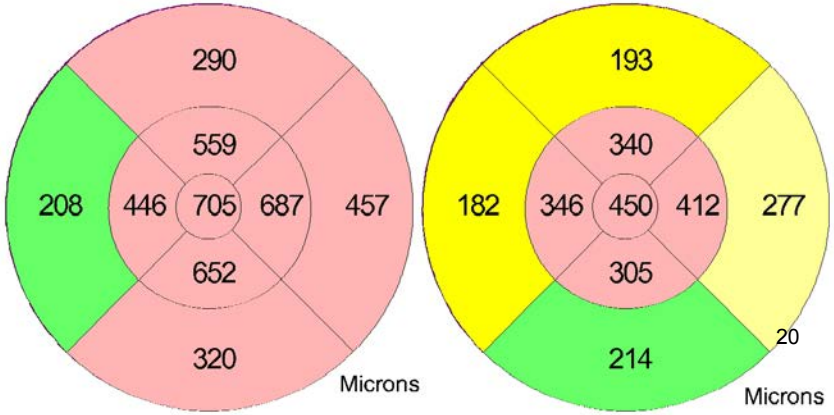




Normative Data

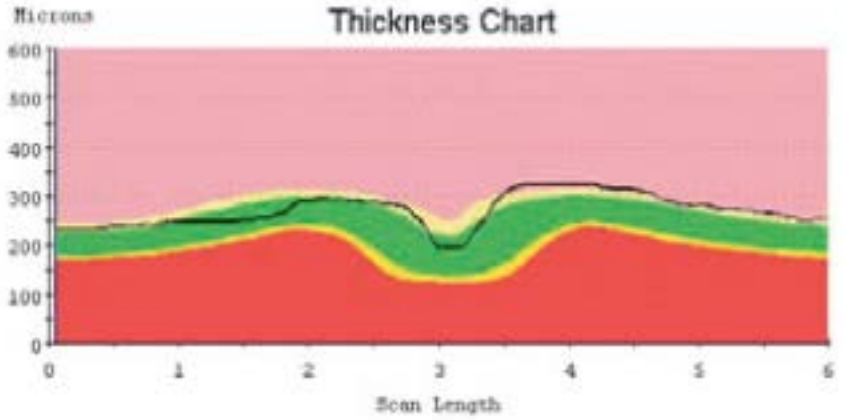






Of the normal population:

1%	<	100%	1% fall within the light red band; considered outside the normal limit
		99%	
4%	<		5% fall within or above the light yellow band
		95%	
90%	<		95% fall within or below the green band 90% fall within the green band
		5%	
4%	<		5% fall within or below the yellow band
		1%	
1%	<		1% fall within the red band; considered outside the normal limit
		0%	



STRATUS OCT
Retinal Thickness Tabular Output Report - 4.0.1 (0056)

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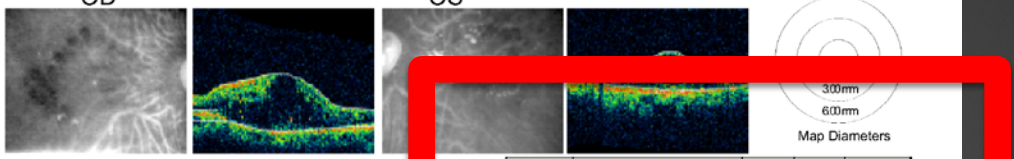
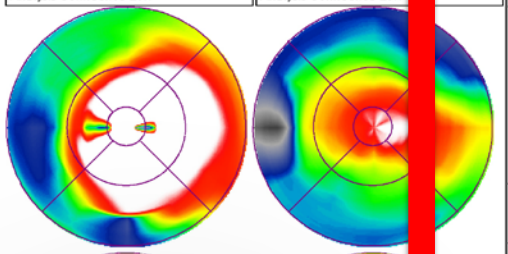
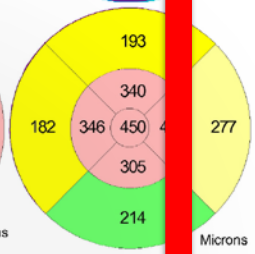


Map Diameters

Signal Strength (Max 10)	5	Signal Strength (Max 10)	7
Analysis Confidence Low		Analysis Confidence Low	



Microns



Microns

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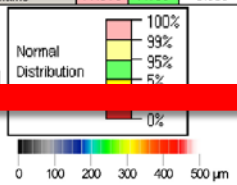
	Total macula volume	11.013	7.100	3.053



OD	Scans used	1, 2, 3, 4, 5, 6	OS	S

Signature:

Physician: HARRY FLYNN

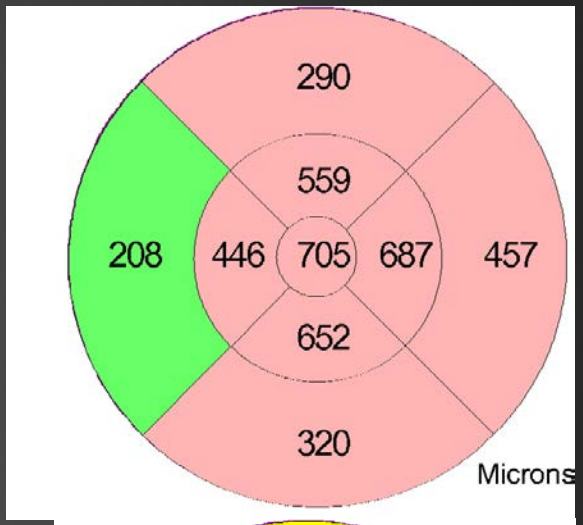
BASCOM PALMER EYE INSITUTE #2-3932

Subfield Measurements

	Parameter	OD	OS	Diff (OD-OS)
Thickness	Foveal minimum	791	459	332
Average Retinal Thickness (microns)	Fovea	705	450	255
	Temporal inner macula	446	412	34
	Superior inner macula	559	340	219
	Nasal inner macula	687	346	341
	Inferior inner macula	652	305	347
	Temporal outer macula	208	277	-69
	Superior outer macula	290	193	97
	Nasal outer macula	457	162	275
	Inferior outer macula	320	214	106
	Superior/Inferior outer	0.906	0.902	0.004
	Temporal/Nasal inner	0.649	1.191	-0.542
	Temporal/Nasal outer	0.455	1.522	-1.067
Volume (cubic mm)	Fovea	0.554	0.353	0.201
	Temporal inner macula	0.702	0.647	0.055
	Superior inner macula	0.878	0.534	0.344
	Nasal inner macula	1.08	0.544	0.536
	Inferior inner macula	1.025	0.479	0.546
	Temporal outer macula	1.105	1.473	-0.368
	Superior outer macula	1.541	1.027	0.514
	Nasal outer macula	2.423	0.965	1.458
	Inferior outer macula	1.701	1.134[2]	0.567
	Total macula volume	11.013	7.160	3.853

Sector averages

OD



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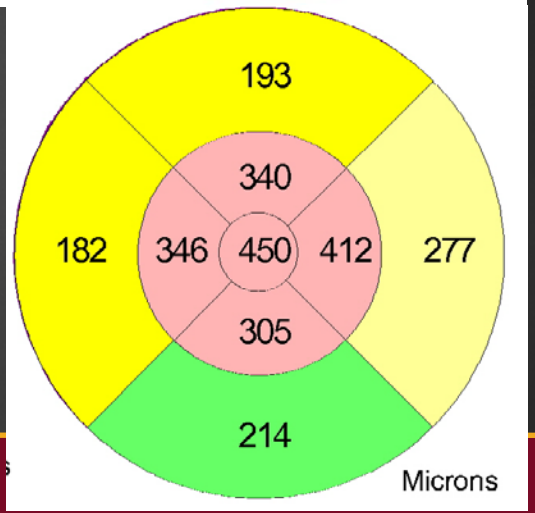
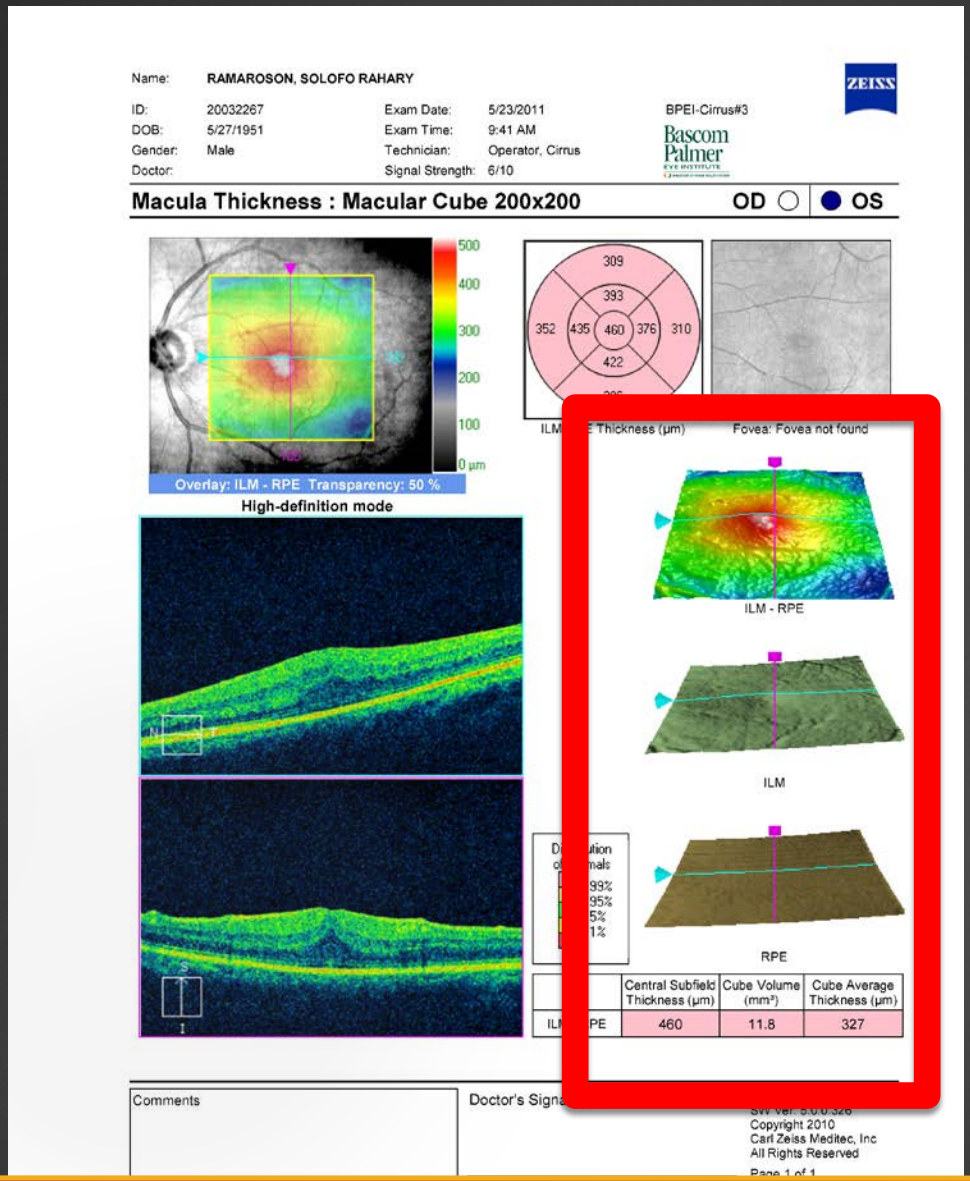


USC Keck Me

Reading the OCT

- **Zeiss Cirrus**

CARL ZEISS MEDITEC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ID: 20032267
DOB: 5/27/1951
Gender: Male
Doctor:
Exam Date: 5/23/2011
Exam Time: 9:41 AM
Technician: Operator, Cirrus
Signal Strength: 6/10
BPEI-Cirrus#3
ZEISS
Bascom Palmer EYE INSTITUTE
Macula Thickness : Macular Cube 200x200
OD
OS
500
400
300
200
100
0 µm
309
393
352
435
460
376
310
422
Overlay: ILM - RPE Transparency: 50 %
High-definition mode
Thickness (µm)
Fovea: Fovea not found
ILM - RPE
ILM
RPE
Central Subfield Thickness (µm)
Cube Volume (mm³)
Cube Average Thickness (µm)
460
11.8
327
Comments
Doctor's Signa
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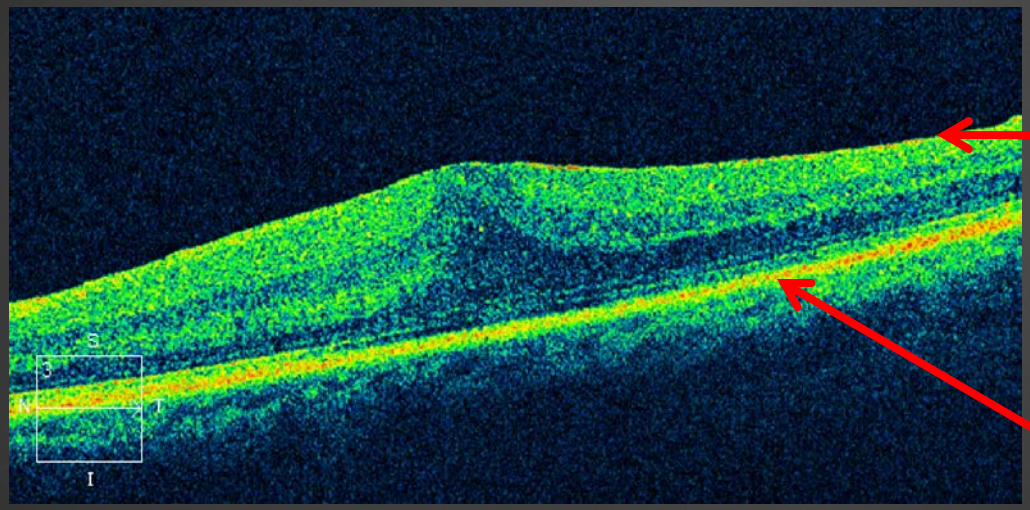
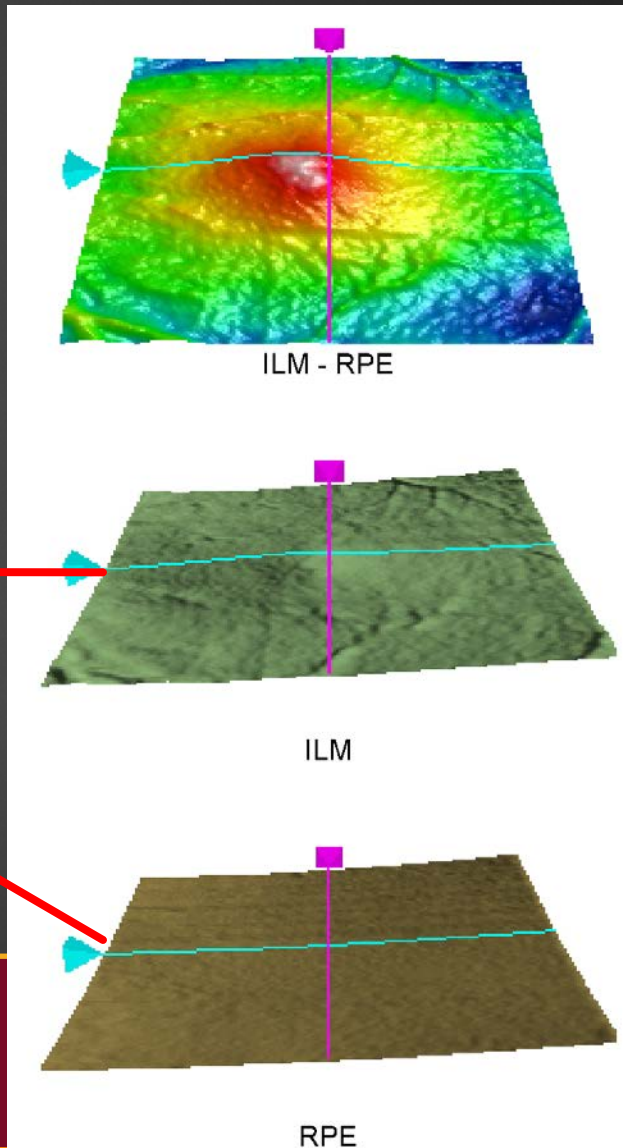
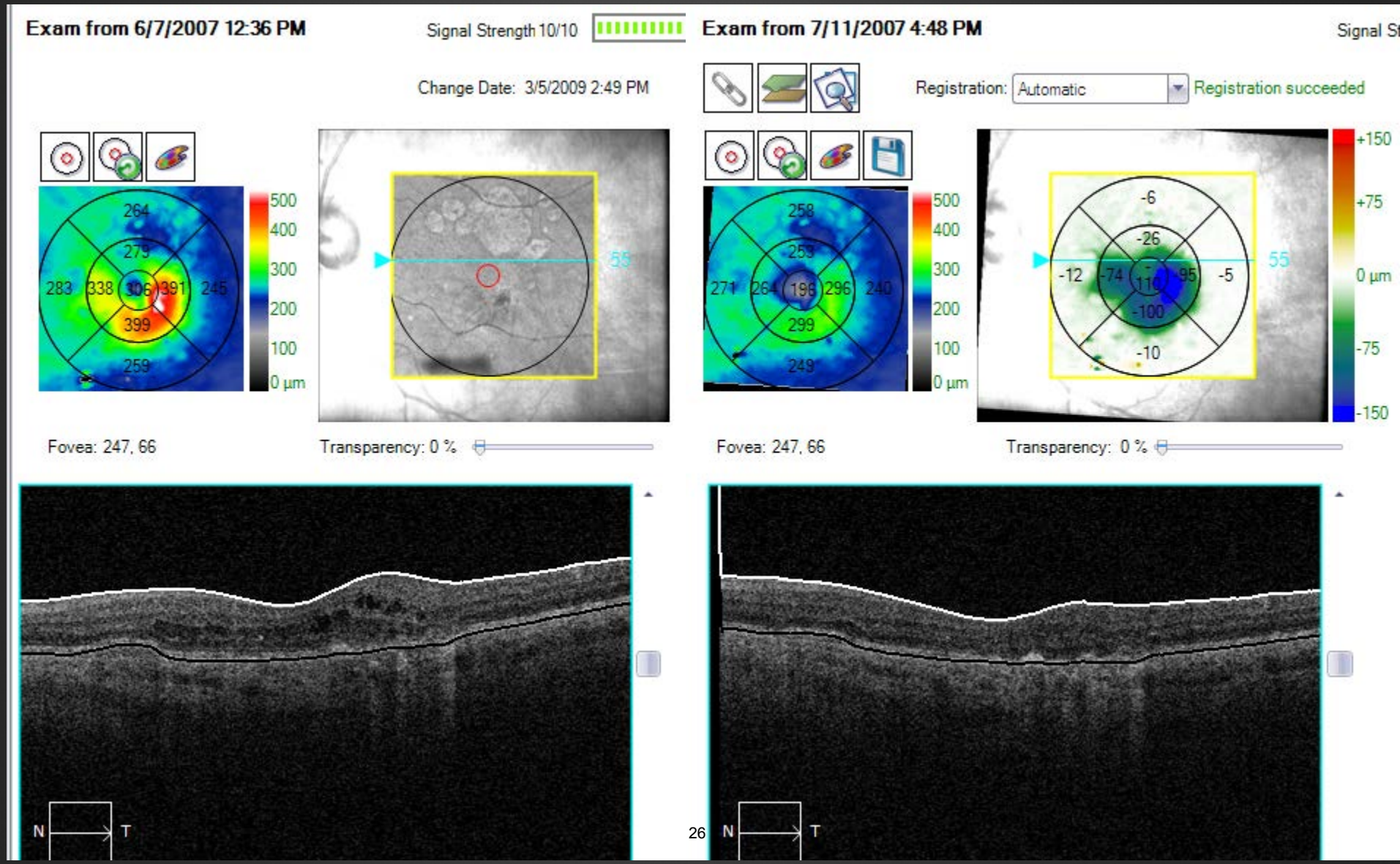
- 3D Macular thickness map
- Segmented ILM map
- Segmented RPE map





