Optical Coherence Tomogrpahy

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& The Western Eye Hospital

The Royal Society of Medicine

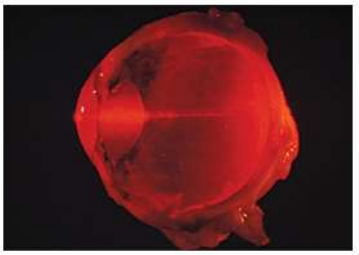
lasers, tips, trips and technology

Date Thursday 12 November 2015
Evening

Venue Royal Society of Medicine
1 Wimpole Street
LONDON
W1G 0AE

Organised by Ophthalmology Section

Accreditation 2 CPD points



agenda

5.30 pm Registration, tea and coffee

6.00 pm Welcome and introduction
Dr Elizabeth Wilkinson, President, Ophthalmology Section, Royal Society of Medicine

6.10 pm Mechanisms in laser damage and how we use them
Professor John Marshall, Frost Professor of Ophthalmology, University College London, Institute of Ophthalmology

6.30 pm Laser success: Diabetic vasculopathy
Mr Robin Hamilton, Consultant Ophthalmologist, Moorfields Eye Hospital NHS Foundation Trust

6.50 pm Laser failure and the future: Maculopathy
Ms Sharon Heng, University College London

7.10 pm Laser controversy: Vitreolysis
Mr Cees Van Der Windt, Rivierenland Hospital, Tiel, Holland

7.30 pm Laser economics and the lens: short papers for big money
Dr Paul Rosen

7.50 pm Refractive revolution, past, present and future
Professor John Marshall

8.10 pm Panel discussion

8.20 pm Completion of evaluation forms and close of meetings

8.25 pm Drinks reception

Dyspraxia Foundation

Spring Ball

at The Royal Garden Hotel, Kensington

14th May 2016

Drinks reception 6.30pm
Dinner at 7.30pm
Followed by a Charity Auction,
Live Band, Dancing and Casino
Carriages at 12.30am

£130 per Ticket
Black Tie and Evening Dress
To book tickets
Telephone: 01462 455038
Email:
admin@dyspraxiafoundation.org.uk