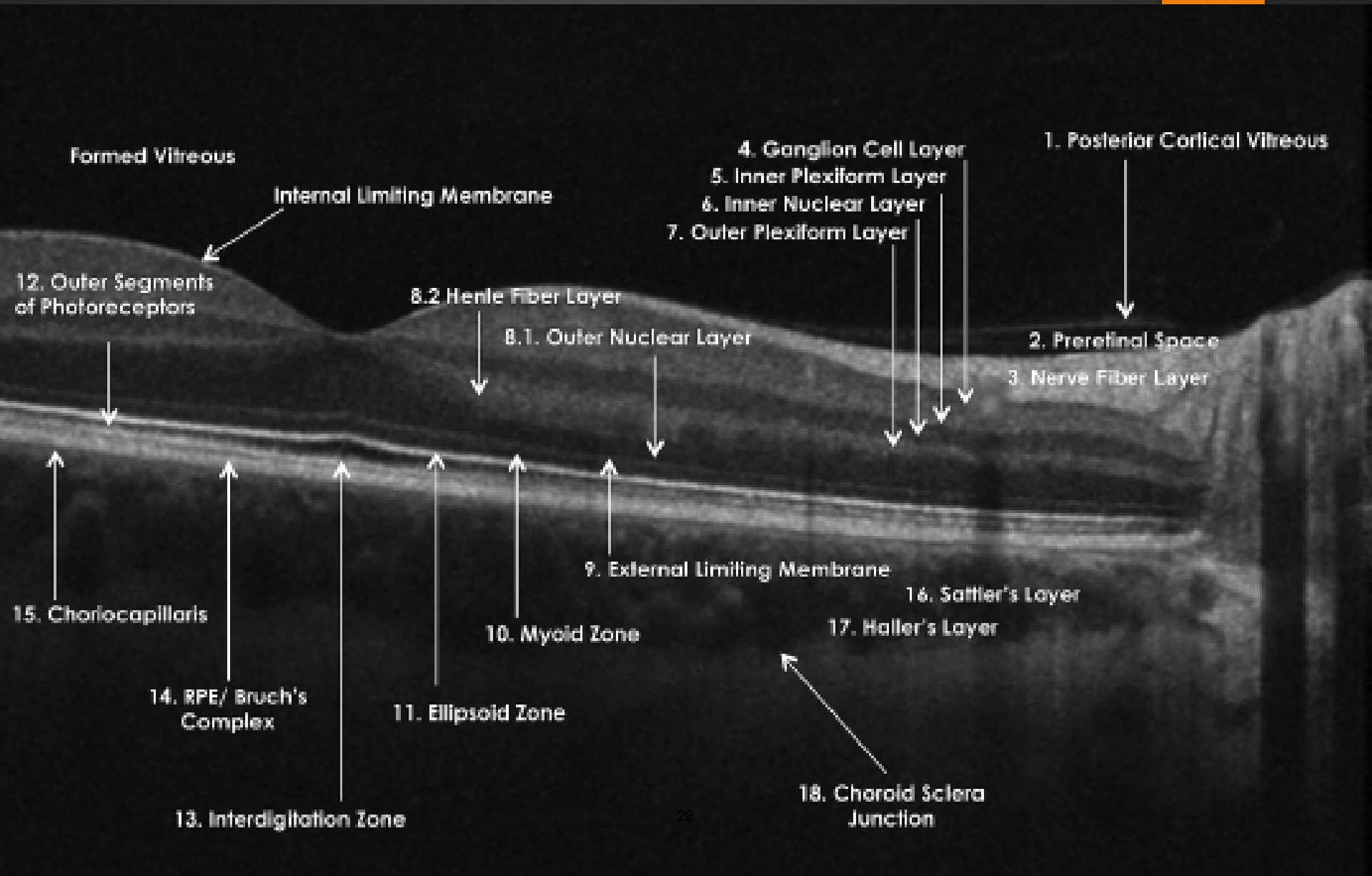
Cirrus Macular Change Analysis



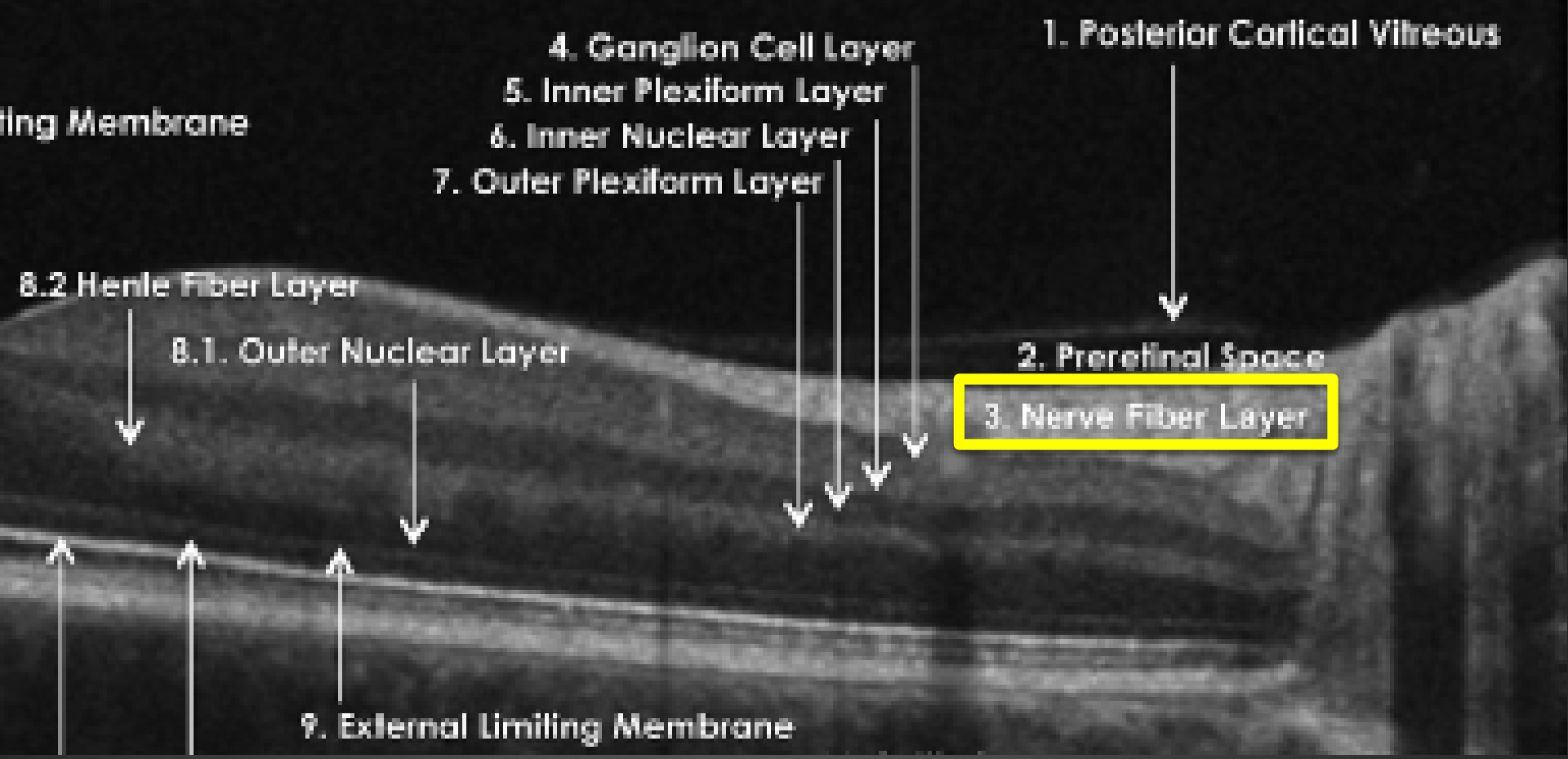
Reading the OCT

- **Heidelberg Spectralis**

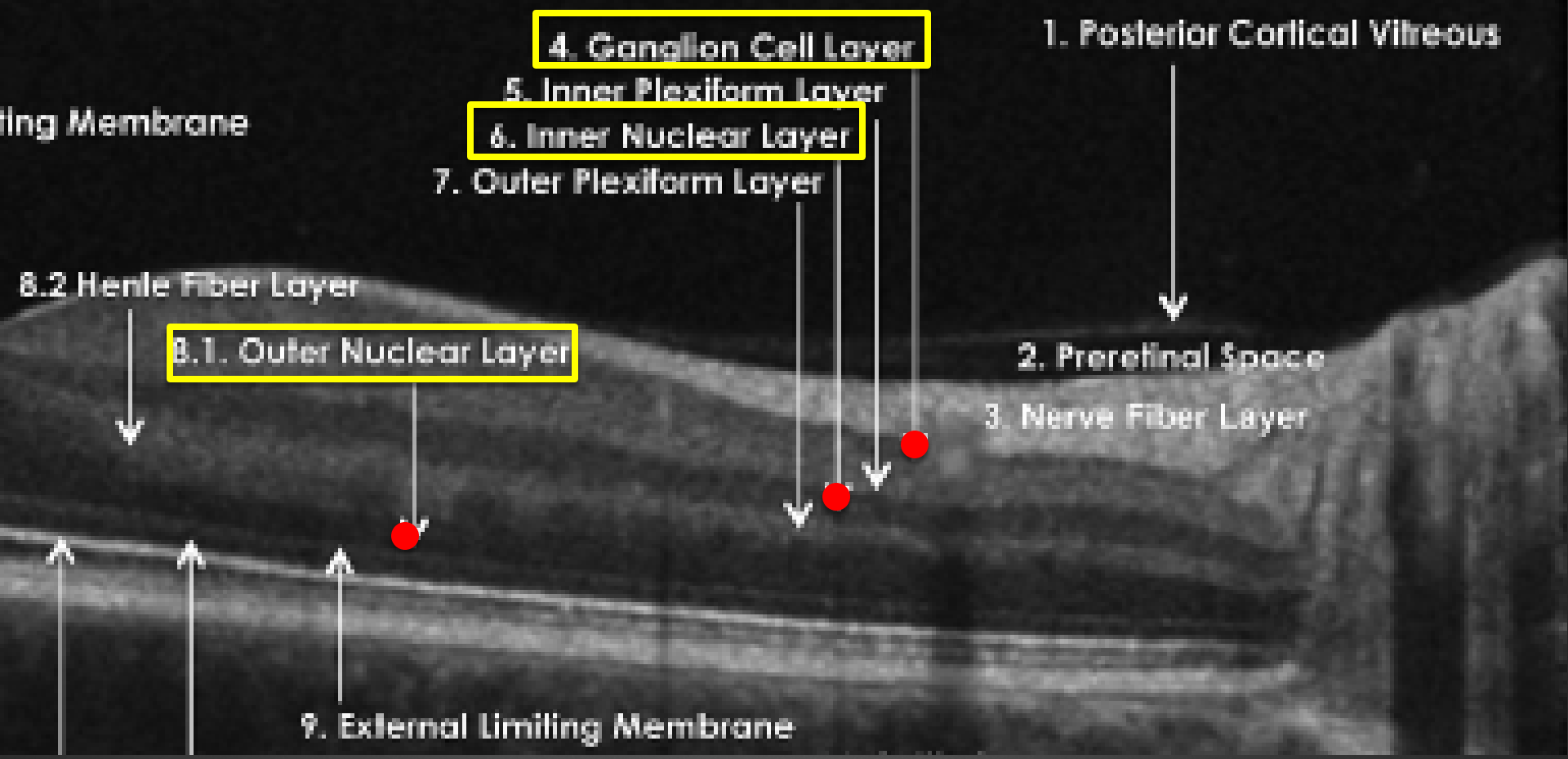
International Nomenclature for Optical Coherence Tomography Panel



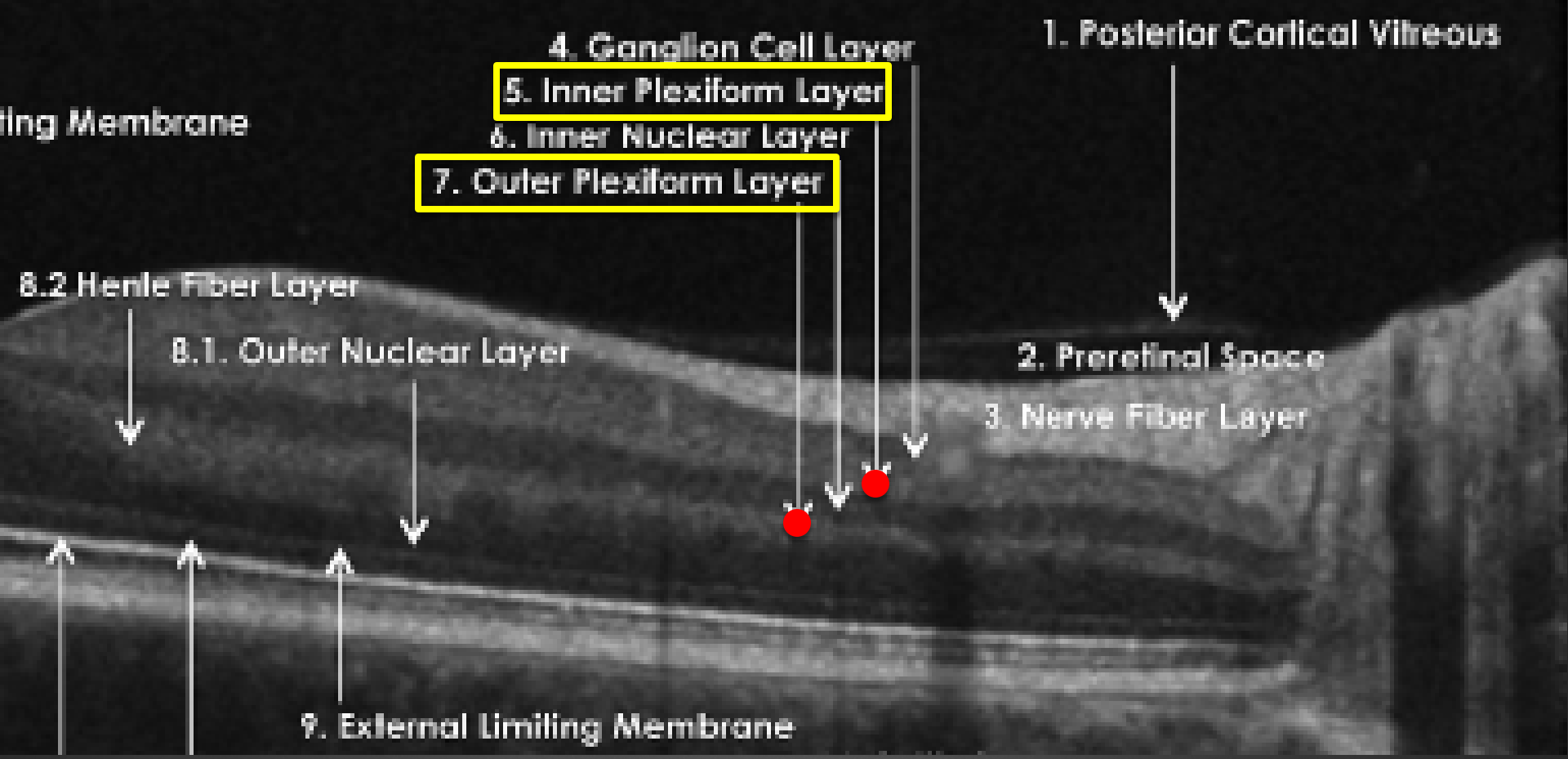
Internal limiting membrane is **bright** (hyper-reflective)



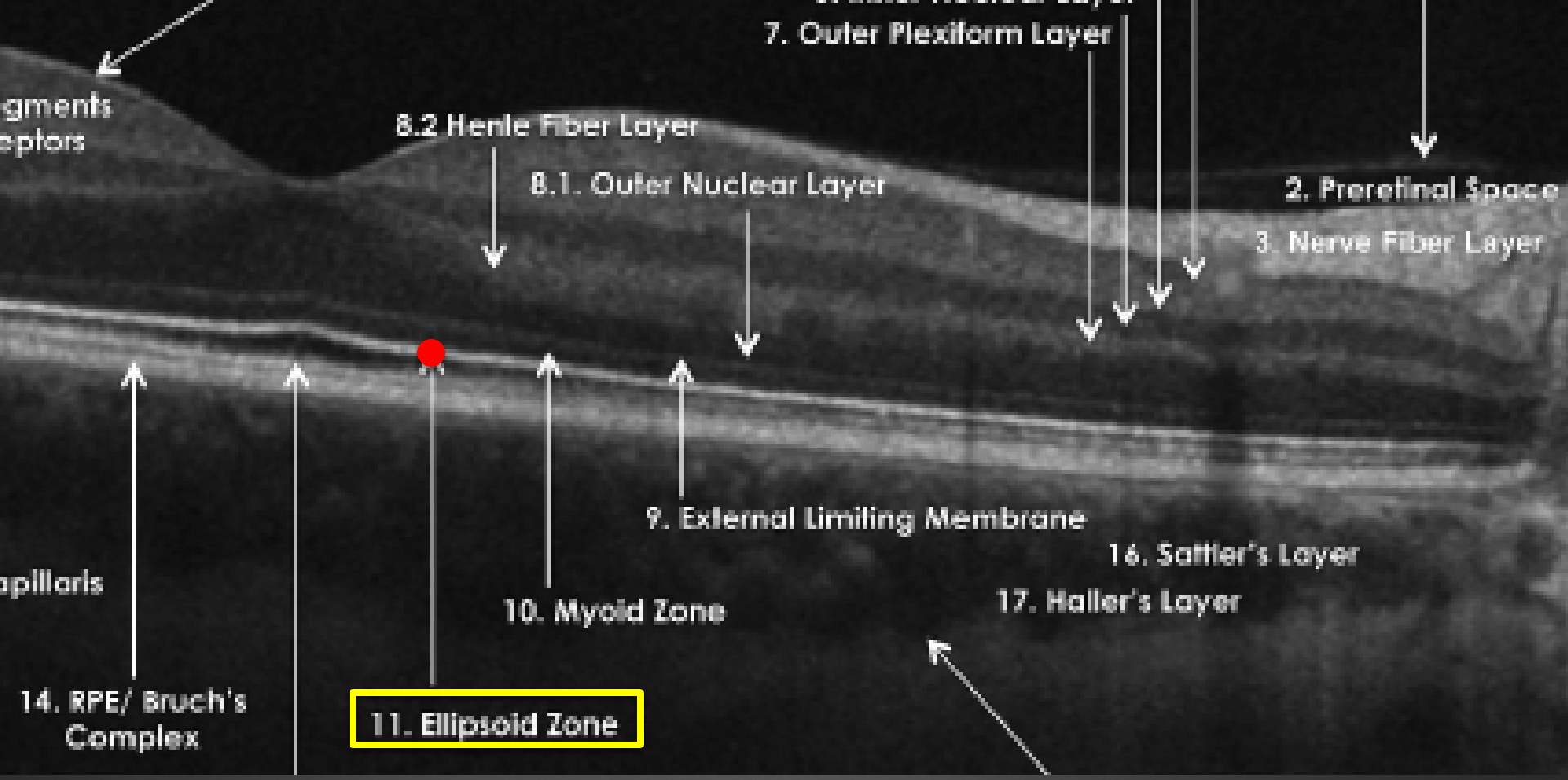
- NFL is **bright** (hyper-reflective)
- Densely packed nuclear layers are **dark** (hypo-reflective)
- Horizontal plexiform layers are **bright** (hyper-reflective)
- Ellipsoid zone is **bright** (hyper-reflective)
- RPE / Bruch's complex is **bright** (hyper-reflective)



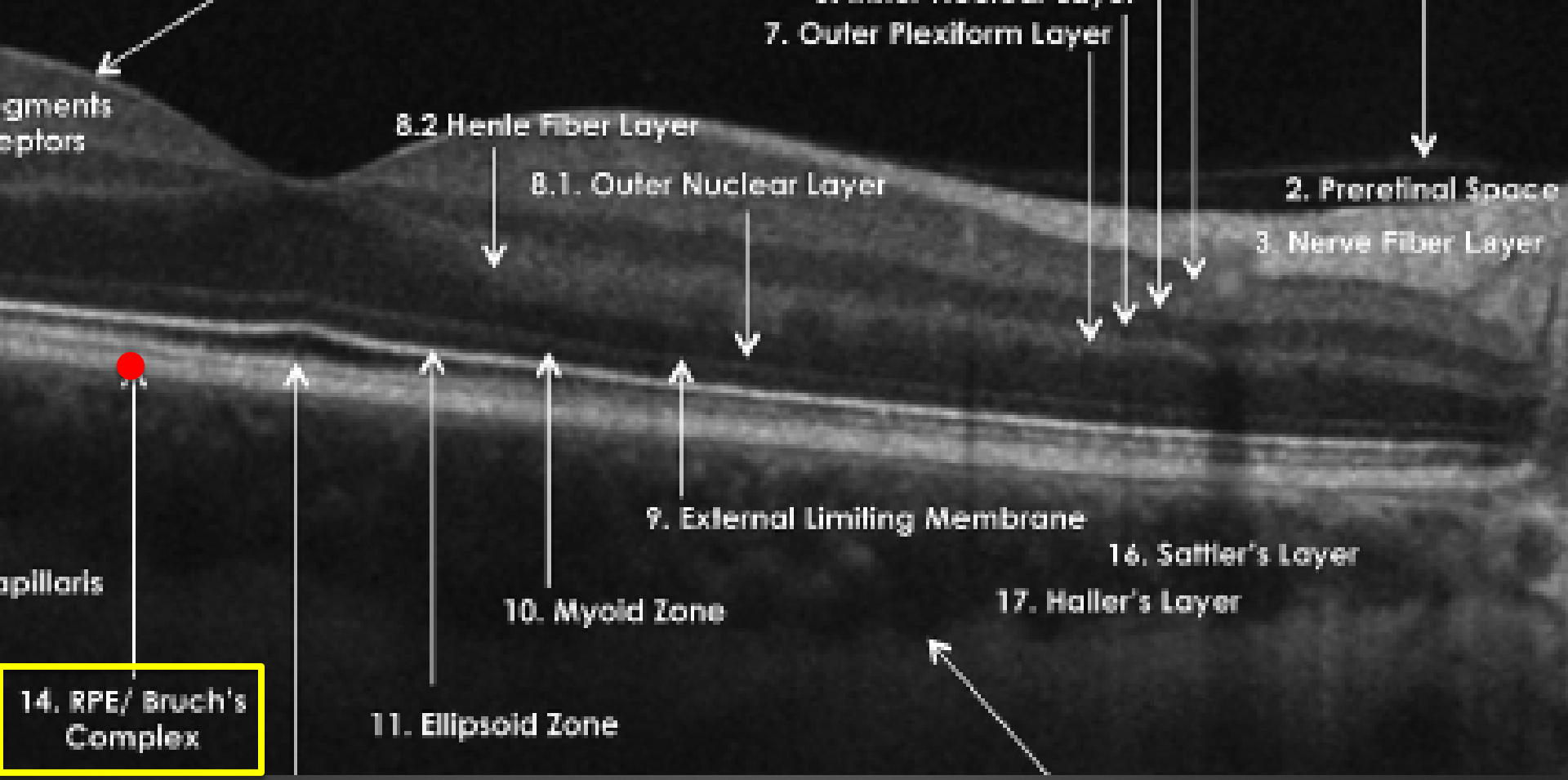
- NFL is **bright** (hyper-reflective)
- Densely packed nuclear layers are **dark** (hypo-reflective)
- Horizontal plexiform layers are **bright** (hyper-reflective)
- Ellipsoid zone is **bright** (hyper-reflective)
- RPE / Bruch's complex is **bright** (hyper-reflective)



- NFL is **bright** (hyper-reflective)
- Densely packed nuclear layers are **dark** (hypo-reflective)
- Horizontal plexiform layers are **bright** (hyper-reflective)
- Ellipsoid zone is **bright** (hyper-reflective)
- RPE / Bruch's complex is **bright** (hyper-reflective)

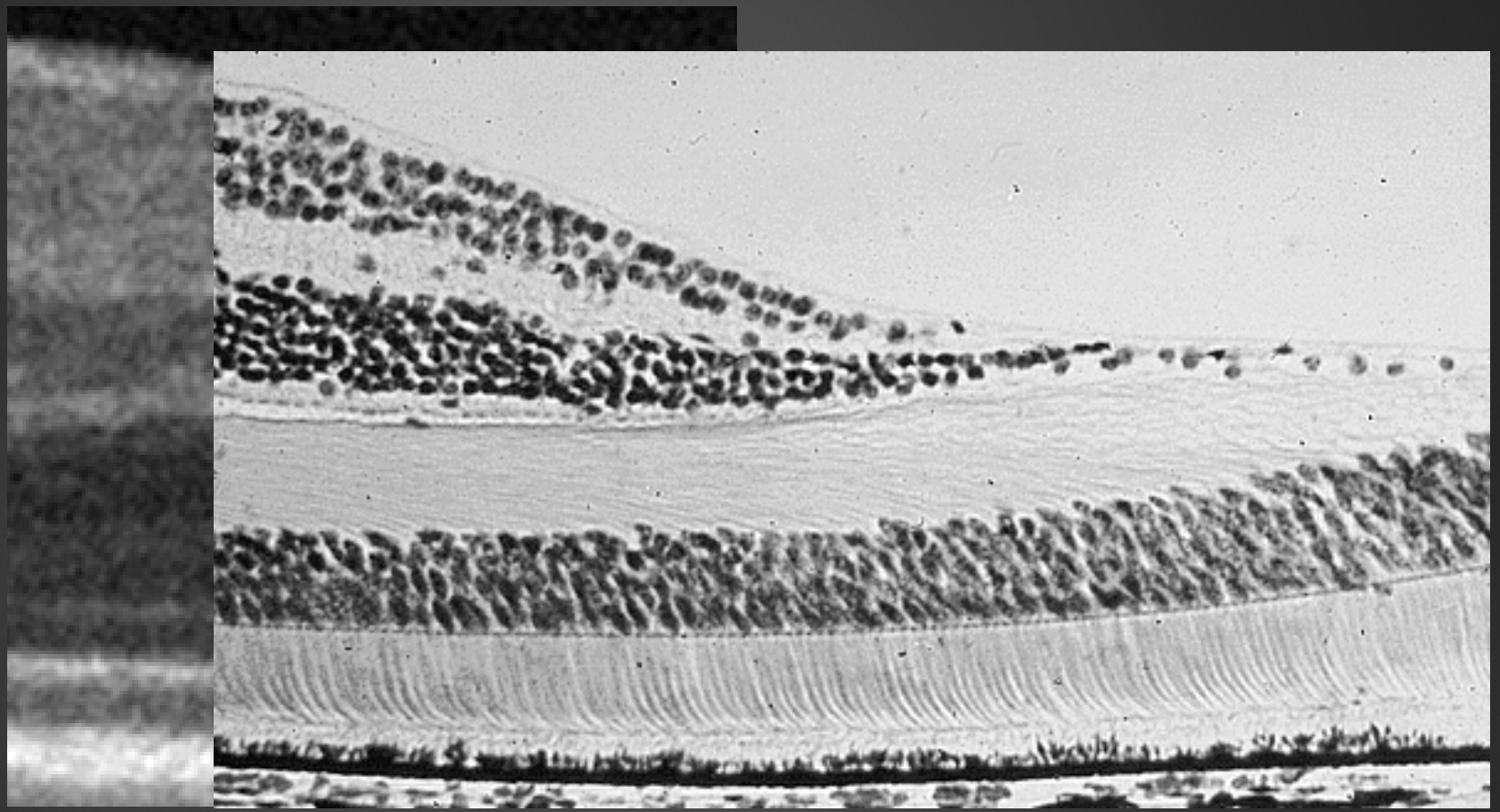


- NFL is **bright** (hyper-reflective)
- Densely packed nuclear layers are **dark** (hypo-reflective)
- Horizontal plexiform layers are **bright** (hyper-reflective)
- Ellipsoid zone is **bright** (hyper-reflective)
- RPE / Bruch's complex is **bright** (hyper reflective)

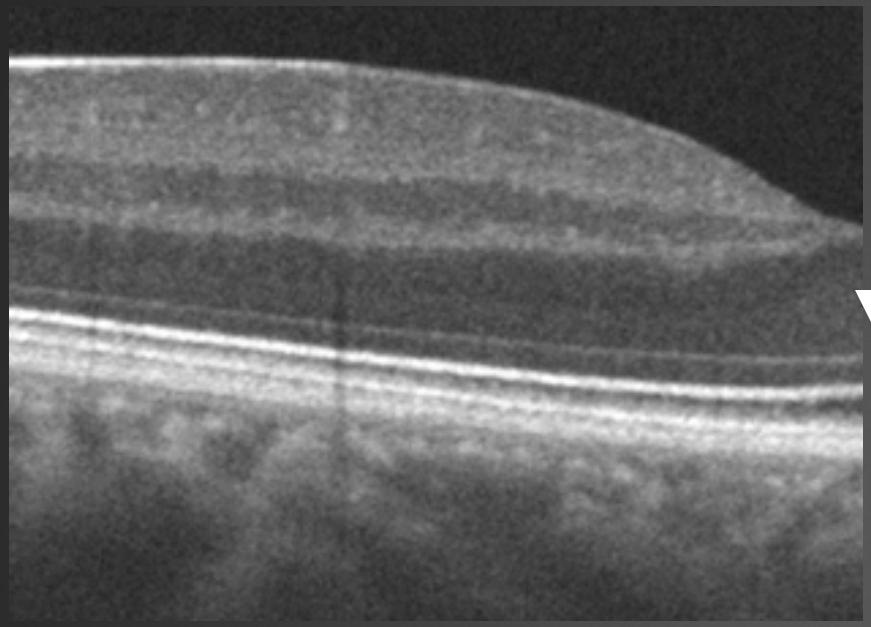


- NFL is **bright** (hyper-reflective)
- Densely packed nuclear layers are **dark** (hypo-reflective)
- Horizontal plexiform layers are **bright** (hyper-reflective)
- IS/OS junction is **bright** (hyper reflective)
- RPE / Bruch's complex is **bright** (hyper-reflective)