- 1851 Hermann von Helmholtz
- 1871 Marc-Antoine Giraud-Teulon

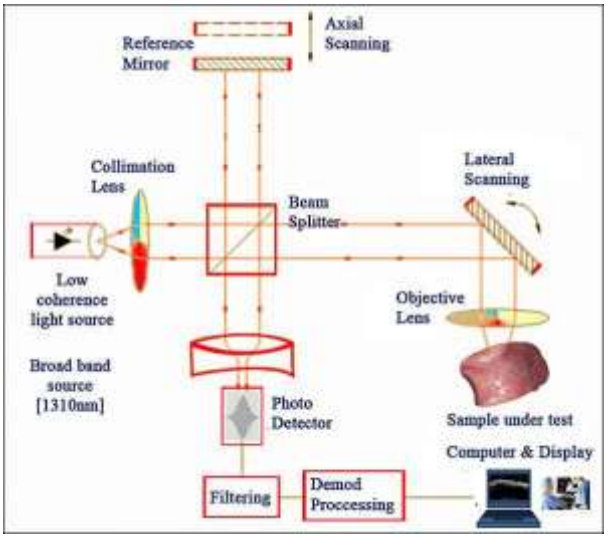
How we Use to Examine the eye 1987

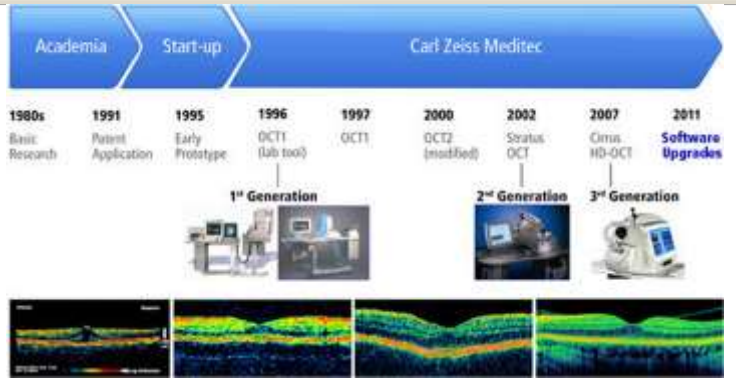
- 1919 Gullstrand slit lamp
- Ruby lenses
- Indirect Lenses - Volk
- Contact lenses
- Detailed binocular view of retina
- 1980+ Quality of optics improved considerably
- 2010 LED illumination

Slit Lamp Indirect Ophthalmoscopy Non-Medical Retina Ophthalmologists

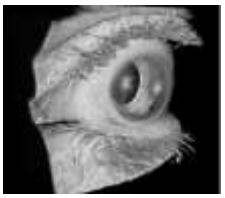
- Fundal Photography
- Film
- Polaroid
- Digital
- 3D
- Hollographic

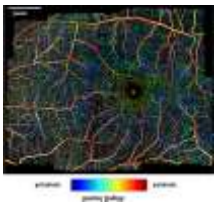
- 1990 – First Fundal images Published
- low coherence interferometry



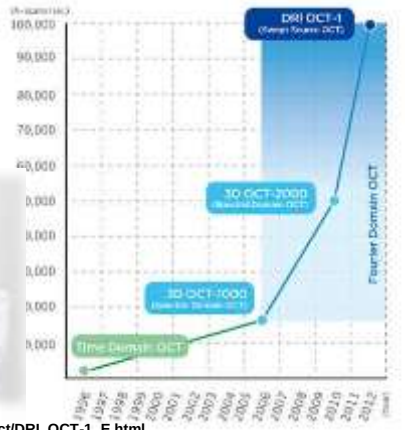


- 2015 Swept source
- OCT angiography

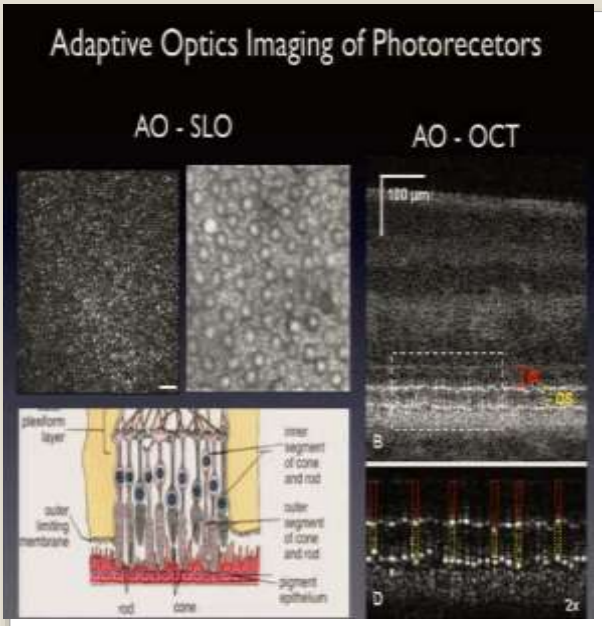




- Topcon SS-OCT



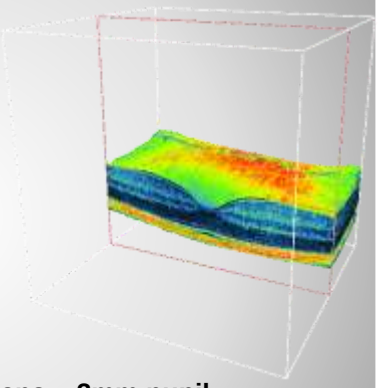
• http://www.topcon.co.jp/en/eyecare/products/product/diagnostic/oct/DRI_OCT-1_E.html



- Richard Rosen AAO 2011

- Where Next? – Cellular Imaging
- Adaptive Optics
- Different Wavelengths
- Research Only Currently
- Cellular Markers