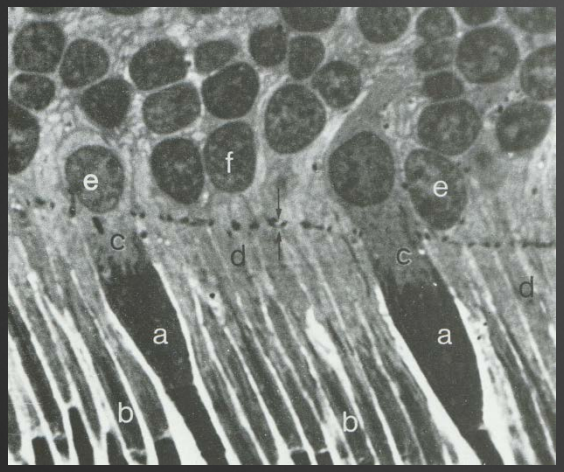
Outer retinal OCT layers

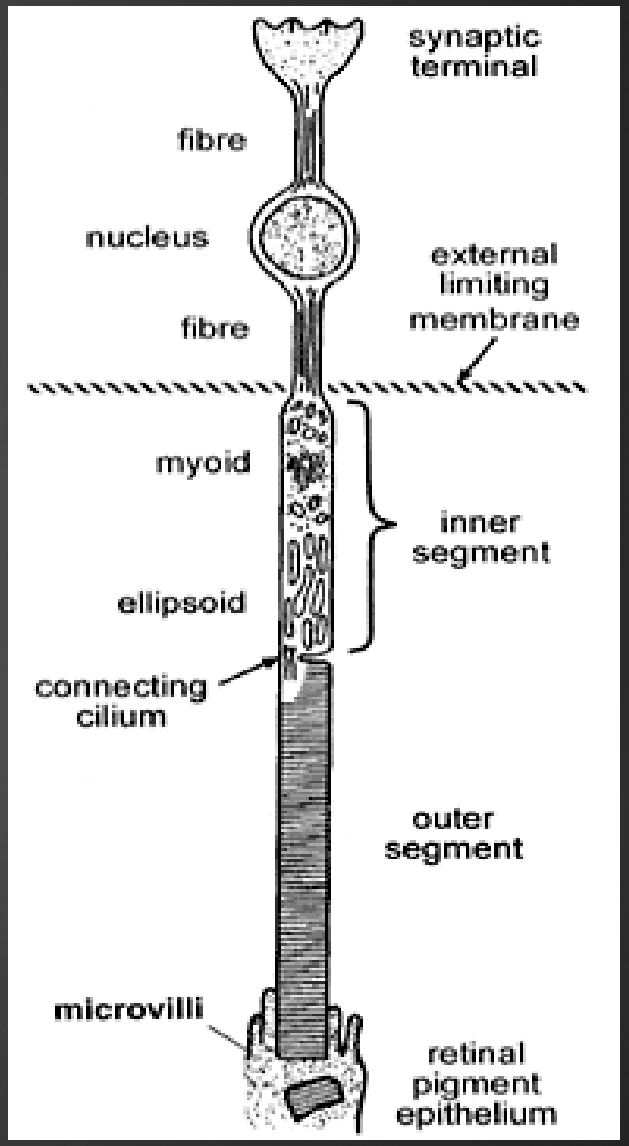


Anatomy of the Outer Retina



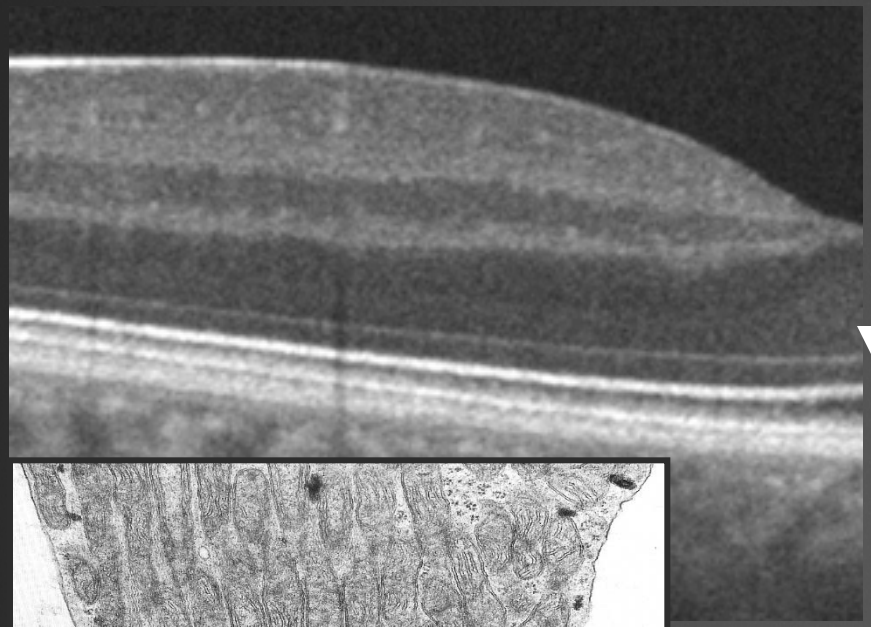
ELM

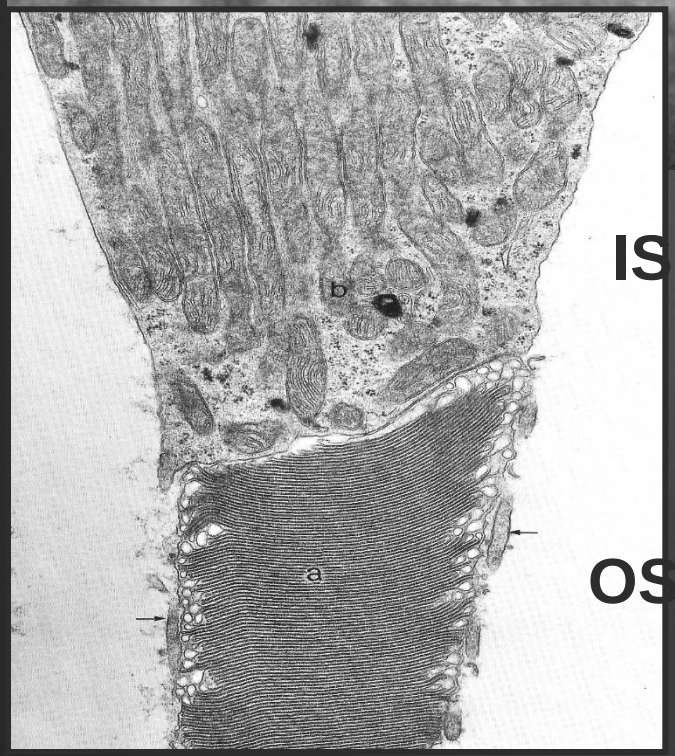




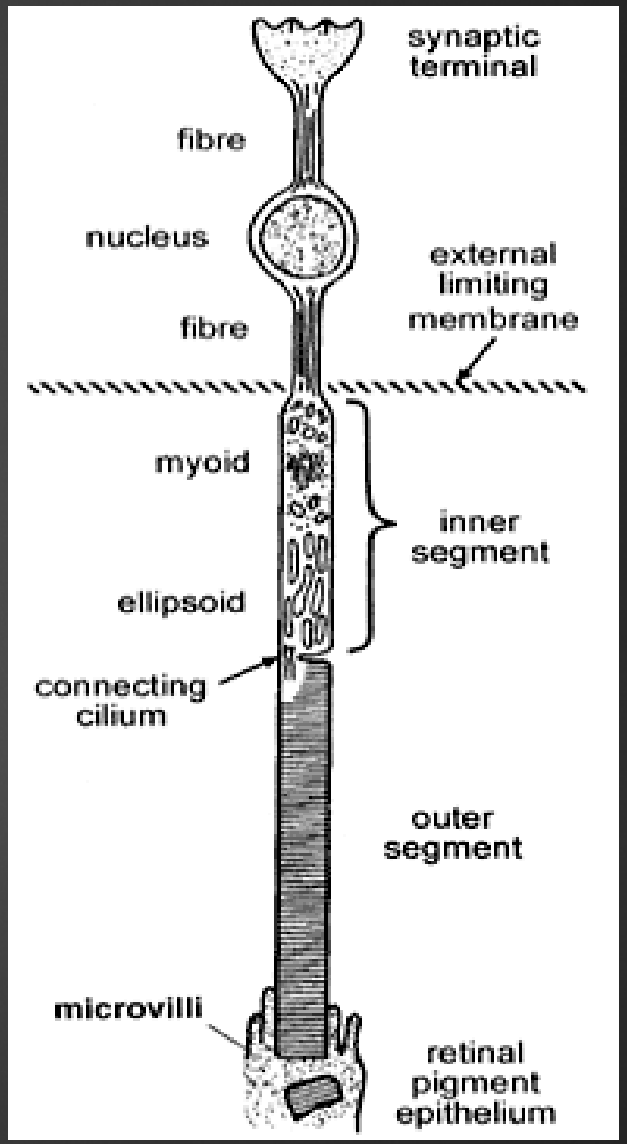
Hogan and Alvarado 1971

Anatomy of the Outer Retina



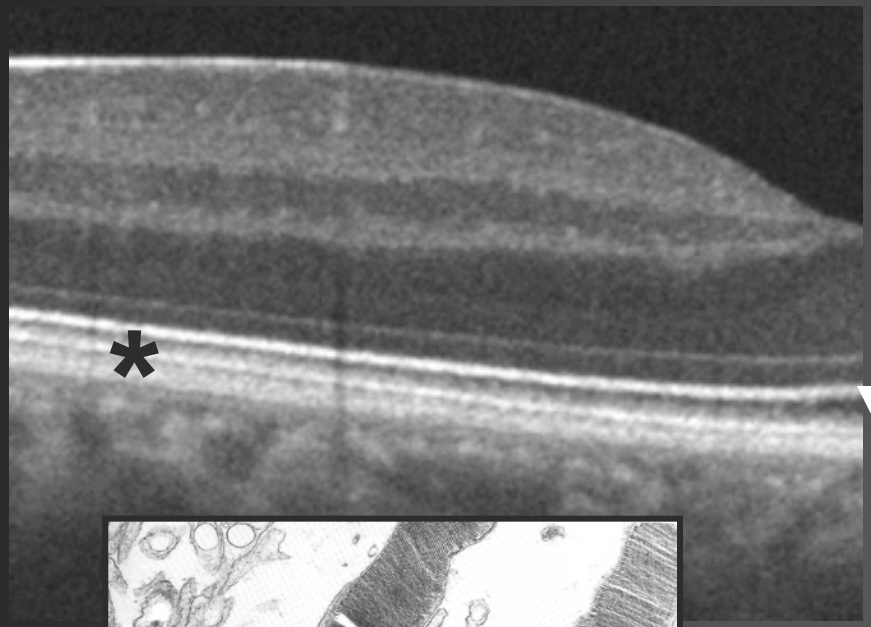


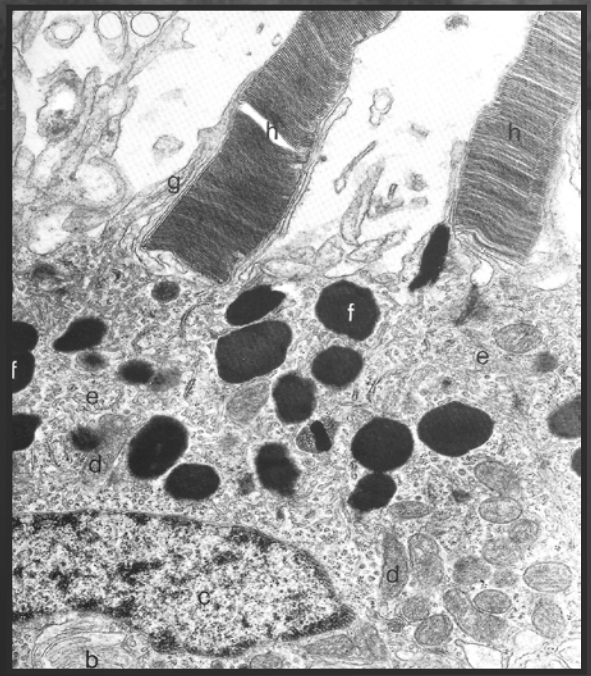
Photoreceptor
IS/OS
Junction



Hogan and Alvarado 1971

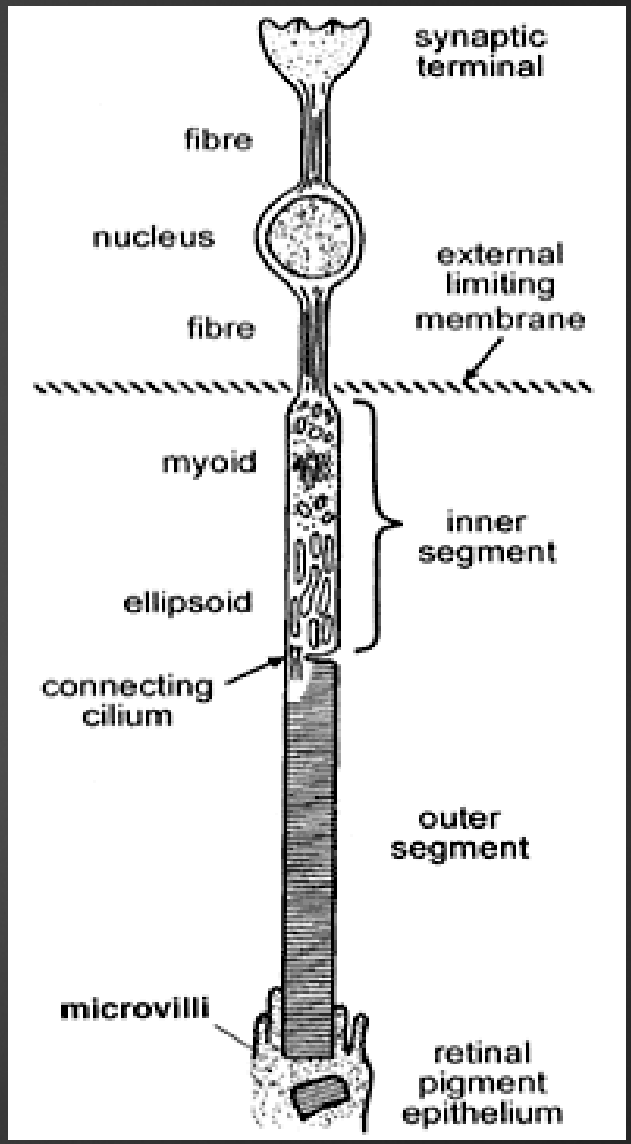
Anatomy of the Outer Retina





RPE

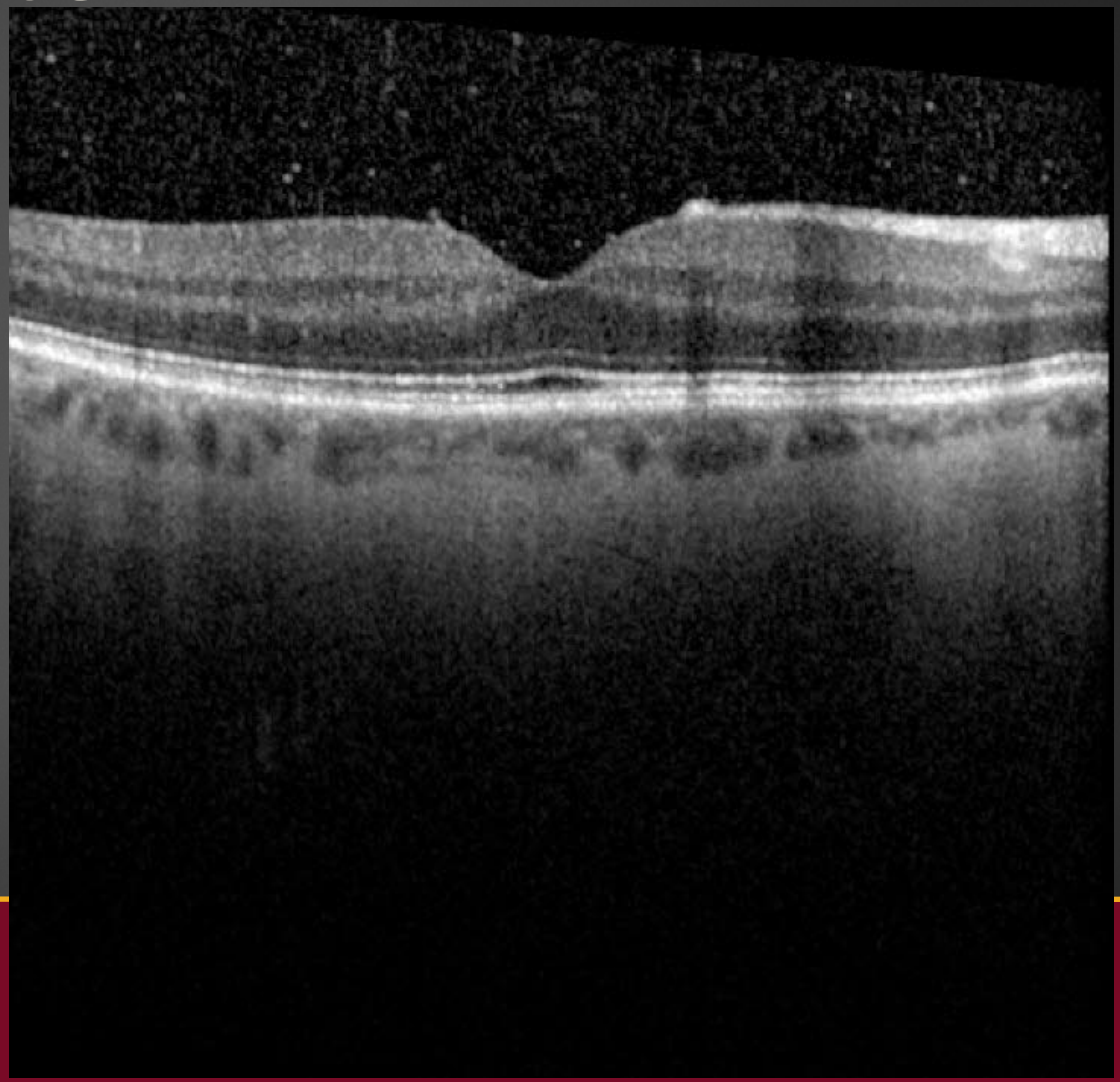
*OS/RPE



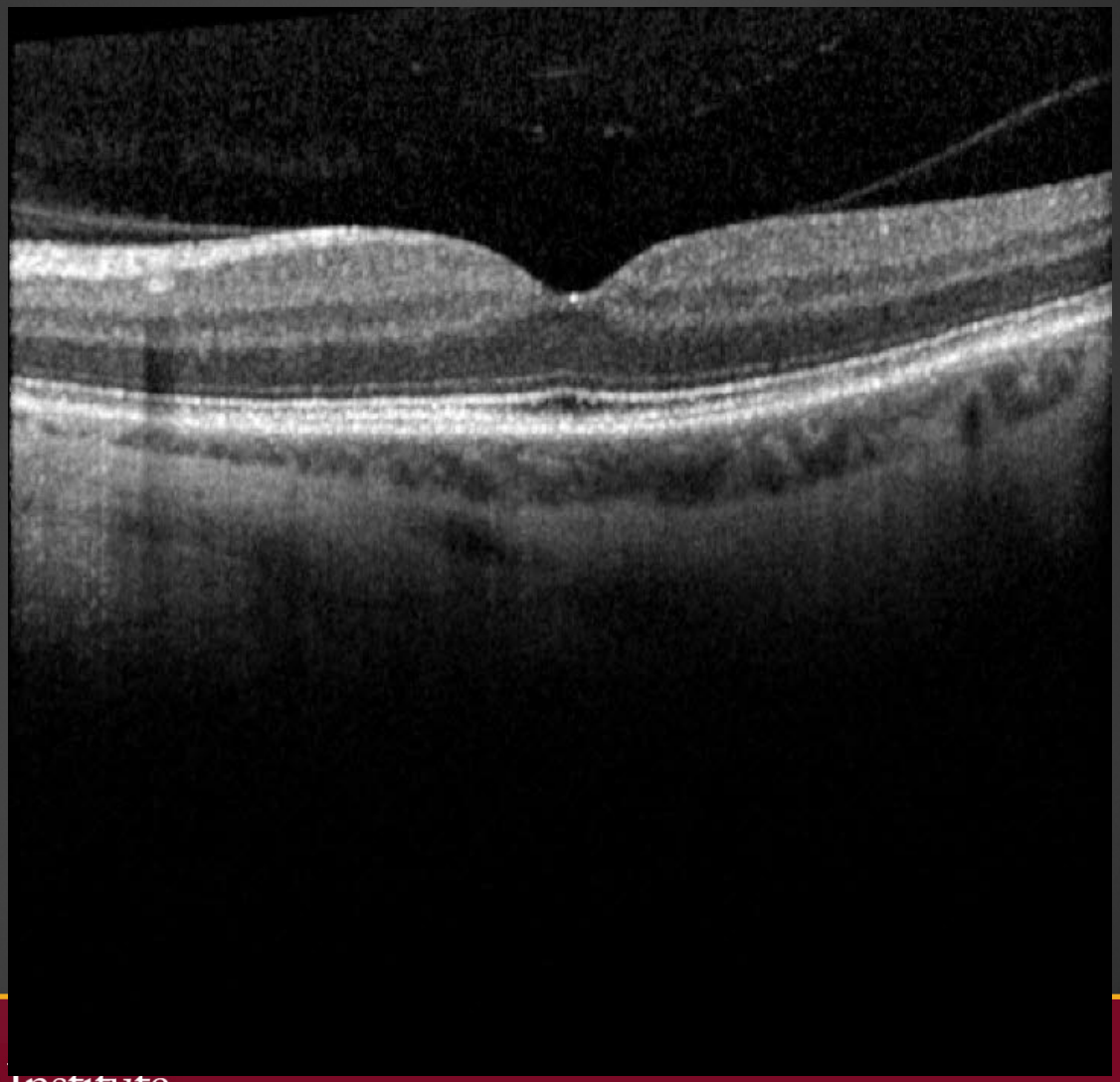
Hogan and Alvarado 1971

Sample Findings: Inner to Outer

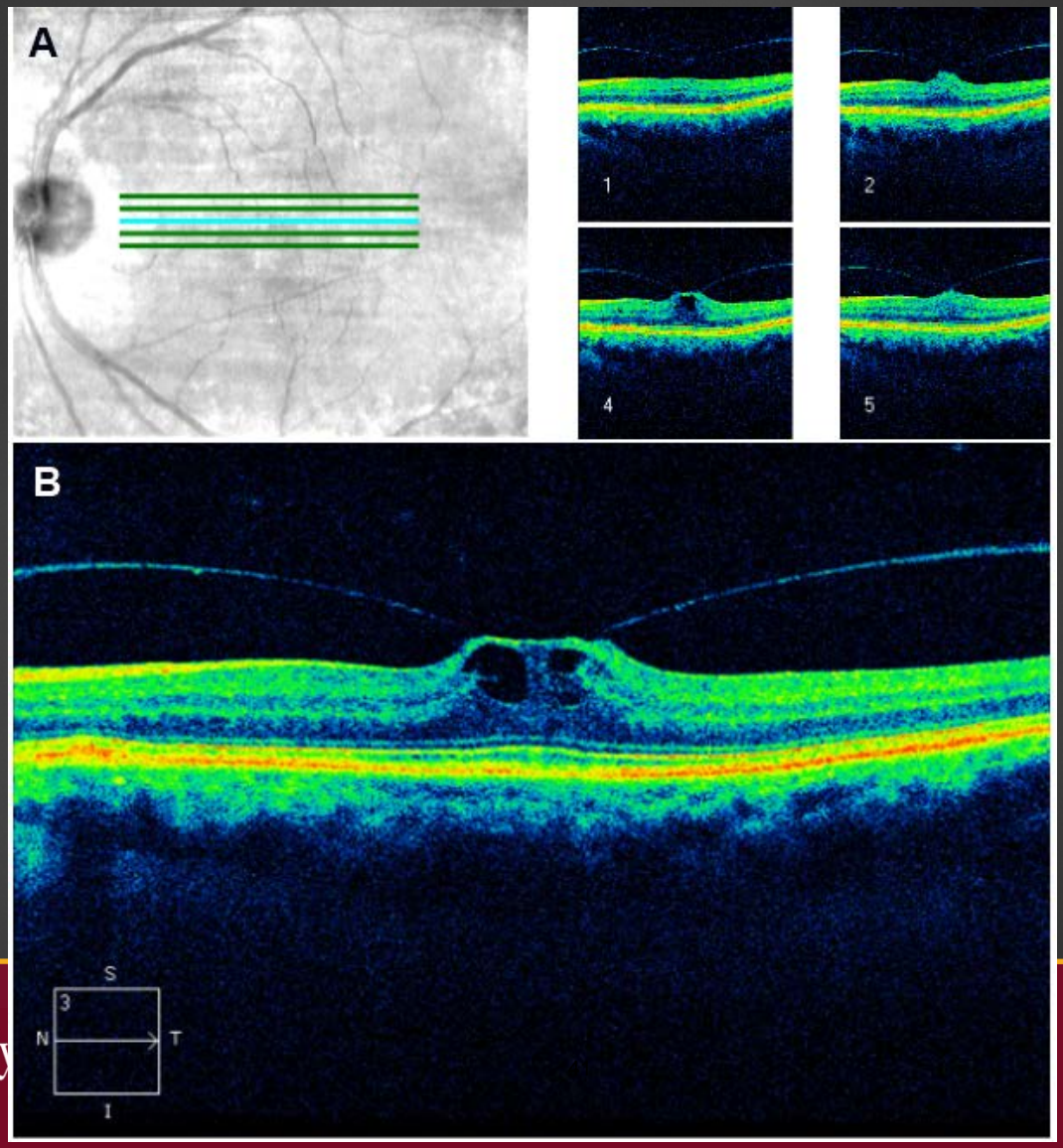
Vitreous Opacities



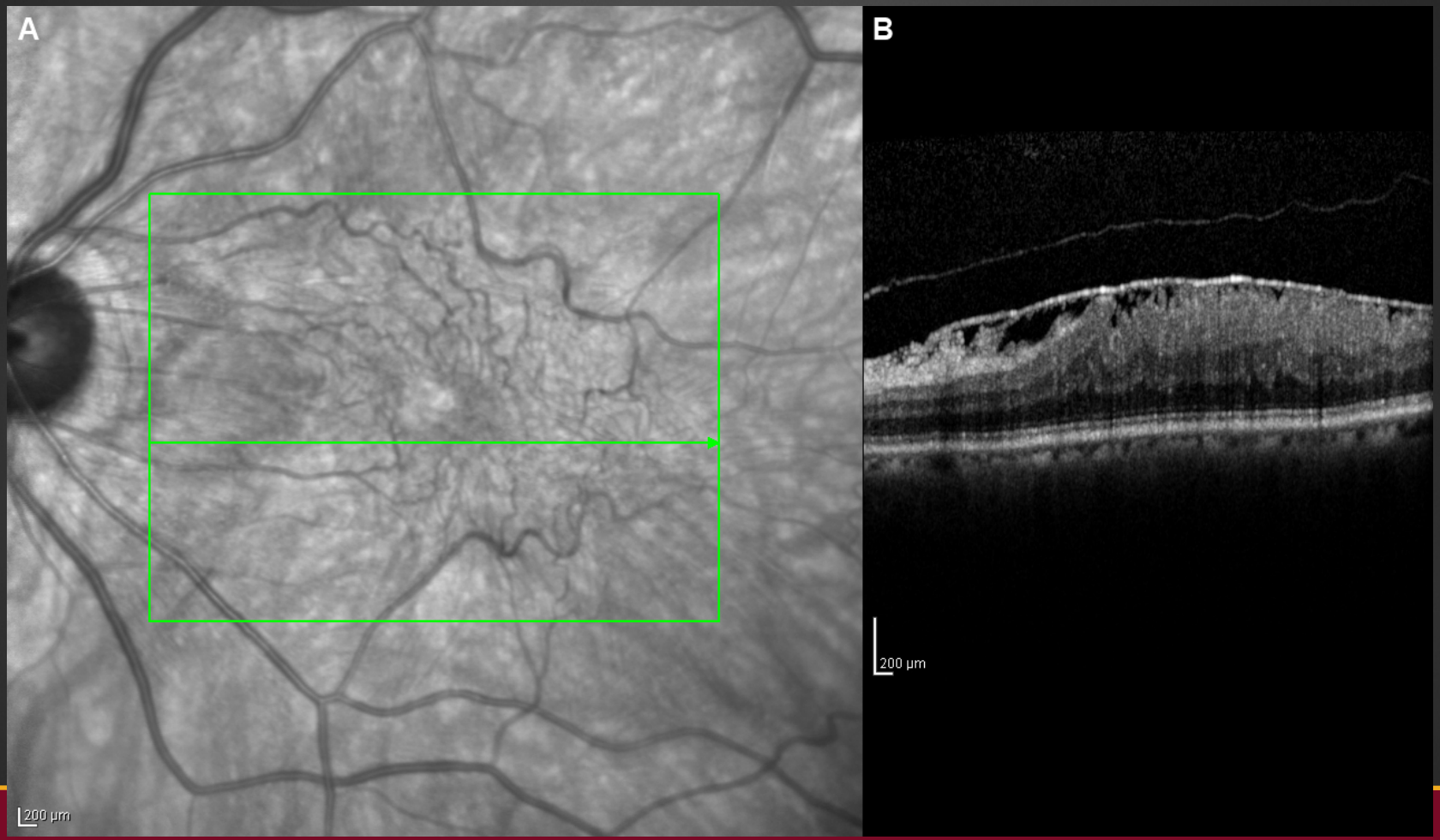
Vitreo-Macular Adhesion



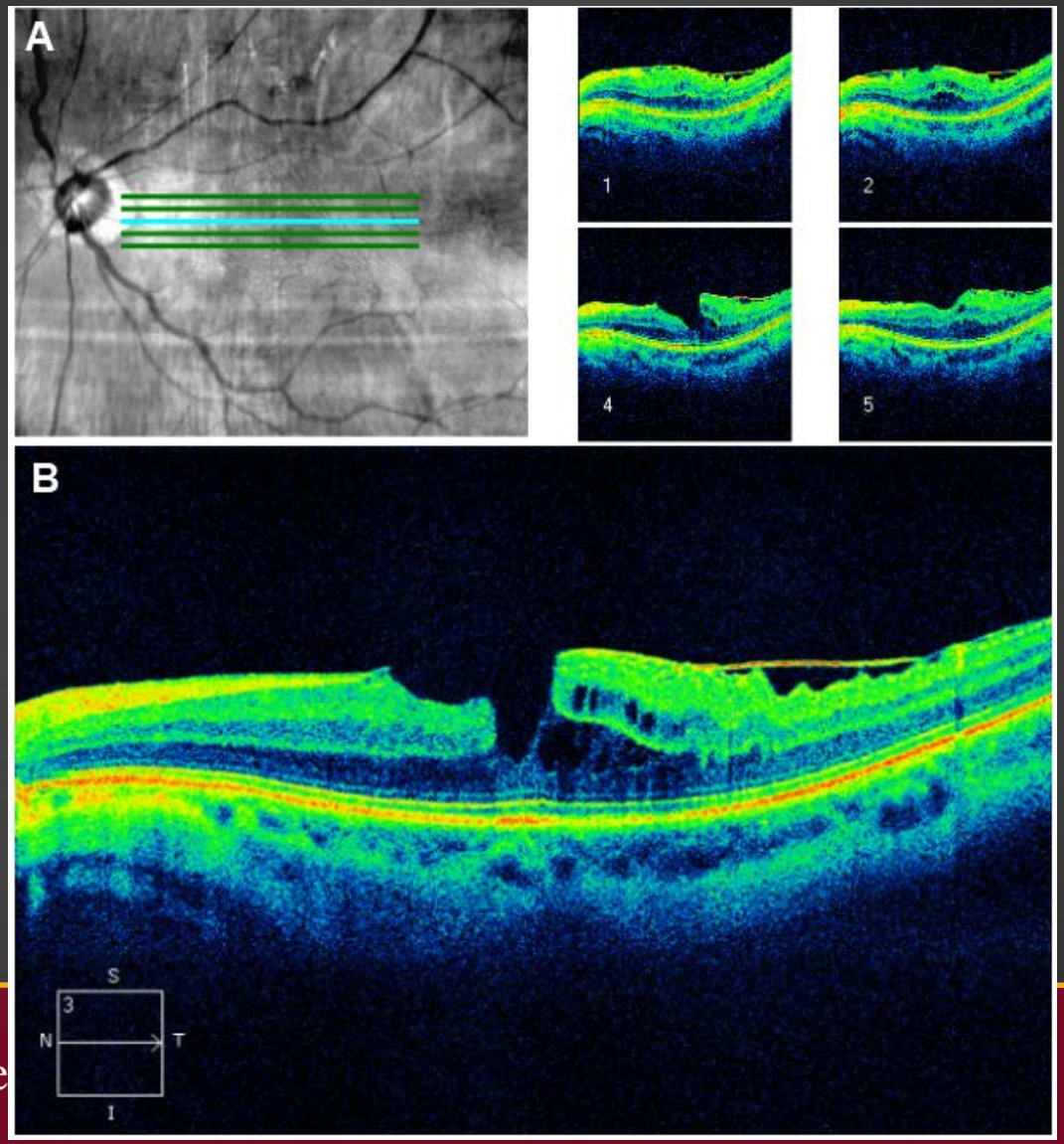
Vitreo Macular Traction



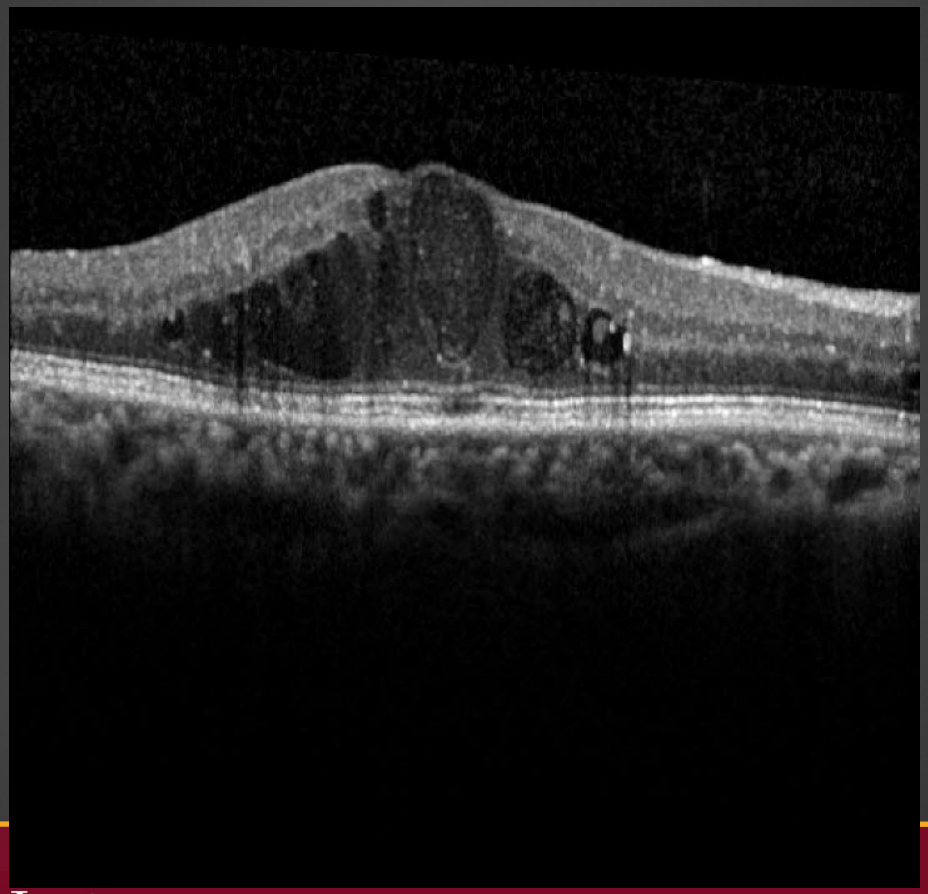
Epiretinal Membrane



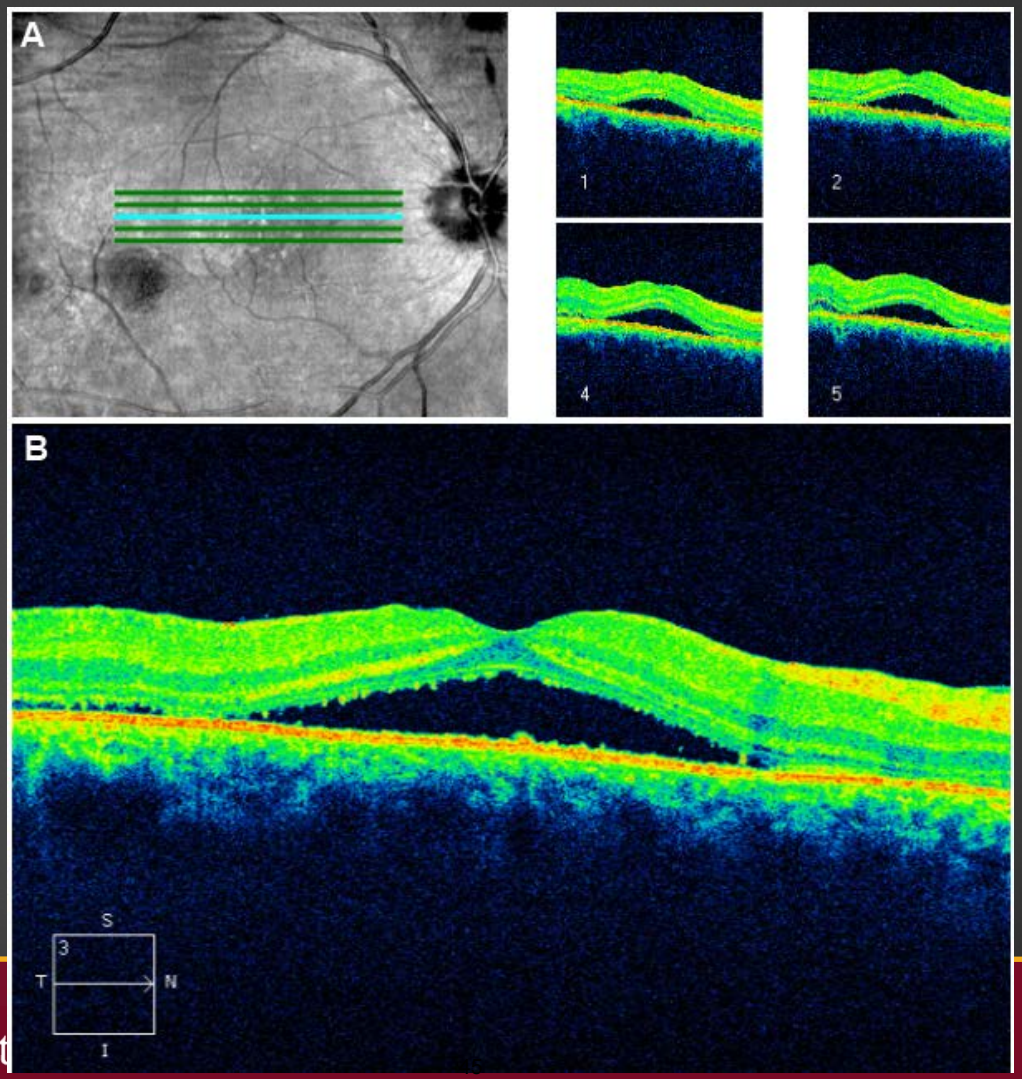
Lamellar Macular Hole



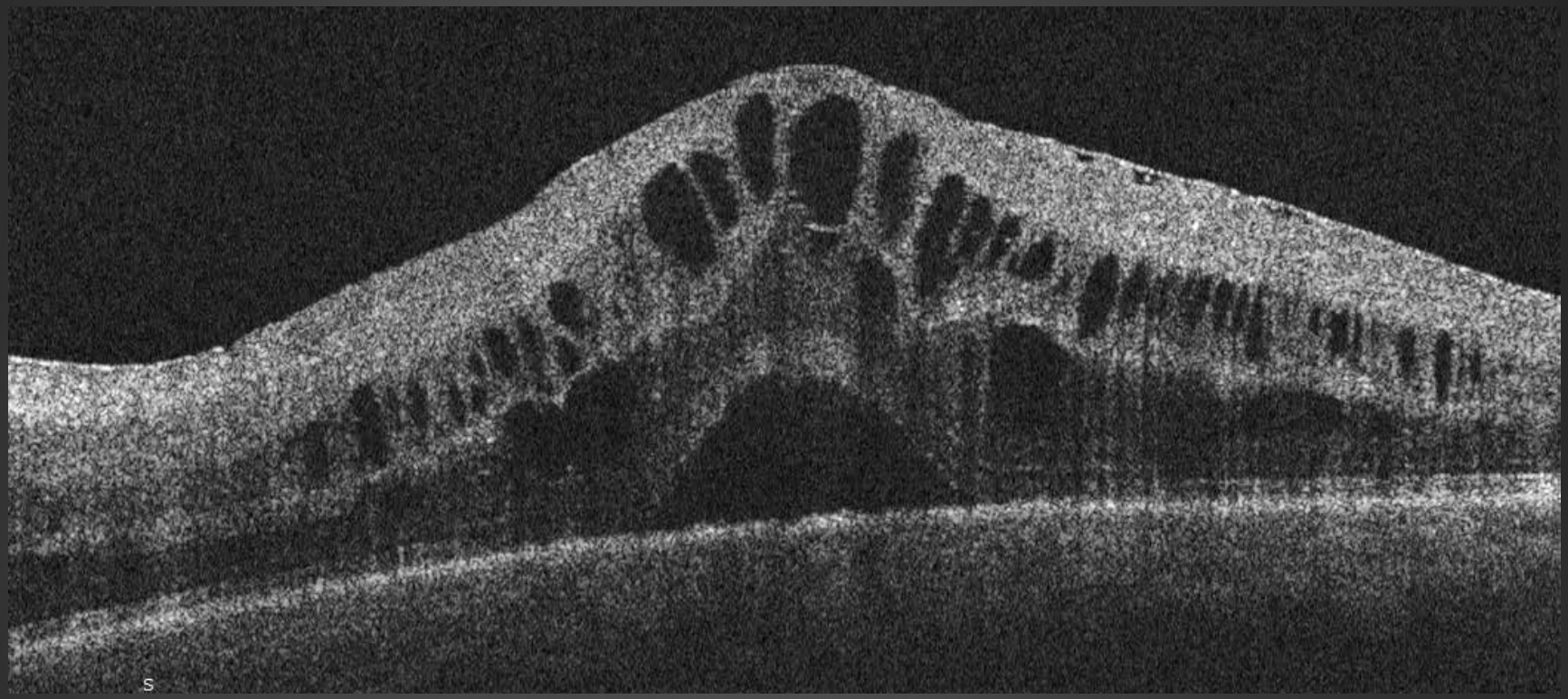
Intraretinal Fluid
Cystoid Macular Edema



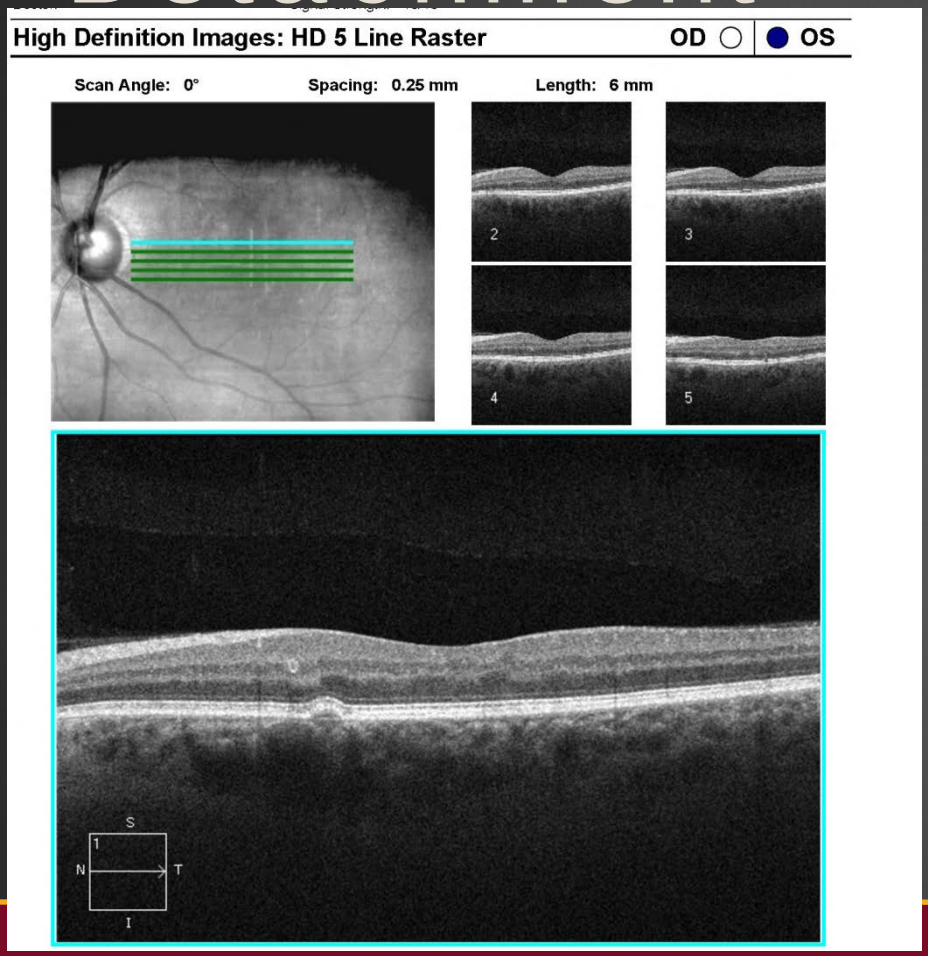
SubRetinal Fluid

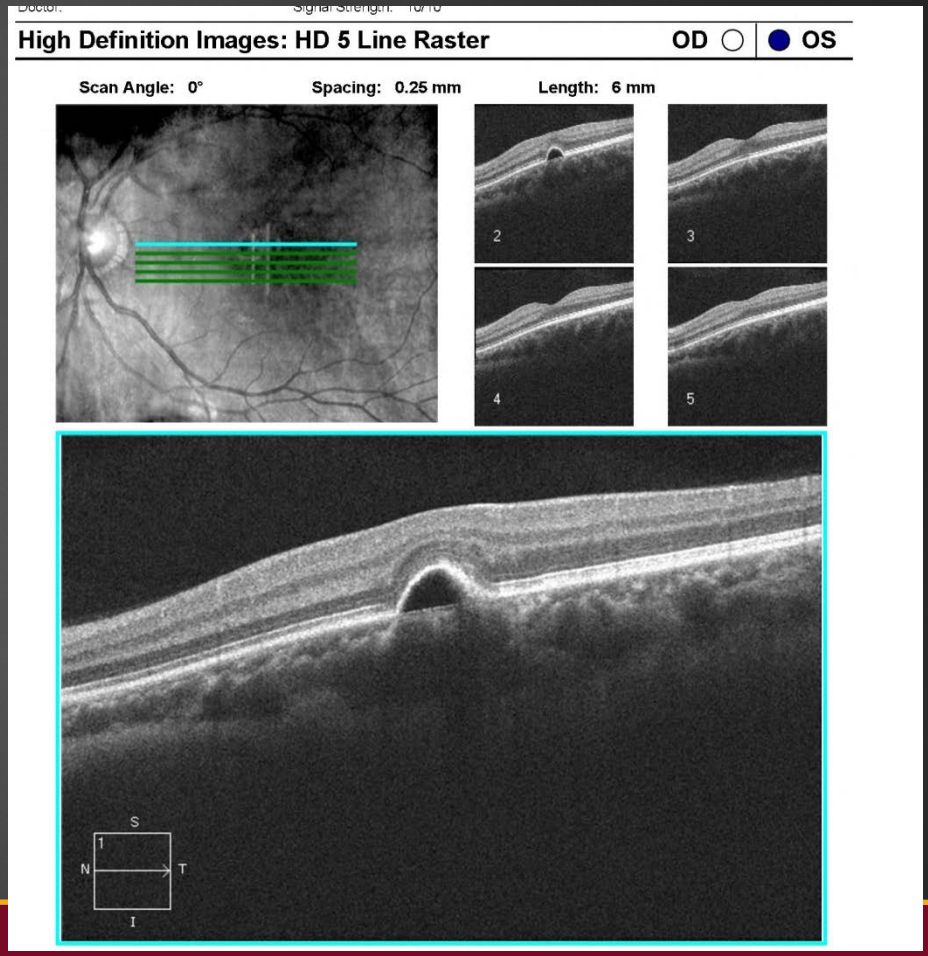


IRF & SRF

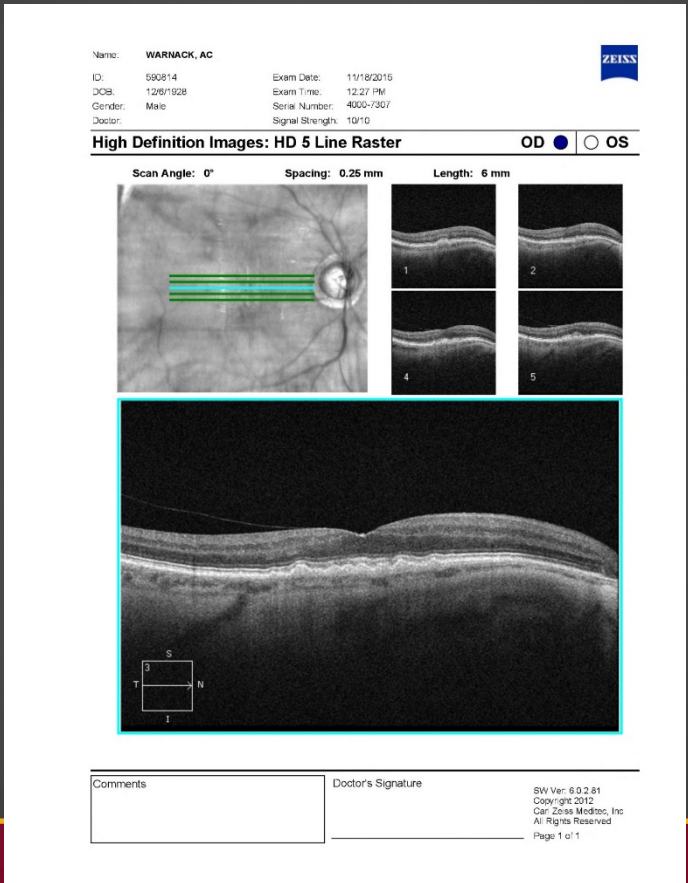


Pigment Epithelial Detachment





Drusen



Name: WARNACK, AC

ID: 590814
DOB: 12/6/1928
Gender: Male
Doctor:

Exam Date: 11/18/2015
Exam Time: 12:27 PM
Serial Number: 4000-7307
Signal Strength: 10/10

ZEISS

High Definition Images: HD 5 Line Raster OD ● ○ OS

Scan Angle: 0° **Spacing: 0.25 mm** **Length: 6 mm**

1 2 4 5

S T 3 N I

Comments

Doctor's Signature

SW Ver: 6.0.2.81
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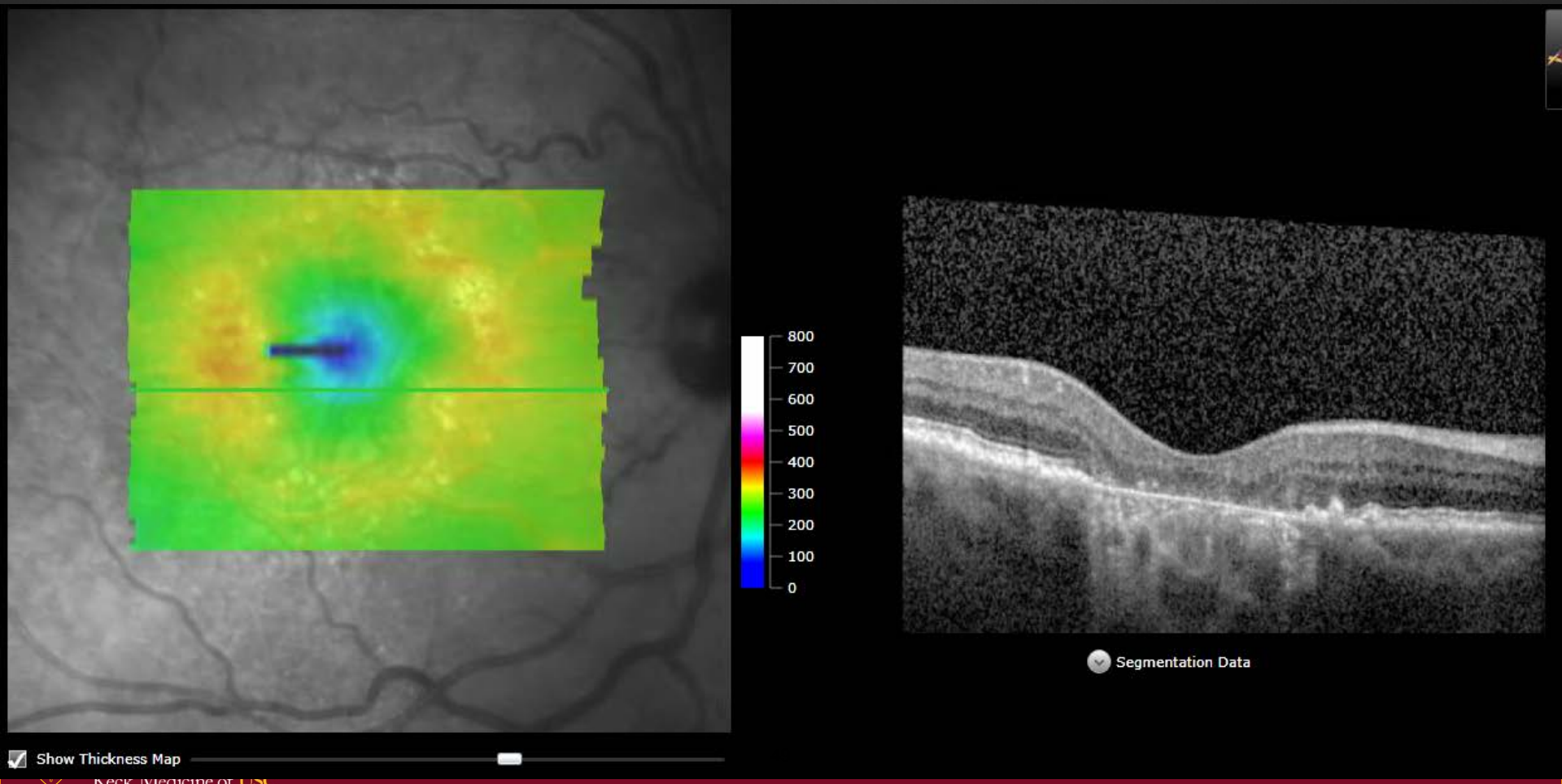
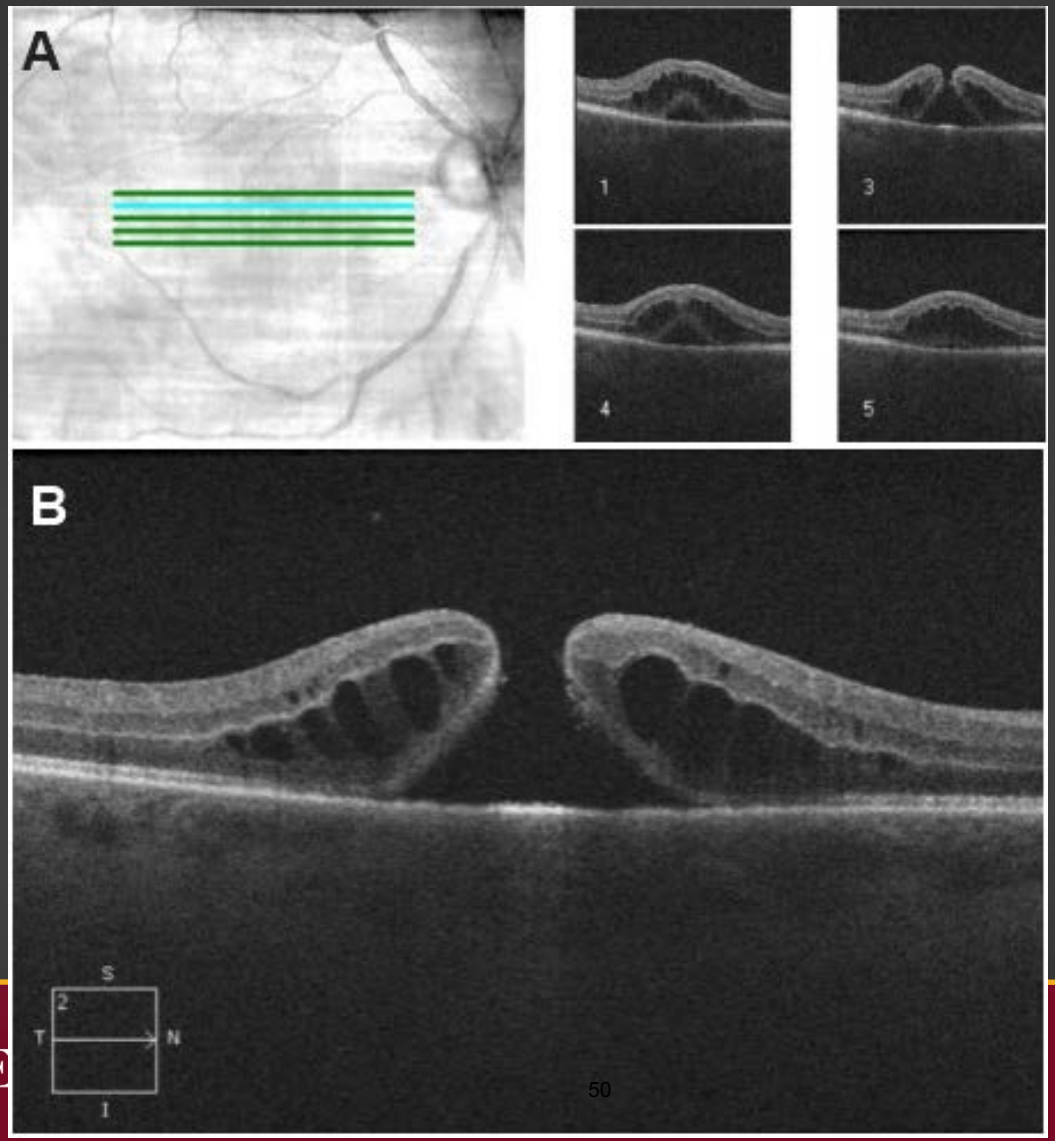
Page 1 of 1

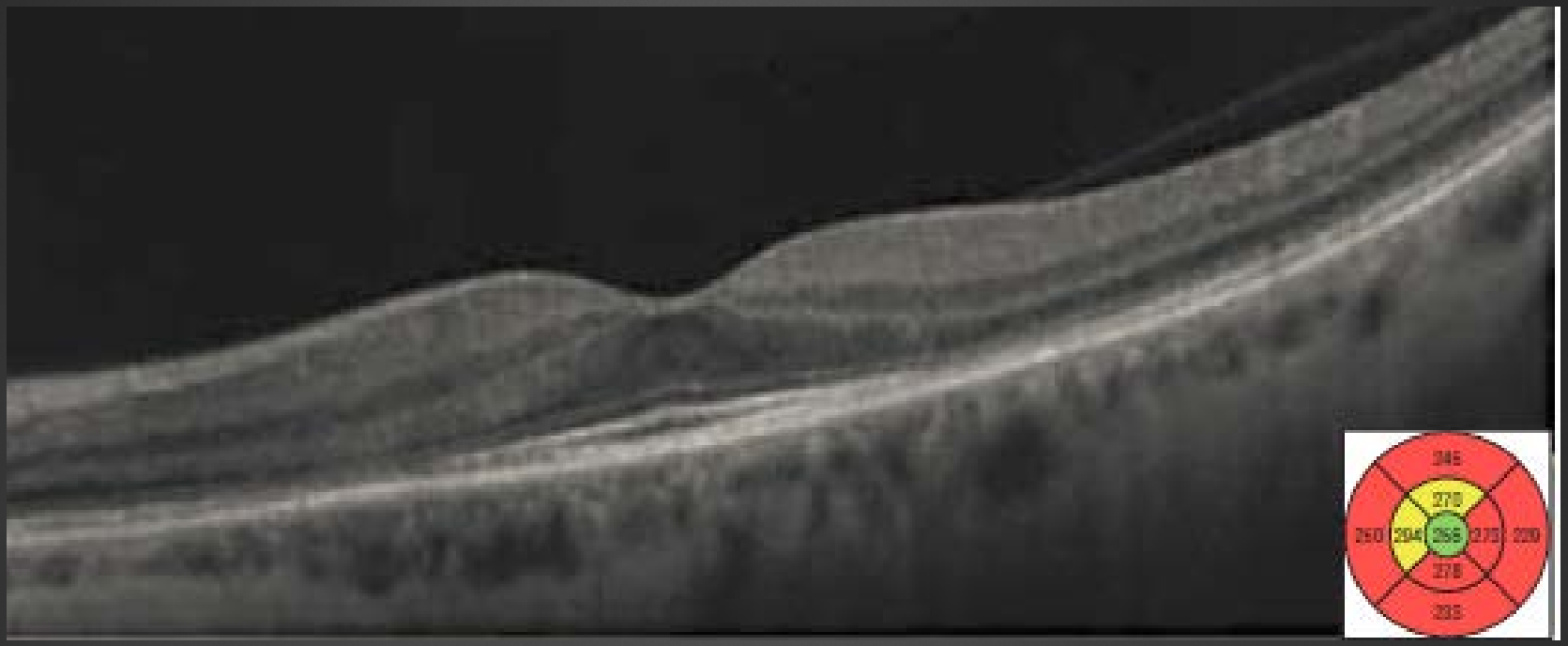
Geographic Atrophy



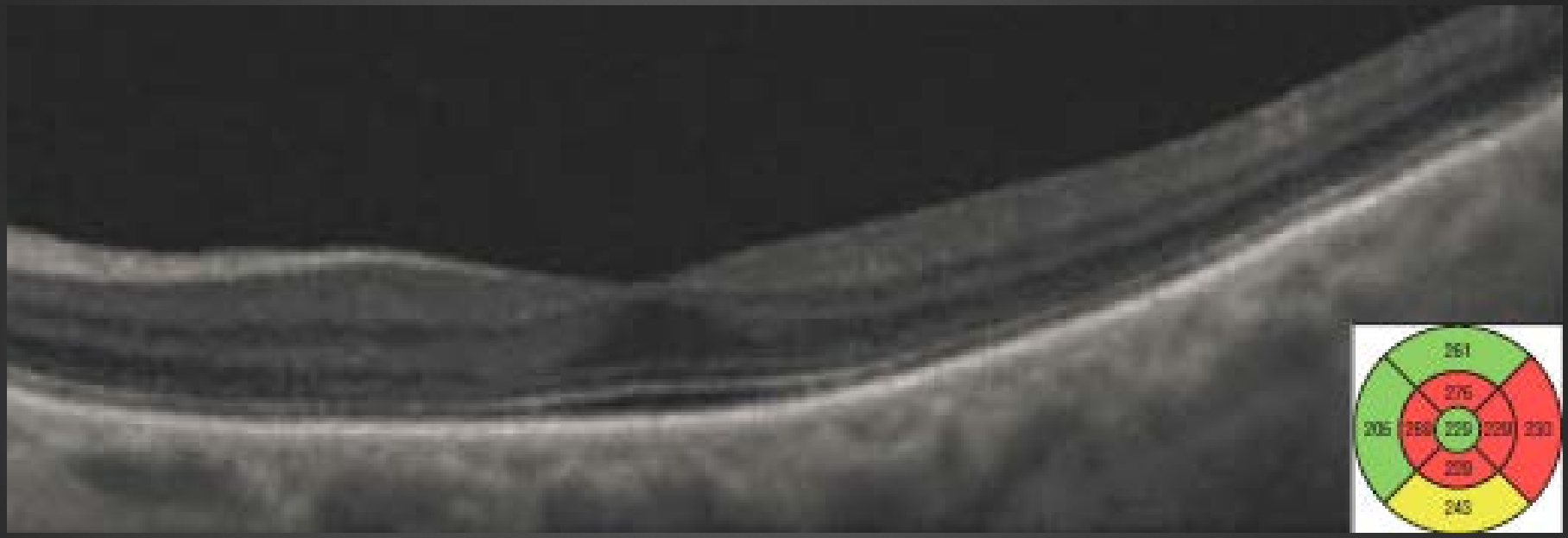
Full Thickness Macular Hole



Mystery case 1



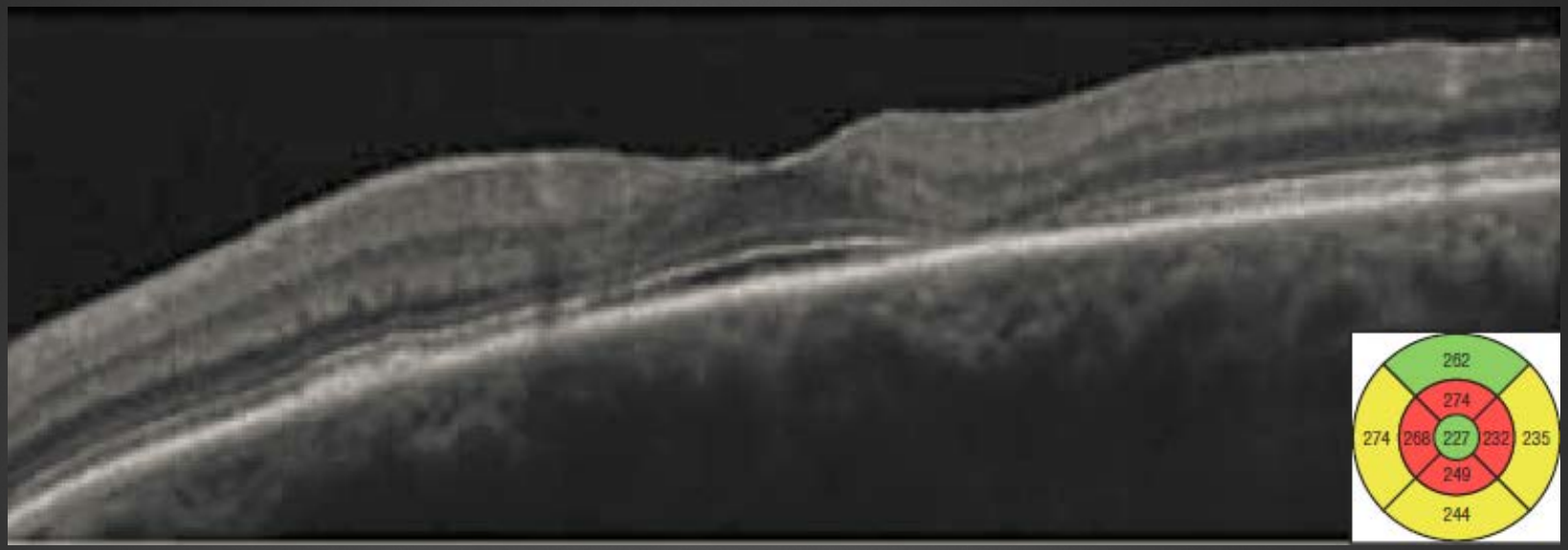
Mystery case 2



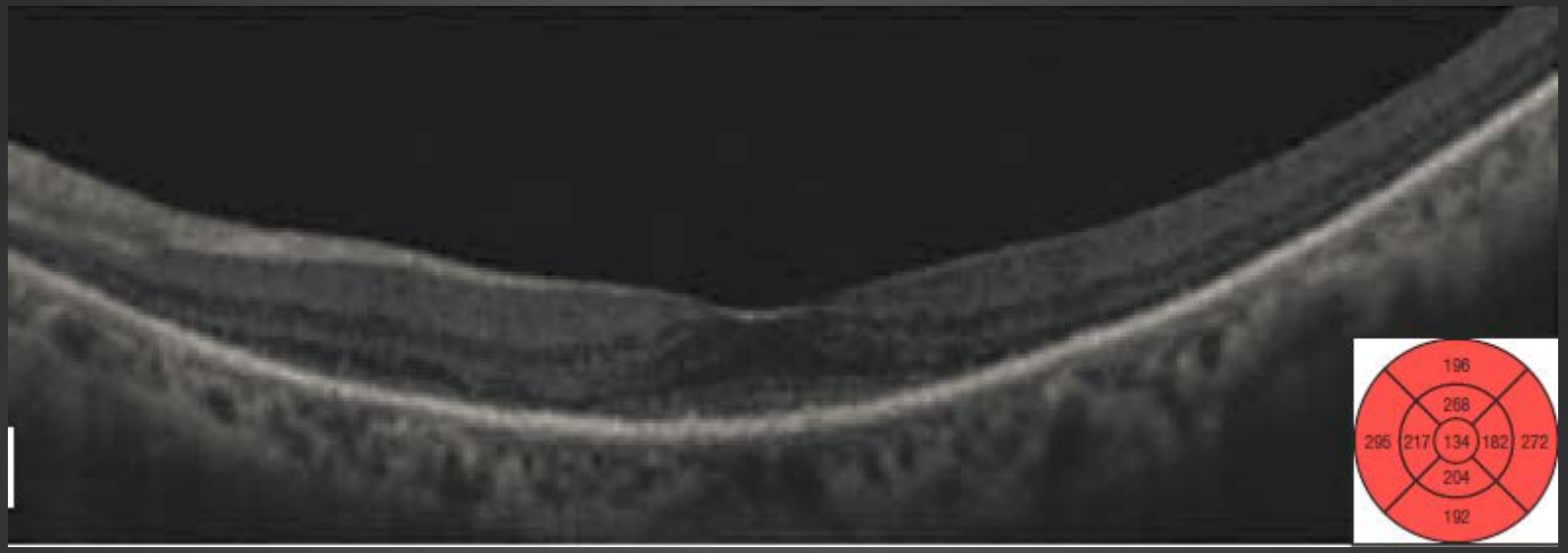
Mystery case 3

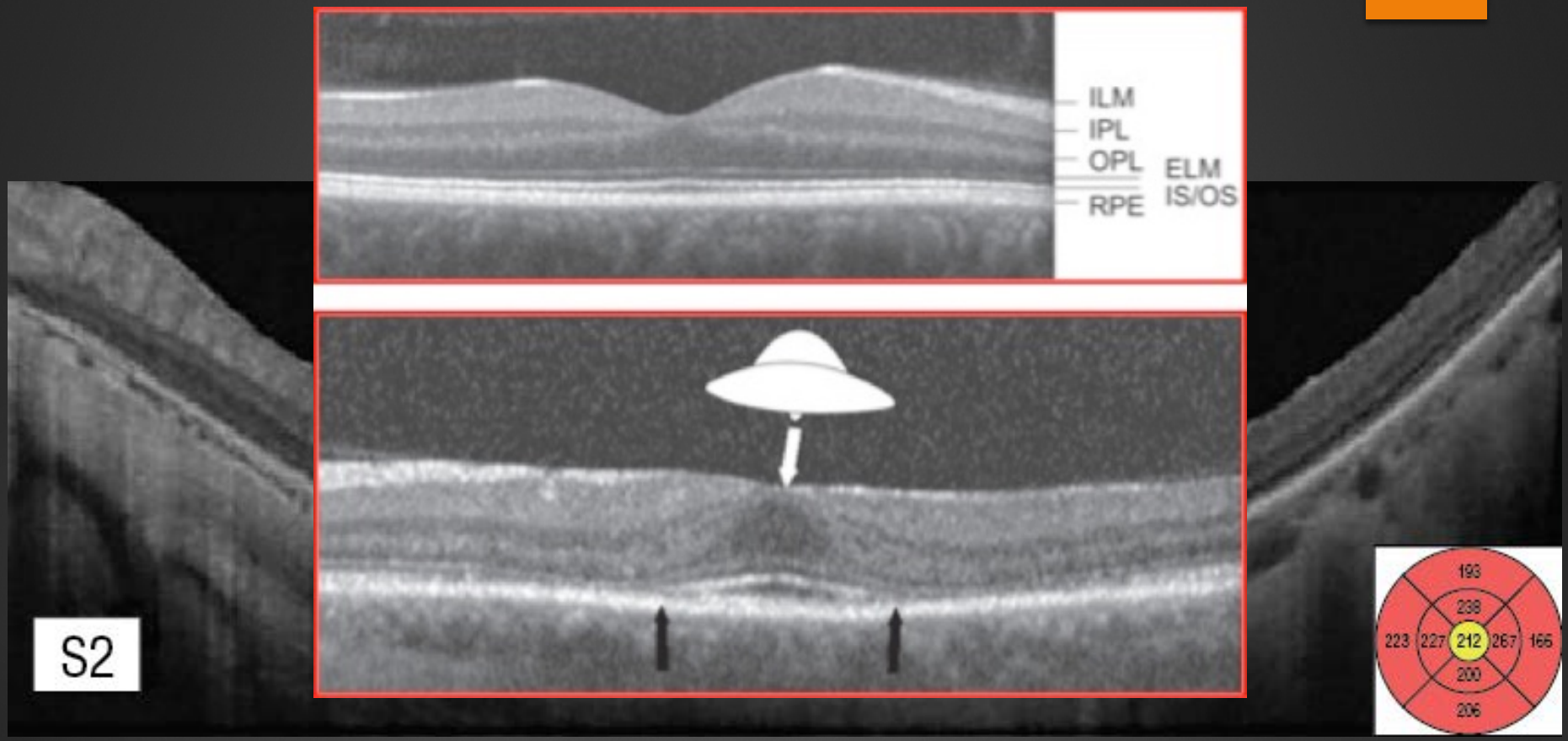
Mystery case 4

Mystery case 5



Mystery case 6




ILM
IPL
OPL
ELM
IS/OS
RPE
S2
193
238
223
227
212
267
166
200
206

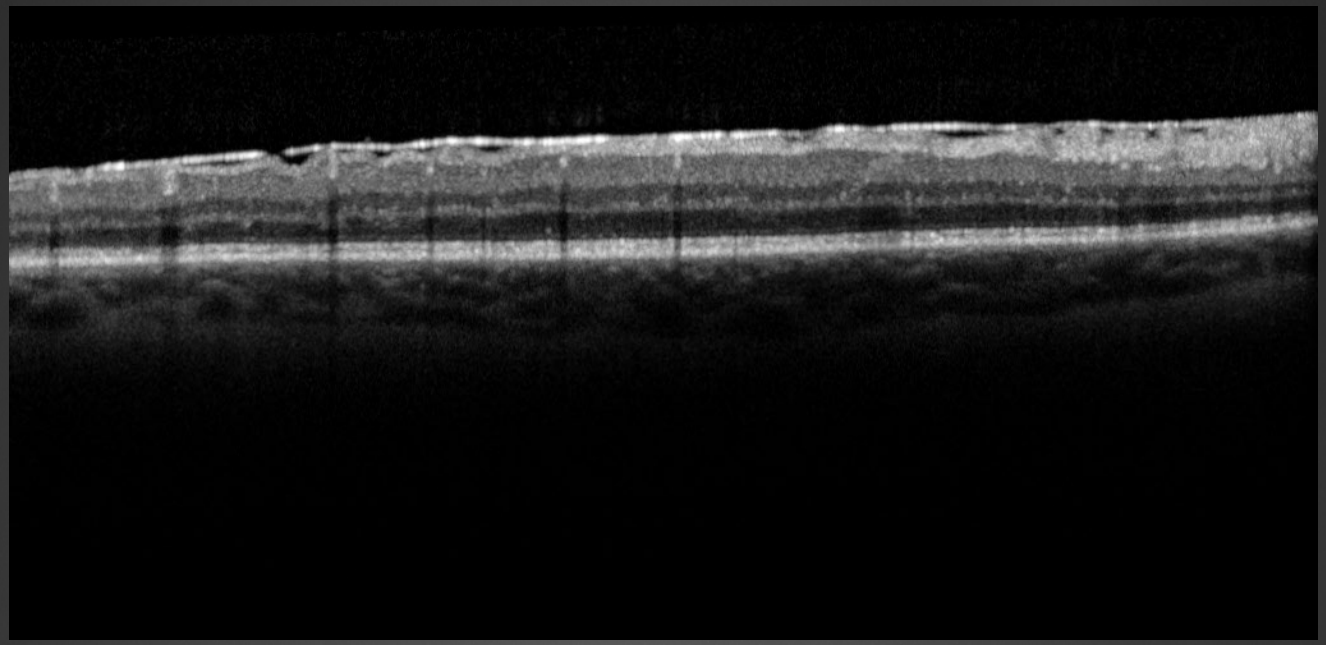
Screening and Suggested Guidelines for Treatment

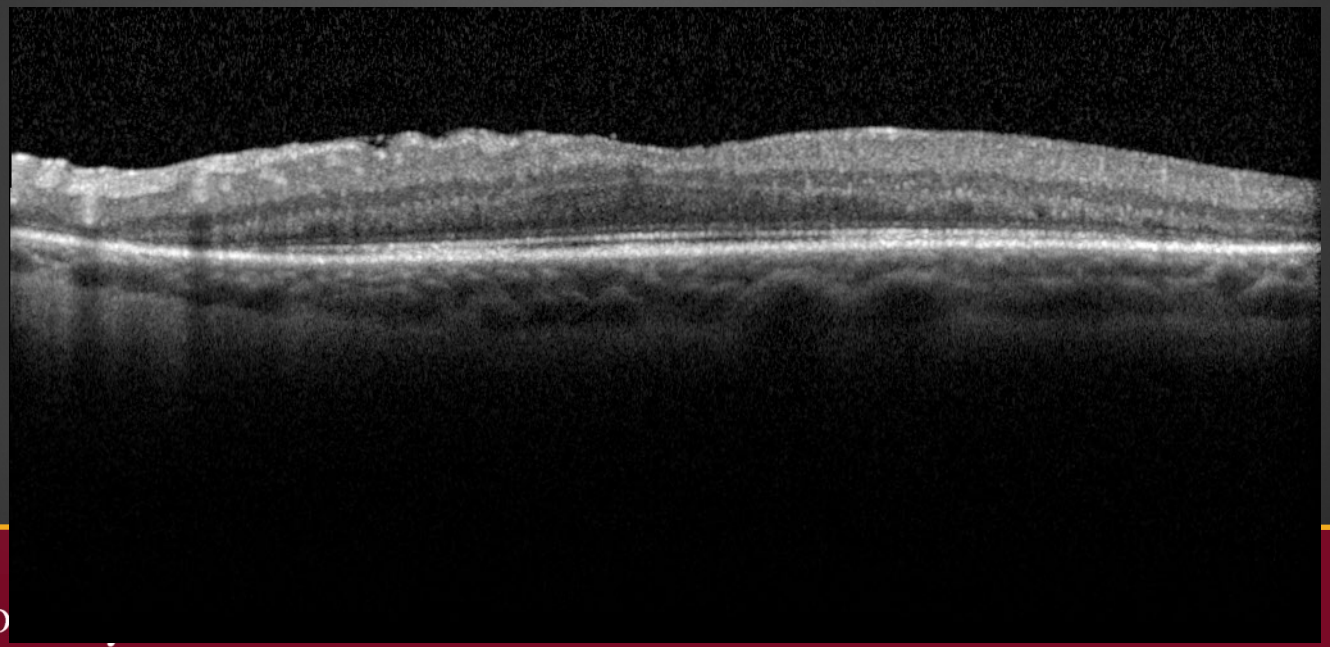
- American Academy of Ophthalmology Guidelines suggest that daily doses be limited to 400 mg HCQ or 250 mg CQ
- Lower doses (in the range of 6.5 mg/kg HCQ or 3.0 mg/kg CQ, calculated on the basis of ideal body weight) should be used for individuals who are of short stature

Screening and Suggested Guidelines for Treatment

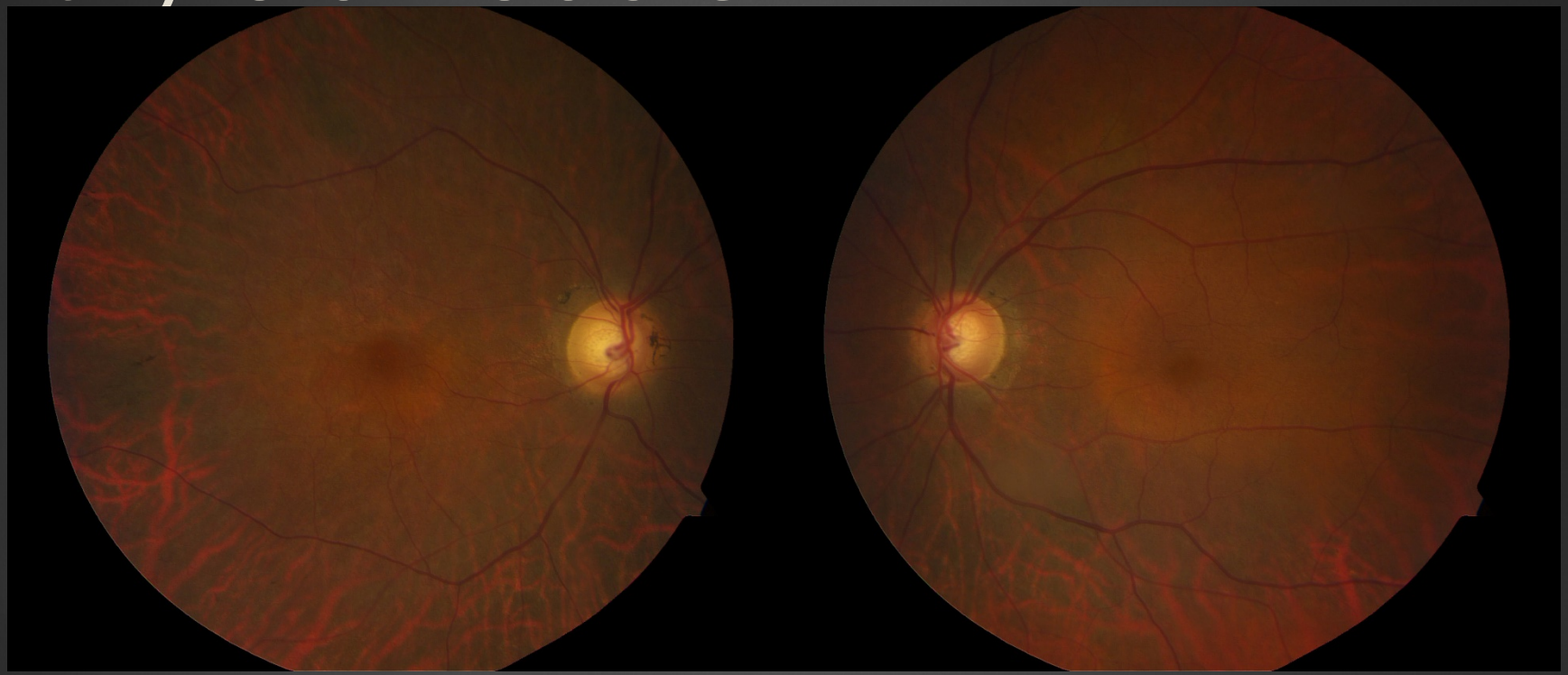
- A baseline examination to serve as a reference point and to rule out maculopathy, which might be contraindication to use
- Annual screening should begin after 5 years (or sooner if there are unusual risk factors)
- Along with 10-2 automated fields get one of following at screening exams
  - FAF
  - mfERG
  - OCT
- When fields are performed independently, even the most subtle 10-2 field changes should be taken seriously and are an indication for evaluation by objective testing
- mfERG testing may be used in place of visual fields
- Amsler grid testing is no longer recommended

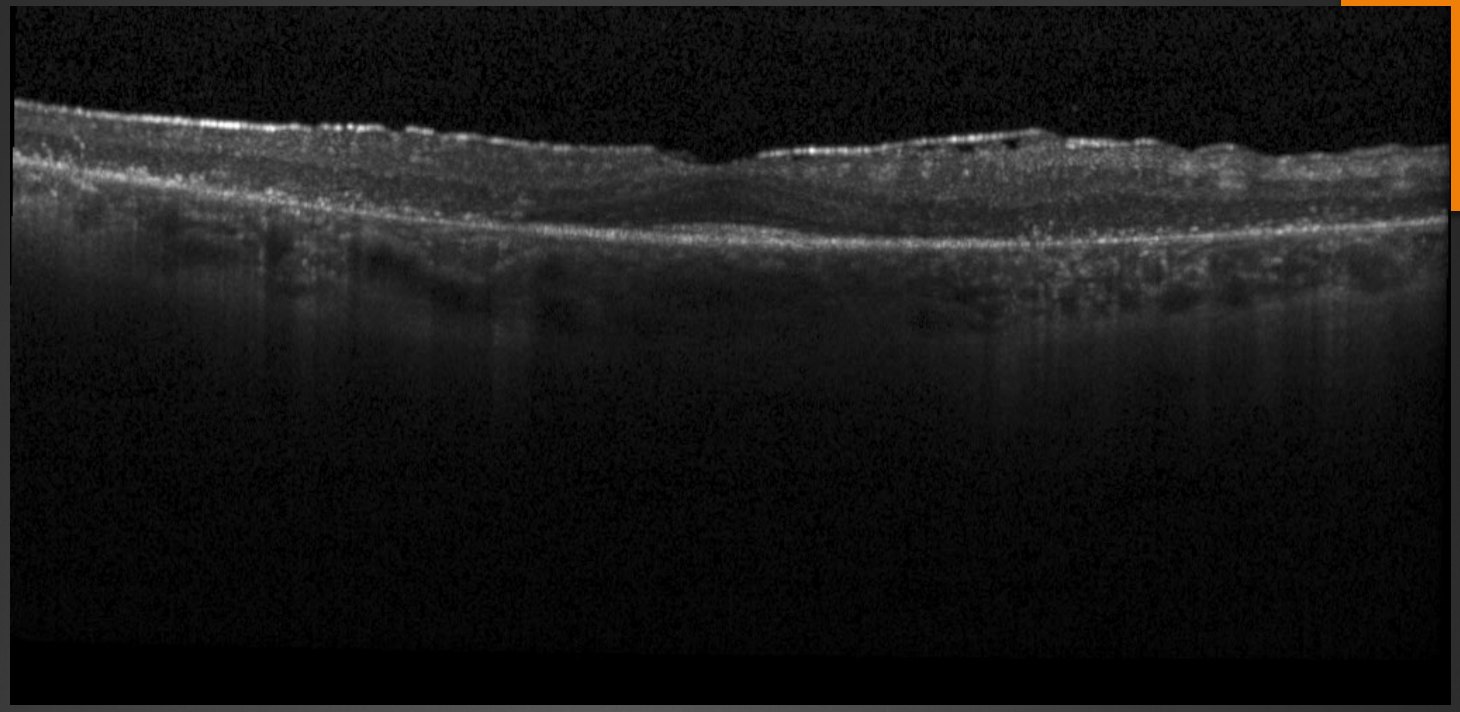
53y M without prior medical history



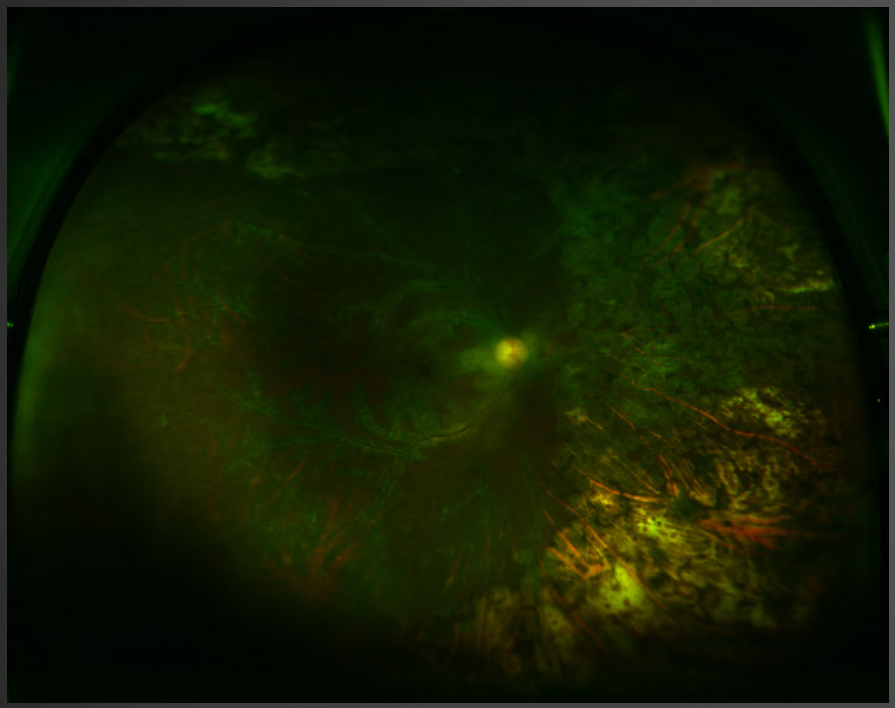


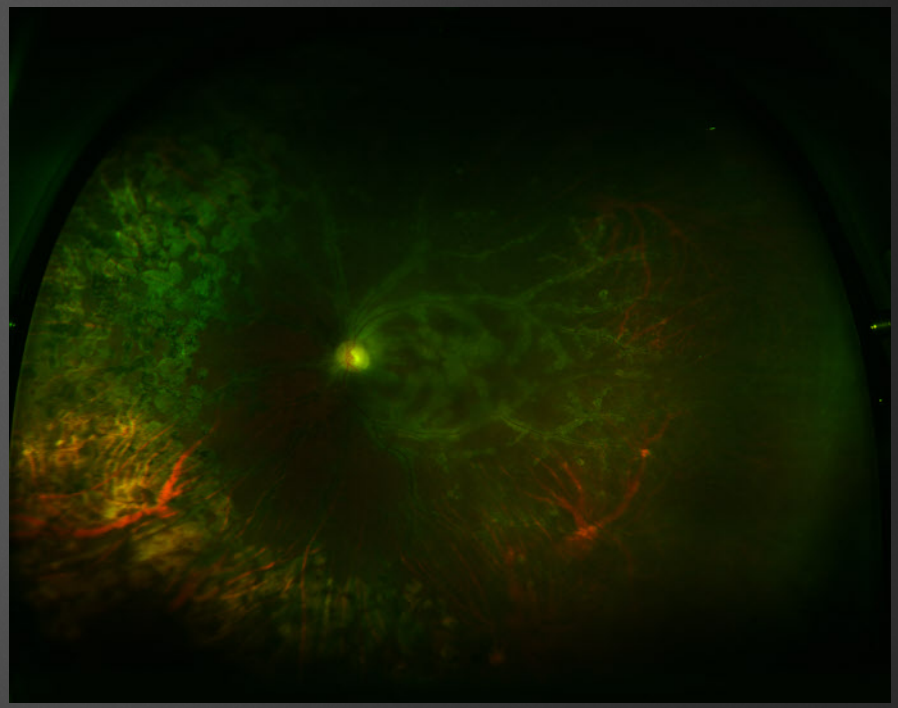
63 y/o M with history of thyroid nodule

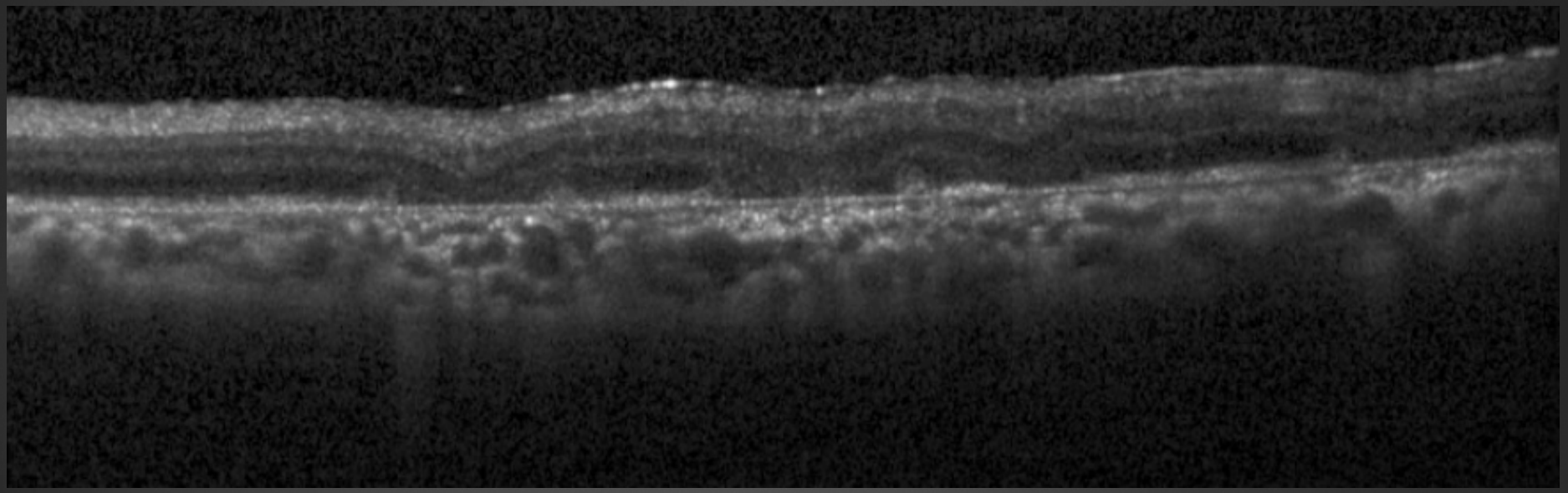




60 y/o H M referred for vasculitis





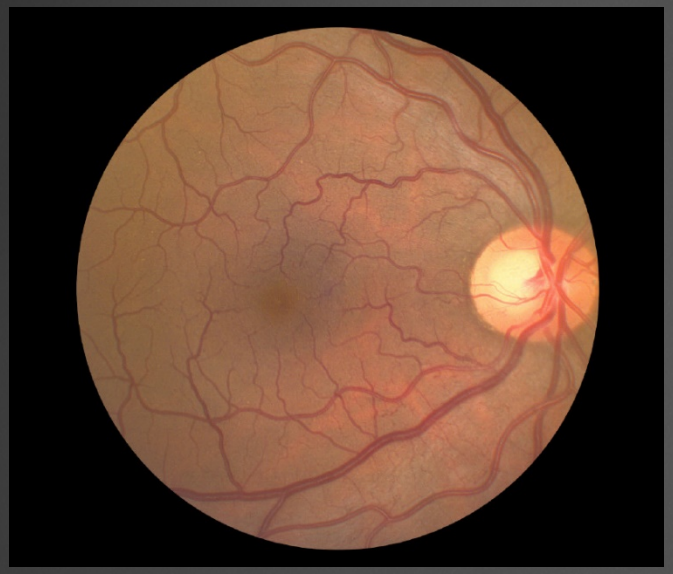


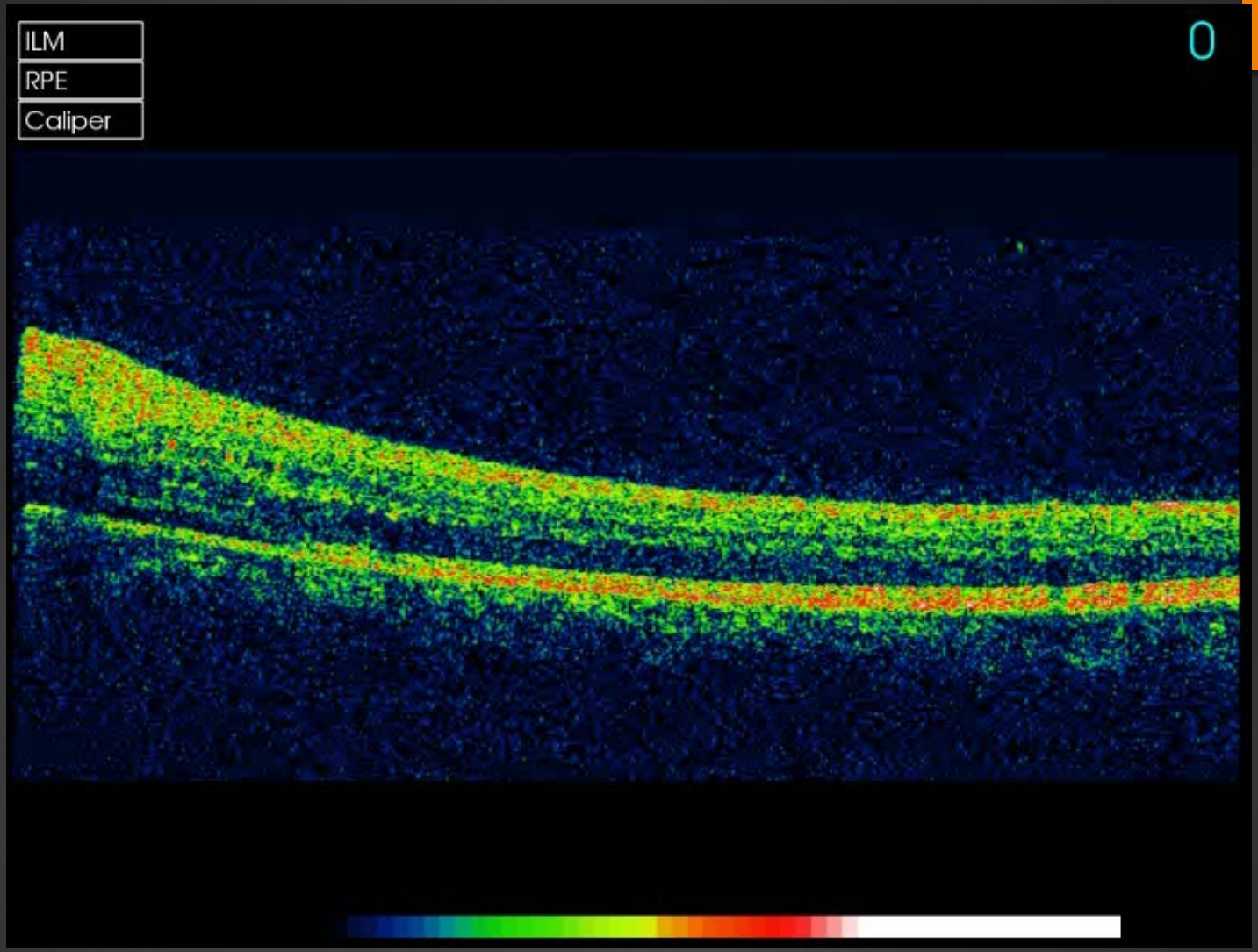
Autoimmune retinopathy vs cancer/melanoma associated retinopathy

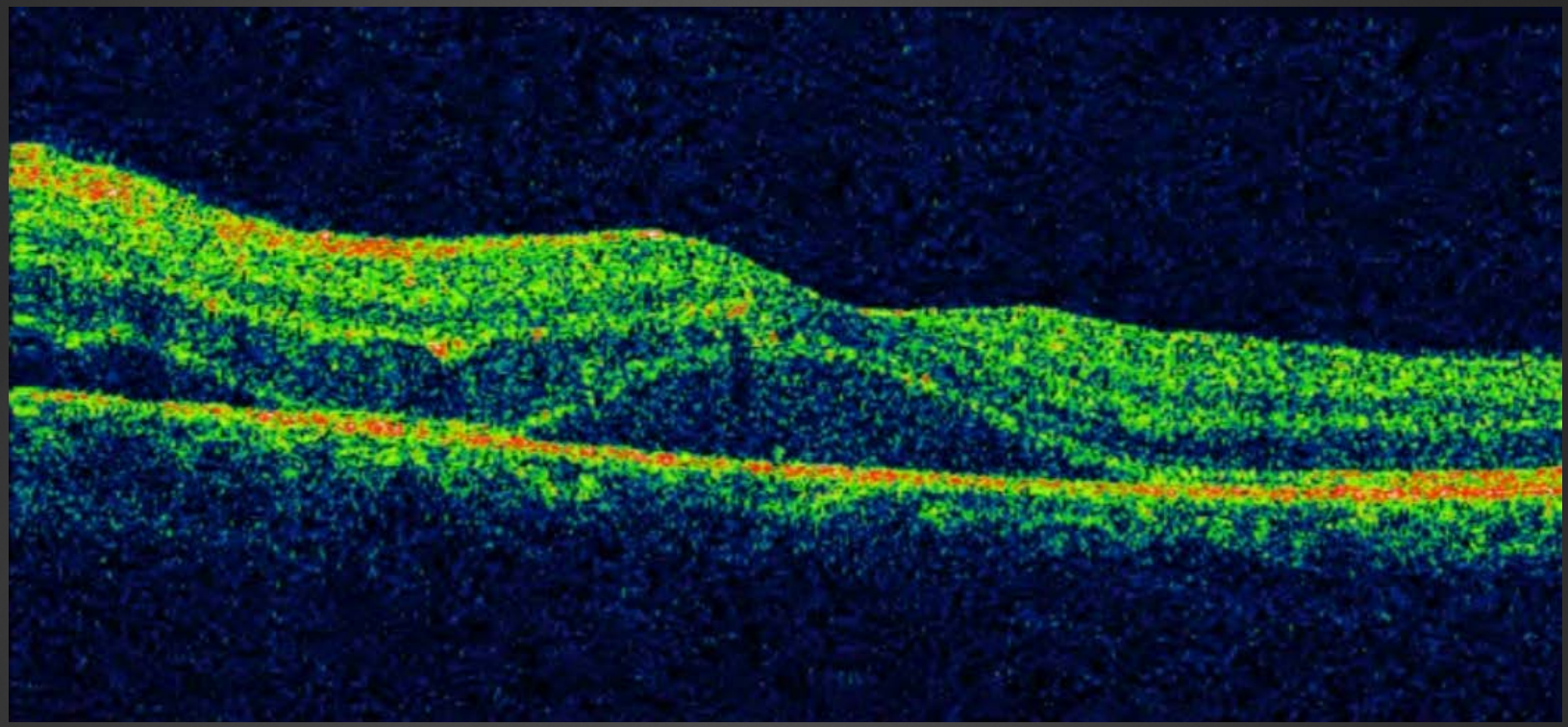
- Antiretinal antibody testing
- Full neoplastic work up
- Immunomodulatory therapy
- Low vision services

41 yo HM w/ newly diagnosed DMII p/w OS blurry vision x 14 days

DFE

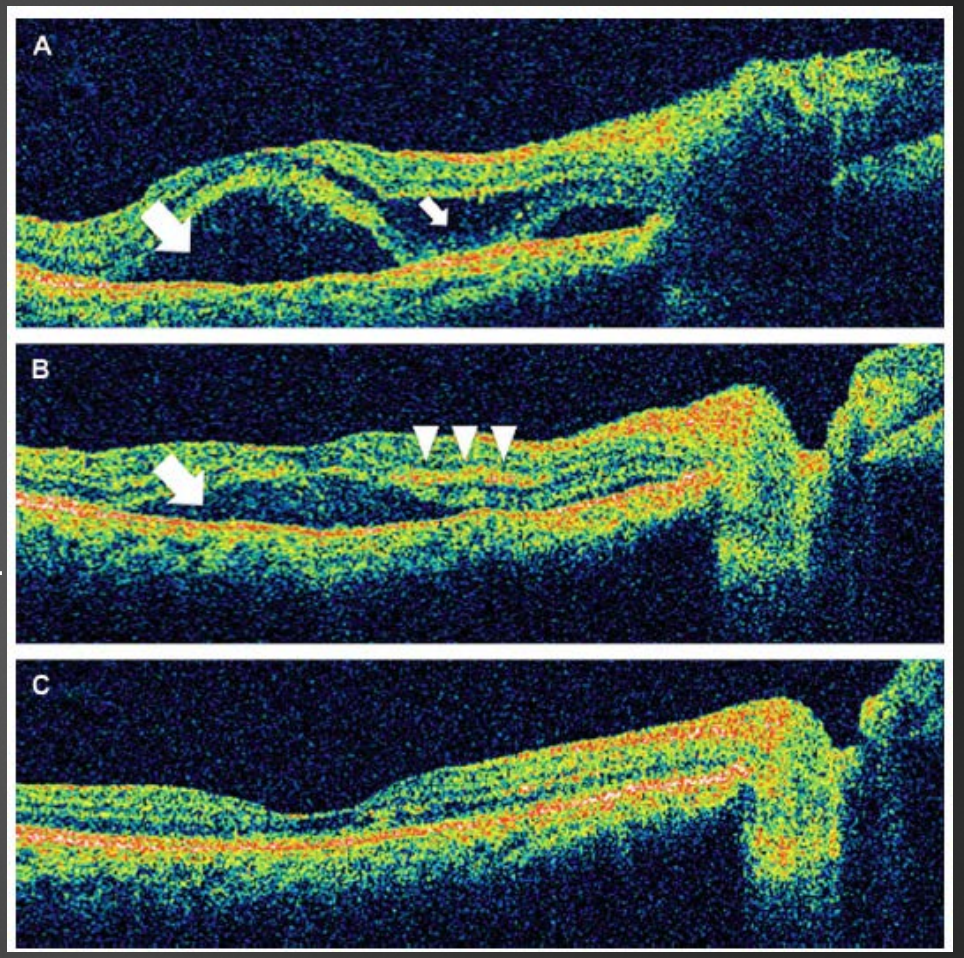


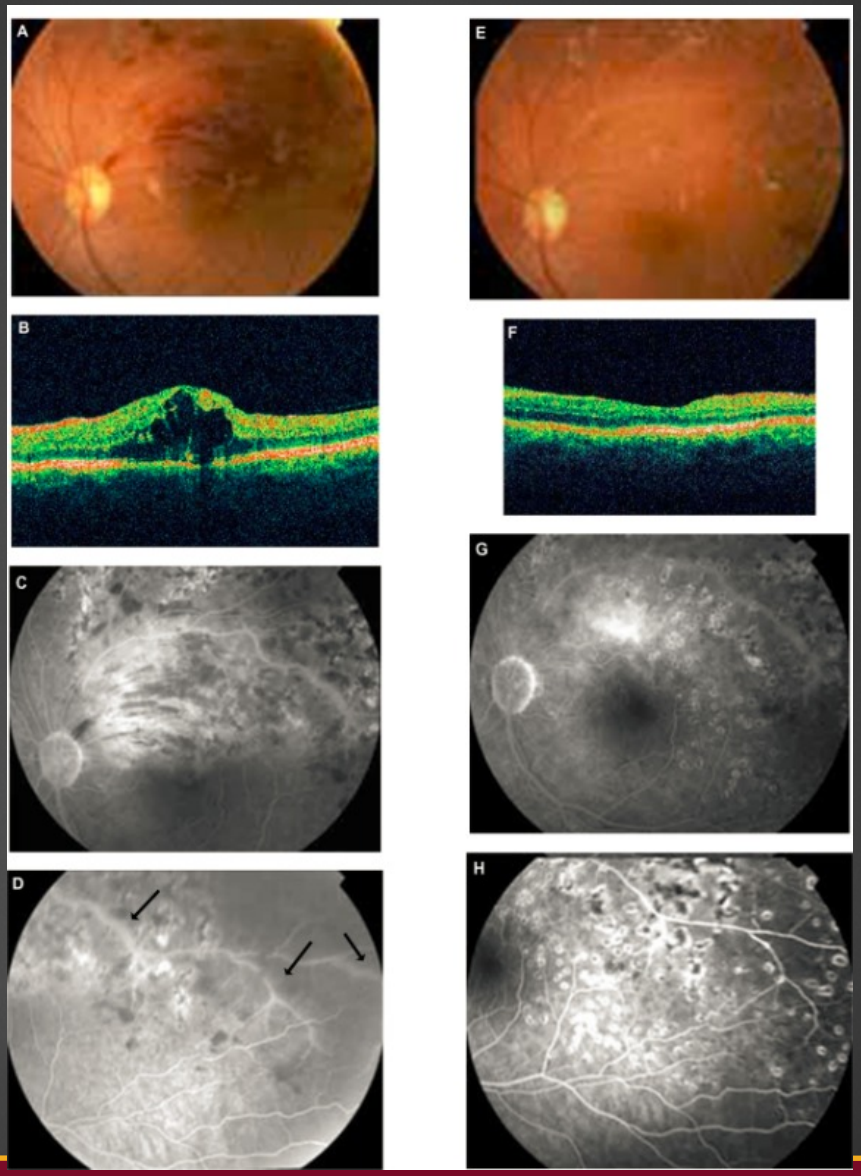

ILM
RPE
Caliper
0



- CBC, BMP, CXR: WNL
- HIV, RPR, ACE, ANA, PPD: negative
- IgM negative: VZV, EBV, HSV 1 & 2, Toxoplasmosis
- Bartonella henselae IgG + IgM Positive

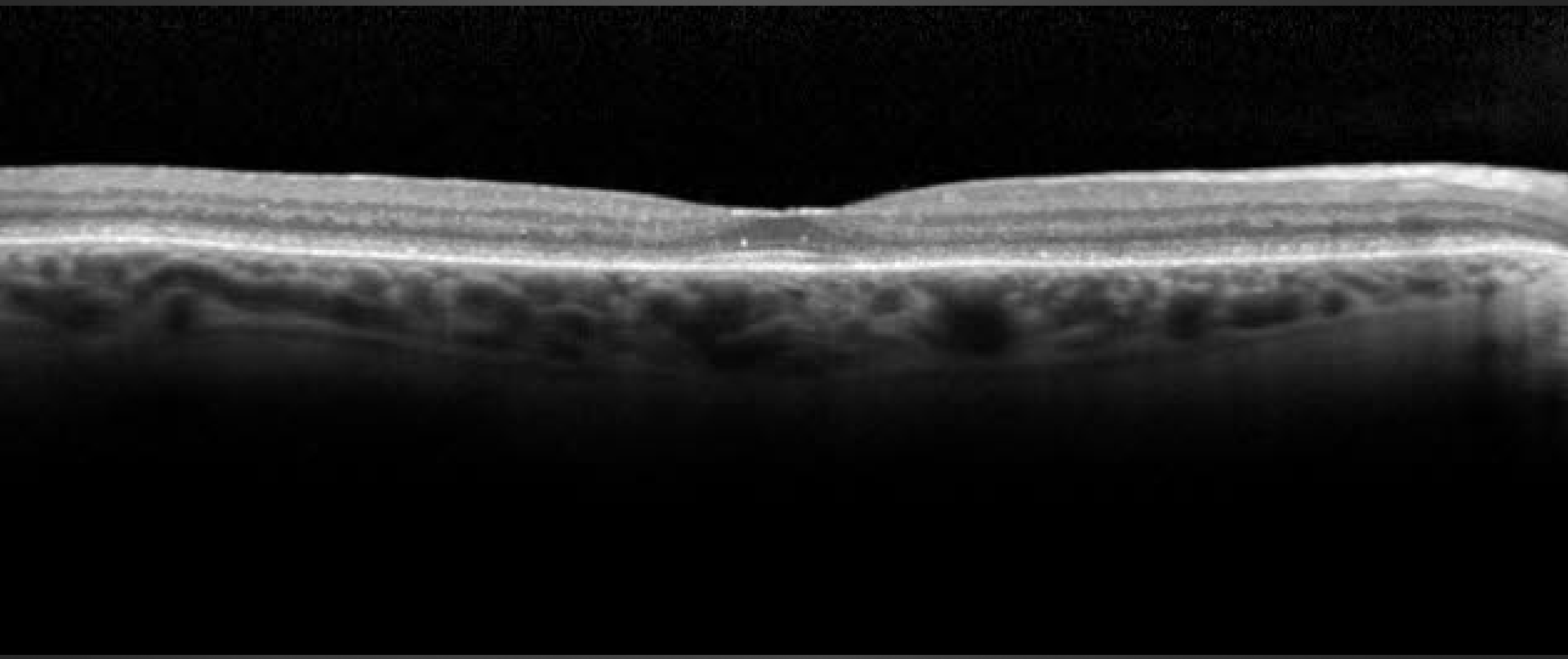
- Treated with Cipro with good resolution



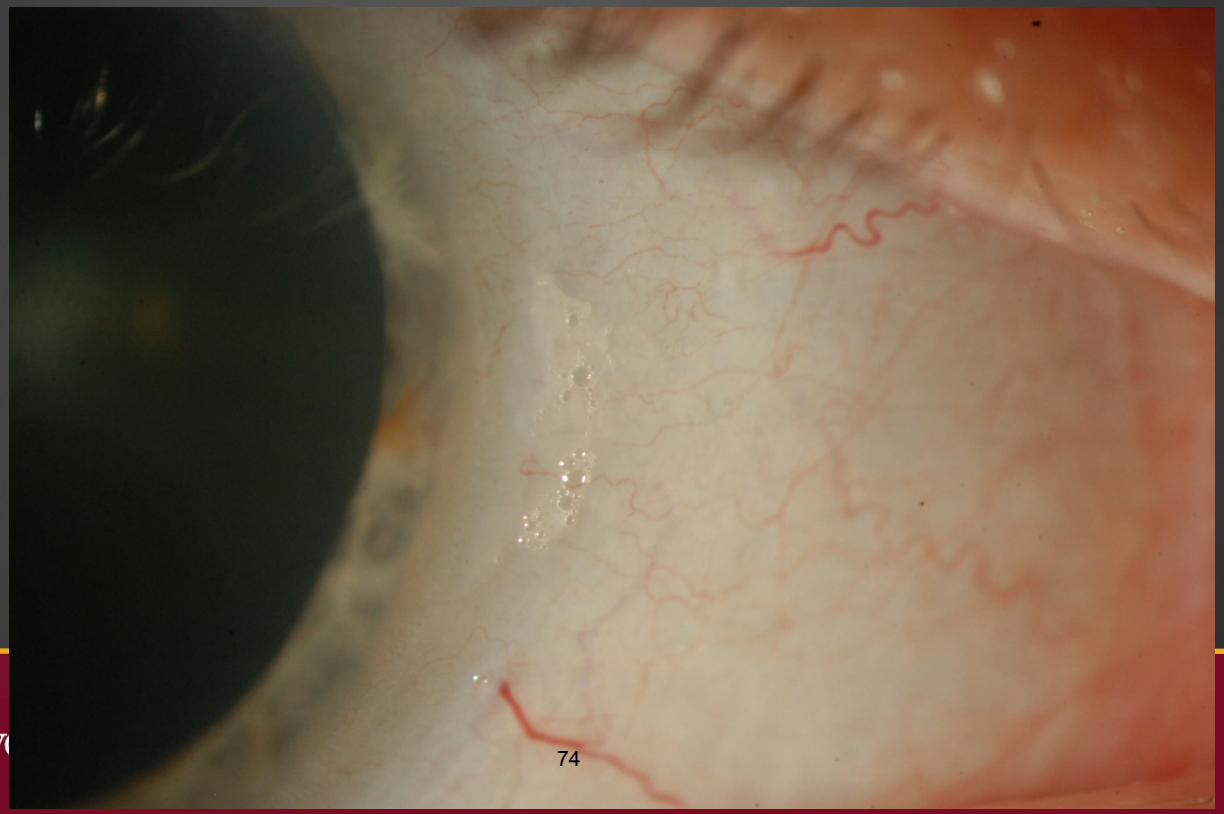


Clin Ophthalmol. 2011; 5: 817–829.

Middle aged female with decreased vision in both eyes



- Prior surgical history: gastric bypass/intestinal resection

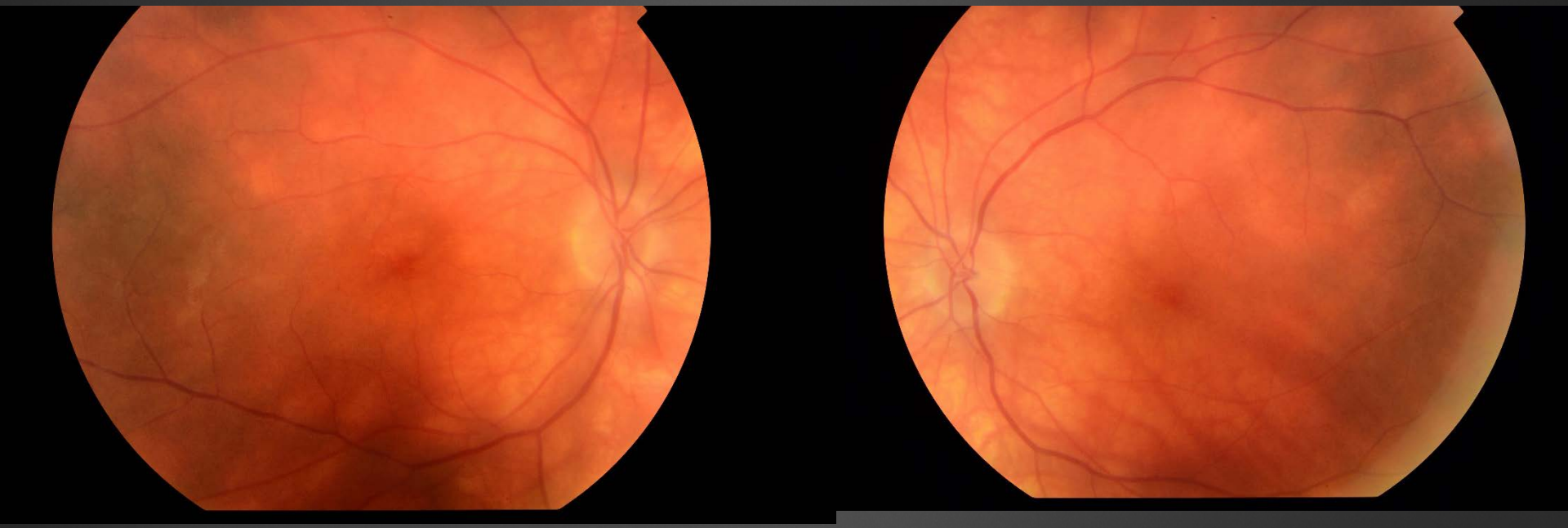


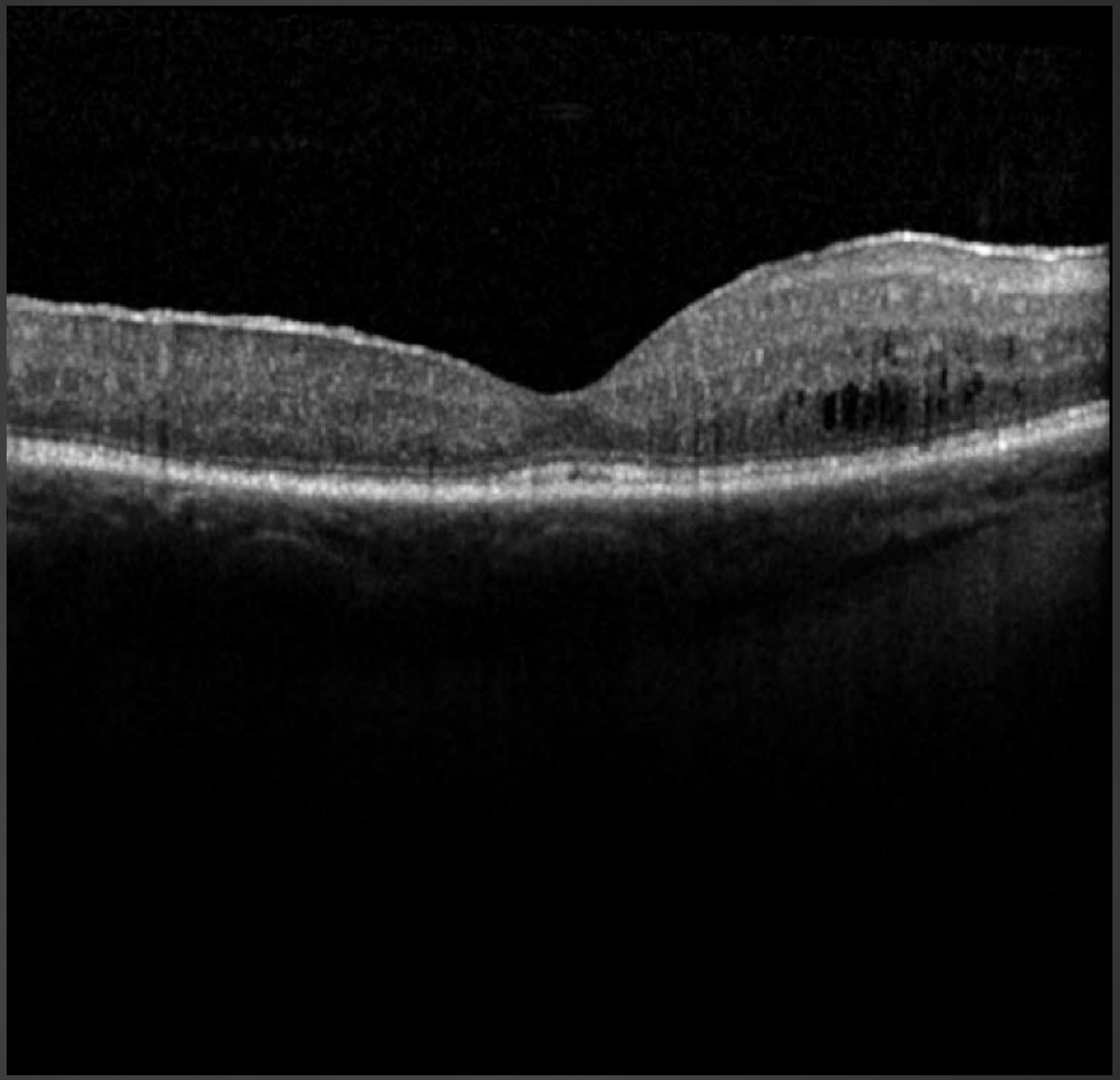
Vitamin A deficiency

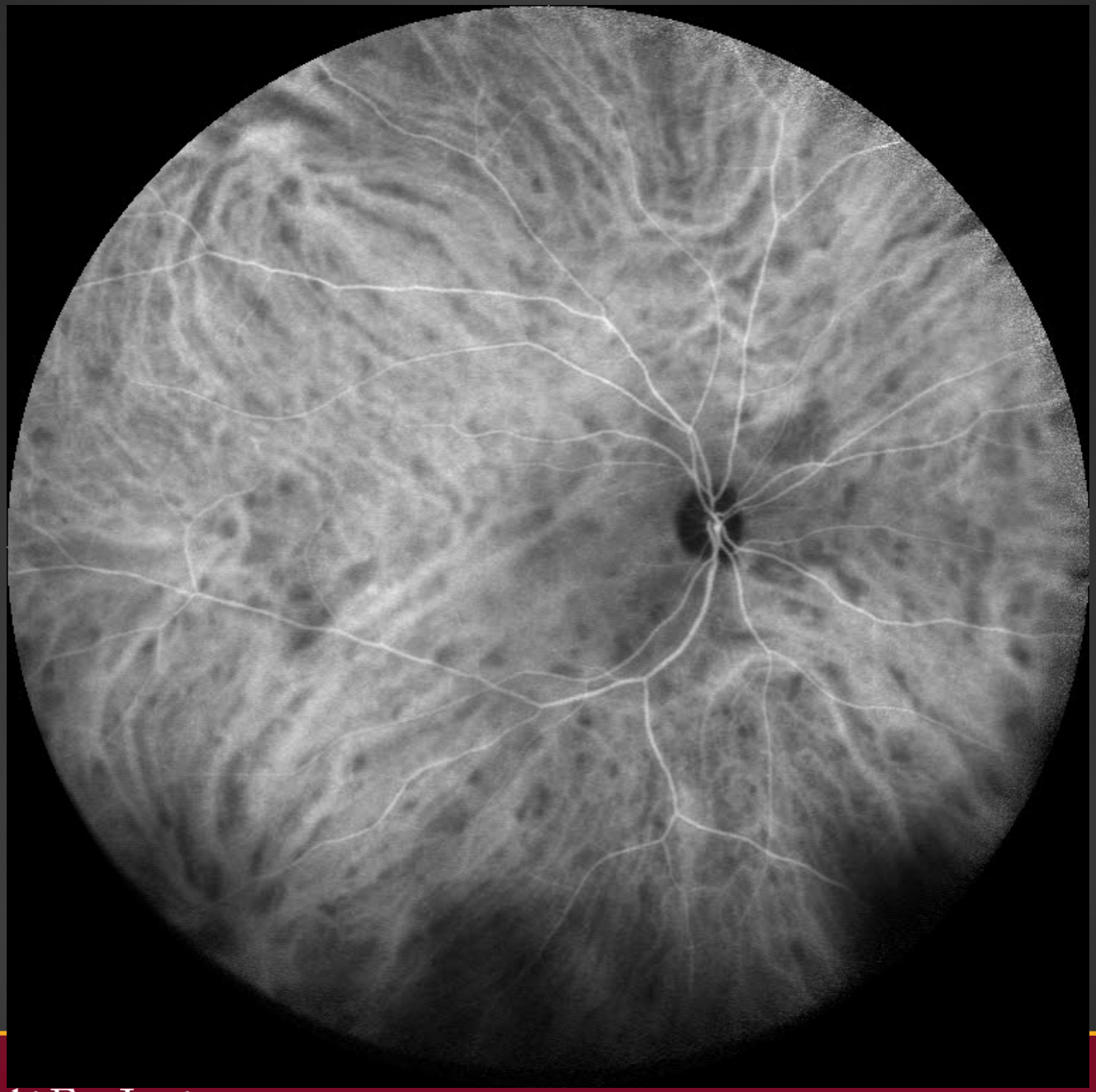
- Replenish vitamin A

CC/HPI

- 47 yo WF with decreasing vision in both eyes
  - ~1 year, more rapidly w/in last 6 mo
  - Vision appears “darker”
  - Difficulty with depth perception







One month after Ozurdex and starting cyclosporine

Treatment for Birdshot Chorioretinopathy

- Acute episode: Steroids
  - Oral steroids
  - Intravitreal dexamethasone implant
- Chronic disease: Immunomodulatory therapy
  - Cyclosporine – 1st line therapy
  - Mycophenylate mofetil
  - Azathioprine
  - Methotrexate
  - Daclizumab

Acknowledgments

- Lisa Olmos de Koo, MD, MBA

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J. Bradley Randleman, MD

Professor of Ophthalmology, Director, Cornea, External Disease, and Refractive Surgery Service

J. Bradley Randleman, MD is one of the nation's top corneal researchers and surgeons and an expert on everything from LASIK to the latest FDA approved treatments for corneal cross-linking surgery.

Alena Reznik, MD

Assistant Professor of Clinical Ophthalmology

Dr. Reznik specializes in early detection and treatment of glaucoma and cataracts as well as novel surgical techniques for advanced cases. Her research interests are minimally invasive glaucoma surgery and new approaches to eye emergencies. She is a principal investigator on clinical trials for glaucoma medications and surgical devices.

Damien C. Rodger, MD, PhD

Assistant Professor of Clinical Ophthalmology

Dr. Rodger's clinical interests include diabetic retinopathy, macular degeneration, medical retina, retinal detachment, uveitis and vitreoretinal surgery.He has conducted research on the design, fabrication, and testing of high-density microtechnologies for retinal and spinal cord prostheses, and has been instrumental in the development of other novel bioMEMS.

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Private 2 Hour CME in Beverly Hills

Date: Monday, Februay 13, 2017
Time: 7:00pm
Location:
Maggiano's Little Italy at The Grove
189 The Grove Dr. Suite Z80
Los Angeles, CA 9036
RSVP: Lina Poyzner at
lina.poyzner@med.usc.edu

Program:

Glaucoma (Optic Nerve Cupping), presented by Dr. Reznik — 1 Hour

Retina (OCT Reading and OCT Enigmas), presented by Dr. Rodger — 30 min.

Cornea (Cross Linking), presented by Dr. Randleman — 30 min.

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Pasadena, CA 91105
626 796-0293

Arcadia Clinic
USC Roski Eye Institute
65 N. First Avenue, Suite 101
Arcadia, CA 91006
626 446 2122

CURRICULUM VITAE
DAMIEN C. RODGER, MD, PHD
DECEMBER 8, 2016

PERSONAL INFORMATION

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Glendale, CA 91202

Citizenship: USA
Email: damien.rodger@med.usc.edu

EDUCATION AND PROFESSIONAL APPOINTMENTS

EDUCATION:

2000	Bachelor of Science, Electrical Engineering, Cornell University, New York, NY
2008	Doctor of Philosophy, Bioengineering, California Institute of Technology. Pasadena, CA
2009	Doctor of Medicine, University of Southern California, Los Angeles, CA

POST-GRADUATE TRAINING:

2009-2010	Residency, Transitional Year NorthShore University HealthSystem, Department of Medicine University of Chicago (NorthShore) Program, Evanston, IL
2010-2013	Residency, Ophthalmology University of Southern California/LAC+USC Medical Center Doheny Eye Institute; 1450 San Pablo Street; Los Angeles
2013-2015	Vitreoretinal Surgery Fellowship University of Southern California/LAC+USC Medical Center USC Eye Institute; 1450 San Pablo Street; Los Angeles

HONORS, AWARDS:

1996-2000	Dean's Scholar, Cornell University
1999-2000	Schlumberger Collegiate Award Scholarship
2000-2001	W. M. Keck Foundation Fellowship in Nanobiotechnology
2001-2003	Salerni Collegium MD/PhD Award recipient
2003	Dean's Recognition, USC Keck School of Medicine
2003-2006	Whitaker Foundation Graduate Fellowship in Biomedical Engineering
2005-2006	Drinkward Postdoctoral Fellowship
2007	Transducer Research Foundation Travel Award recipient
2007-2008	Salerni Collegium MD/PhD Award recipient

2009	Irving I. Lasky M.D. Memorial Award for Excellence in Research
2009-2010	Intern of the Year Award, Transitional Year Program NorthShore University HealthSystem
2012, 2013	ARVO Travel Award, Doheny-USC Professional Association
2013-2014	Heed Ophthalmic Foundation Fellowship
2014	Ronald G. Michels Fellowship in Vitreoretinal Surgery
2016 - 2019	Member, Allegan Fostering Innovative Retina Stars of Tomorrow Program
2016	Southern California Super Doctors® Rising Stars[SM]

USC ROSKI EYE INSTITUTE:

2015-Present	Assistant Professor	Ophthalmology, USC Eye Institute, Keck School of Medicine, Los Angeles, CA, USA
2015-Present	Visiting Associate	Medical Engineering, Division of Engineering and Applied Science, California Institute of Technology, Pasadena, CA, USA
2016-Present	Research Assistant Professor	Biomedical Engineering, Viterbi School of Engineering, Los Angeles, CA, USA

TEACHING

DIDACTIC TEACHING:

University of Southern California

2015	Biomedical Engineering Seminar	2 Hours	Lecturer
2015-2016	Uveitis Resident Teaching Course	6 Hours	Lecturer

GRADUATE AND MEDICAL STUDENT MENTORSHIP:

2015-present	Peiyu Wang	Graduate Student	Home Monitoring System for Uveitis
2015-present	Nicole Koulisis	Medical Student	Ozurdex injection after vitrectomy
2016-present	Bianca Lennarz	Graduate Student	Clinical Shadowing

POSTGRADUATE MENTORSHIP:

2015-2016	Stavros Moysides	Resident
2015-2016	Ananth Sastry	Resident
2015-2016	Esther Lee Kim	Resident
2015-2016	Jeffrey Tan	Fellow
2015-2016	Meena George	Fellow
2015-2016	Ehsan Mozayan	Fellow
2015-2016	Jacqueline Mandell	Fellow

SERVICE

DEPARTMENT SERVICE:

2016-Present	Co-Director, Vitreoretinal Surgery Fellowship	USC Roski Eye Institute

HOSPITAL OR MEDICAL GROUP SERVICE:

2015-Present	Director, Ophthalmology Consult Service	Keck Medical Center of USC
2016-Present	Vice-Chairman Outpatient Operating Room Workgroup	Keck Medical Center of USC

CONSULTANTSHIPS AND ADVISORY BOARDS:

2015	Scientific Advisory Board	Allomind, Inc.

PROFESSIONAL SOCIETY MEMBERSHIPS:

1998-Present	Institute of Electrical and Electronics Engineers (IEEE)
2000-Present	Tau Beta Pi (Engineering Honor Society),
2000-Present	Eta Kappa Nu (Electrical Engineering Honor Society)
2000-Present	Golden Key National Honor Society
2002-Present	IEEE Engineering in Medicine and Biology Society (EMBS)
2005-Present	Association for Research in Vision and Ophthalmology (ARVO)
2010-Present	American Academy of Ophthalmology (AAO)
2014-Present	American Society of Retina Specialists (ASRS)
2011-Present	Los Angeles Society of Ophthalmology (LASO)
2016-Present	American Uveitis Society

COMMUNITY SERVICE:

2010,2011	Volunteer	Care Harbor, Los Angeles	Physician volunteer
2012,2013,2014, 2015	Volunteer	CareNow, Los Angeles	Physician volunteer
2013,2014	Volunteer	Vision for Vision, Los Angeles	Physician volunteer

COMMITTEES:

2015-Present	M.D./Ph.D. Admissions Committee
2016-Present	Concurrent Surgery Workgroup

RESEARCH AND SCHOLARSHIP

MANUSCRIPT REVIEW:

2011-present	Review Panel	Sensors and Actuators A: Physical
2008-present	Review Panel	Sensors and Actuators B: Chemical
2008-present	Review Panel	Engineering in Medicine and Biology Society Conference
2014-present	Review Panel	Biomedical Microdevices
2015-present	Review Panel	Ocular Immunology and Inflammation
2015-present	Review Panel	American Journal of Ophthalmology
2015-present	Review Board	Retina
2015-present	Review Board	Retinal Cases and Brief Reports
2016-present	Review Panel	Expert Review of Medical Devices

MAJOR AREAS OF RESEARCH INTEREST:

Research Areas

1. Microelectronics for Ophthalmic Use (Retina, Glaucoma, Uveitis)
2. Imaging in Uveitis

GRANT SUPPORT - PAST:

Dates of Award:1/27/2015 – 12/8/2015

Agency: XOMA

Title: Safety and Efficacy Study of Gevokizumab to Treat Active Non-infectious Uveitis (EYEGUARD™-A)

Description: The purpose of this study is to evaluate the efficacy of gevokizumab in the treatment of active non-infectious intermediate, posterior, or pan- uveitis.

Role: Principal Investigator

Total Direct Costs:$14,326

Dates of Award: 1/27/2015 – 12/8/2015

Agency: XOMA

Title: Safety and Efficacy Study of Gevokizumab to Treat Non-infectious Uveitis Controlled With Systemic Treatment (EYEGUARD™-C)

Description: The purpose of this study is to evaluate the efficacy of gevokizumab in reducing the risk of recurrent uveitic disease in subjects with non-infectious uveitis whose disease is currently controlled with systemic treatment.

Role: Principal Investigator

Total Direct Costs:$18,224

ISSUED AND PENDING PATENTS:

- U.S. Patent 6,487,907. “Microgyroscope with integrated vibratory element.” Tony K. Tang, **Damien C. Rodger**, Roman C. Gutierrez. California Institute of Technology (Pasadena, CA). December 3, 2002.

- U.S. Patent 6,727,778. “Transmission line structures for use as phase shifters and switches.” Thomas D. Kudrle, Hercules P. Neves, **Damien C. Rodger**, Noel C. MacDonald. Cornell Research Foundation, Inc. (Ithaca, NY). April 27, 2004.

- U.S. Patent 6,758,093. “Microgyroscope with integrated vibratory element.” Tony K. Tang, Damien C. Rodger, Roman C. Gutierrez, California Institute of Technology (Pasadena, CA). July 6, 2004.

- U.S. Patent 7,252,006. “Implantable mechanical pressure sensor and method of manufacturing the same.” Yu-Chong Tai, Ellis Meng, Po-Jui Chen, Damien C. Rodger, Mark Humayun. California Institute of Technology (Pasadena, CA). August 7, 2007.

- U.S. Patent 7,326,649. “Parylene-based flexible multi-electrode arrays for neuronal stimulation and recording and methods for manufacturing the same.” **Damien C. Rodger**, Mark Humayun, Yu-Chong Tai, James D. Weiland. University of Southern California (Los Angeles, CA), California Institute of Technology (Pasadena, CA). February 5, 2008.

- U.S. Patent 7,338,836. “Method for integrating pre-fabricated chip structures into functional electronic systems.” Yu-Chong Tai, **Damien C. Rodger**. California Institute of Technology (Pasadena, CA). March 4, 2008.

- U.S. Patent 7,600,533. “Microfluidic valve having free-floating member and method of fabrication.” Yu-Chong Tai, Po-Jui Chen, **Damien C. Rodger**, Mark S. Humayun. California Institute of Technology (Pasadena, CA). October 13, 2009.

- U.S. Patent 7,684,868. “Microfabricated devices for wireless data and power transfer.” Yu-Chong Tai, **Damien C. Rodger**, Wen Li, Mark Humayun, James D. Weiland. California Institute of Technology (Pasadena, CA). March 23, 2010.

- U.S. Patent 7,706,887. “Method for integrating pre-fabricated chip structures into functional electronic systems.” Yu-Chong Tai, **Damien C. Rodger**. California Institute of Technology (Pasadena, CA). April 27, 2010.

- U.S. Patent 7,774,931. “Method of fabricating an integrated intraocular retinal prosthesis device.” Yu-Chong Tai, **Damien C. Rodger**, Wen Li, Mark Humayun, James D. Weiland, Hossein Ameri, Armand R. Tanguay, Jr. California Institute of Technology (Pasadena, CA), University of Southern California (Los Angeles, CA). August 17, 2010.

- U.S. Patent 7,887,508. “MEMS device and method for delivery of therapeutic agents.” Ellis Meng, Yu-Chong Tai, Mark S. Humayun, Rajat Agrawal, Ronalee Lo, Jason Shih, Kenrick Kuwahara, Po-Ying Li, **Damien Rodger**, Po-Jui Chen. University of Southern California (Los Angeles, CA). February 15, 2011.

- U.S. Patent 7,900,518. “Microfabricated implantable wireless pressure sensor for use in biomedical applications and pressure measurement and sensor implantation methods.” Yu-Chong Tai, Po-Jui Chen, **Damien C. Rodger**, Mark S. Humayun. California Institute of Technology (Pasadena, CA). March 8, 2011.

- Japanese Patent 4,854,514,B. “Method for integrating pre-fabricated chip structures into functional electronic systems.” Yu-Chong Tai, **Damien C. Rodger**. California Institute of Technology (Pasadena, CA). November 4, 2011.

- U.S. Patent 8,112,157. “Magnetic material-containing microfabricated devices for wireless data and power transfer.” Yu-Chong Tai, **Damien C. Rodger**, Wen Li. California Institute of Technology (Pasadena, CA). February 7, 2012.

- U.S. Patent 8,141,573. “Microfluidic valve having free-floating member and method of fabrication.” Yu-Chong Tai, Po-Jui Chen, **Damien C. Rodger**, Mark S. Humayun. California Institute of Technology (Pasadena, CA). March 27, 2012.

- U.S. Patent 8,246,569. “Implantable intraocular pressure drain.” Ellis Meng, Po-Jui Chen, **Damien C. Rodger**, Yu-Chong Tai, Mark S. Humayun. California Institute of Technology (Pasadena, CA). August 21, 2012.

- U.S. Patent 8,258,909. “Foldable polymer-based coil structure and method for fabricating the same.” Wen Li, **Damien C. Rodger,** Yu-Chong Tai. California Institute of Technology (Pasadena, CA). September 4, 2012.

- U.S. Patent 8,308,686. “MEMS device and method for delivery of therapeutic agents.” Ellis Meng, Yu-Chong Tai, Mark Humayun, Rajat Agrawal, Ronalee Lo, Jason Shih, Kenrick Kuwahara, Po-Ying Li, **Damien Rodger**, Po-Jui Chen. The University of Southern California (Los Angeles, CA). November 13, 2012.

- U.S. Patent 8,323,488. “IC-processed polymer nano-liquid chromatoraphy system on-a-chip and method of making it.” Yu-Chong Tai, Qing He, Jun Xie, Changlin Pang, Terry D. Lee, Matthieu Liger, **Damien C. Rodger**. California Institute of Technology (Pasadena, CA). December 4, 2012.

- U.S. Patent 8,549,925. “Microfabricated implantable wireless pressure sensor for use in biomedical applications and pressure measurement and sensor implantation methods.” Yu-Chong Tai, Po-Jui Chen, **Damien C. Rodger**, Mark S. Humayun. California Institute of Technology (Pasadena, CA). October 8, 2013.

- U.S. Patent 8,585,630. “Implantable intraocular pressure drain.” Ellis Meng, Po-Jui Chen, **Damien Rodger** Yu-Chong Tai, Mark Humayun. California Institute of Technology (Pasadena, CA). November 19, 2013.

- U.S. Patent 8,628,492. “Implantable glaucoma drainage device.” Jeffrey Lin, Po-Jui Chen, Yu-Chong Tai, **Damien C. Rodger**. California Institute of Technology (Pasadena, CA). January 14, 2014.

- U.S. Patent 8,805,542. “Parylene-based microelectrode array implant for spinal cord stimulation.” Yu-Chong Tai, Mandheerej S. Nandra, Joel W. Burdick, **Damien Craig Rodger**, Andy Fong, Victor Reggie Edgerton, Roland R. Roy, Yury Gerasimenko, Igor Lavrov, Susan J. Harkema, Claudia A. Angeli. California Institute of Technology (Pasadena, CA), University of Louisville Research Foundation, Inc. (Louisville, KY), The Regents of the University of California (Oakland, CA). August 12, 2014.

- U.S. Patent 9,180,050. “Implantable intraocular pressure drain.” Ellis Fan-Chuin Meng, Po-Jui Chen, **Damien C. Rodger**, Yu-Chong Tai, Mark S. Humayun. California Institute of Technology (Pasadena, CA). November 10, 2015.

- U.S. Patent 9,288,915 B2. “IC-Processed polymer nano-liquid chromatography system on-a-chip and method of making it” Yu-Chong Tai, Qing He, Jun Xie, Changlin Pang, Terry D. Lee, **Damien C. Rodger**, Matthieu Liger. City of Hope (Duarte, CA) California Institute of Technology (Pasadena, CA). March 15, 2016

- U.S. Patent 9,409,011 B2. “Method of Constructing an Implantable Microelectrode Array” Yu-Chong Tai, Mandheerej S. Nandra, Joel W. Burdick, Damien Craig Rodger, Andy Fong, Victor Reggie Edgerton, Roland R. Roy, Yury Gerasimenko, Igor Lavrov, Susan J. Harkema, Claudia A. Angeli. California Institute of Technology (Pasadena, CA), University of Louisville Research Foundation, Inc. (Louisville, KY), The Regents of the University of California (Oakland, CA). Aug 9, 2016.

THESIS:

2008	PhD	California Institute of Technology	Development of flexible parylene-based microtechnologies for retinal and spinal cord stimulation and recording

PUBLICATIONS:

REFEREED JOURNAL ARTICLES:

- **D.C. Rodger** and Y.C. Tai, "Microelectronic packaging for retinal prostheses," IEEE Engineering in Medicine and Biology Magazine, 24(5), pp. 52-57, Sept.-Oct. 2005.

- P.J. Chen, **D.C. Rodger**, M.S. Humayun, and Y.C. Tai, "Unpowered spiral-tube parylene pressure sensor for intraocular pressure sensing," Sensors and Actuators A: Physical, 127(2), pp. 276-282, 2006.

- **D.C. Rodger**, J.D. Weiland, M.S. Humayun, and Y.C. Tai, "Scalable high lead-count parylene package for retinal prostheses," Sensors and Actuators B: Chemical, 117(1), pp. 107-114, 2006.

- P.J. Chen, **D.C. Rodger**, E. Meng, M.S. Humayun, and Y.C. Tai, "Surface-micromachined parylene dual valves for on-chip unpowered microflow regulation," Journal of Microelectromechanical Systems, 16(2), pp. 223-231, 2007.

- P.J. Chen, **D.C. Rodger**, R. Agrawal, S. Saati, E. Meng, R. Varma, M.S. Humayun, and Y.C. Tai, "Implantable micromechanical parylene-based pressure sensors for unpowered intraocular pressure sensing," Journal of Micromechanics and Microengineering, 17(10), pp. 1931-1938, 2007.

- **D.C. Rodger**, A.J. Fong, W. Li, H. Ameri, A.K. Ahuja, C. Gutierrez, I. Lavrov, H. Zhong, P.R. Menon, E. Meng, J.W. Burdick, R.R. Roy, V.R. Edgerton, J.D. Weiland, M.S. Humayun, and Y.C. Tai, "Flexible parylene-based multielectrode array technology for high-density neural stimulation and recording," Sensors and Actuators B: Chemical, 132(2), pp. 449-460, 2008.

- P.N. Wahjudi, J.H. Oh, S.O. Salman, J.A. Seabold, **D.C. Rodger**, Y.C. Tai, and M.E. Thompson, "Improvement of metal and tissue adhesion on surface-modified parylene C," J Biomed Mater Res A 89(1):206-14, 2009.

- W. Li, **D. C. Rodger**, P. R. Menon, and Y. C. Tai, "Corrosion behavior of parylene-metal-parylene thin films in saline," Electrochemical Society Transactions, vol. 11 (18), pp. 1-6, 2008.

- P.-J. Chen, **D. C. Rodger**, M. S. Humayun, and Y.-C. Tai, "Floating-disk parylene microvalves for self-pressure-regulating flow controls," Journal of Microelectromechanical Systems, vol. 17 (6), pp. 1352-1361, 2008.

- P.-J. Chen, **D. C. Rodger**, S. Saati, M. S. Humayun, and Y.-C. Tai, "Microfabricated implantable parylene-based wireless passive intraocular pressure sensors," Journal of Microelectromechanical Systems, vol. 17 (6), pp. 1342-1351, 2008.

- W. Li, **D. C. Rodger**, A. Pinto, E. Meng, J. D. Weiland, M. S. Humayun, and Y.-C. Tai, "Parylene-based integrated wireless single-channel neurostimulator," Sensors and Actuators A: Physical, vol. 17 (2), pp. 193-200, 2011.

- B. Diniz, R. M. Ribeiro, **D. C. Rodger**, M. Maia, and S. Sadda, "Drusen detection by confocal aperture-modulated infrared scanning laser ophthalmoscopy," British Journal of Ophthalmology, vol. 97, pp. 285-290, March 1, 2013

- L. Lam and **D. C. Rodger**. "Bilateral macular detachments, venous stasis retinopathy, and retinal hemorrhages as initial presentation of multiple myeloma: a case report." Retinal Cases and Brief Reports. Vol. 8(4) pp. 240-244, 2014.

- B. Diniz, **D. C. Rodger**, V. R. Chavali, T. MacKay, S. Y. Lee, D. Stambolian and S. V. R. Sadda. "Drusen and RPE atrophy automated quantification by optical coherence tomography in an elderly population." Eye 29, 272-279 (February 2015)

- S. Lee, V. Cheng, **D. Rodger**, and N. Rao, "Clinical and laboratory characteristics of ocular syphilis: a new face in the era of HIV co-infection," J Ophthal Inflamm Infect, vol. 5, no. 1, p. 26, 2015.

- L.C. Olmos, H. Nazari, **D.C. Rodger**, and M.S. Humayun, "Stem Cell Therapy for the Treatment of Dry Age-Related Macular Degeneration". Current Ophthalmology Reports. Mar 1;3(1):16-25, 2015.

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