Optical Coherence Tomography (OCT)



- **Very versatile Scanner akin to MRI scans – 3mm pupil**
- **Pachymetry, Corneal**
- **Iris Angles for Closed or Narrow Angles**
- **Retina**
- **Optic nerve for glaucoma GDx**

The Macula

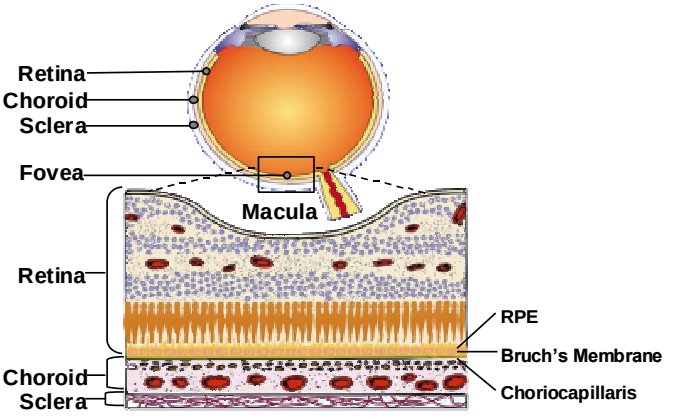
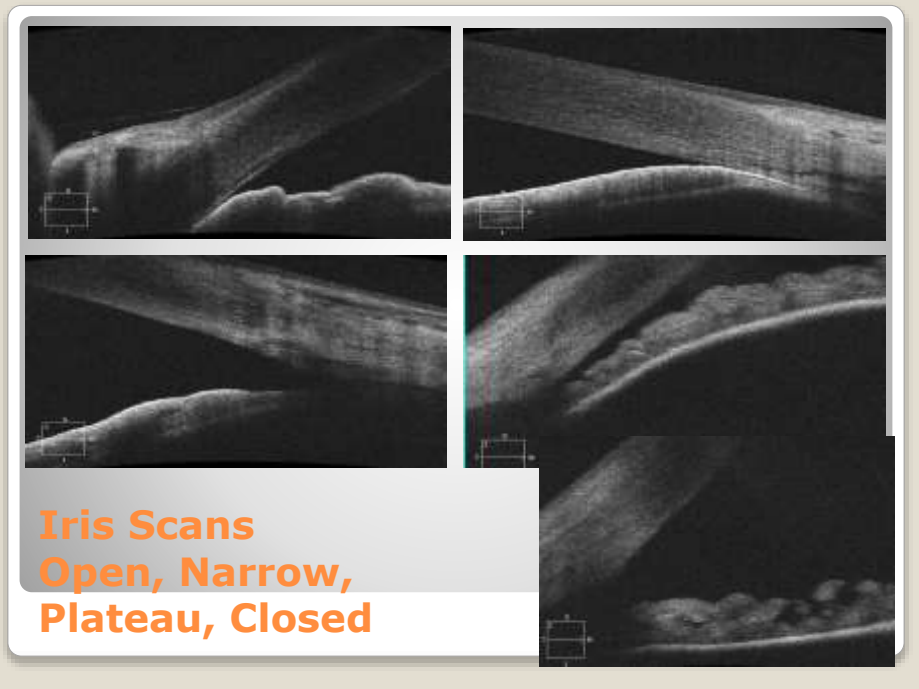
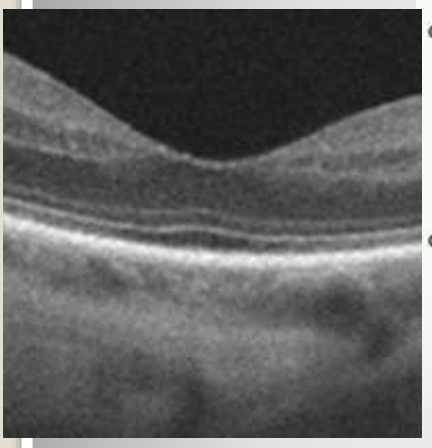
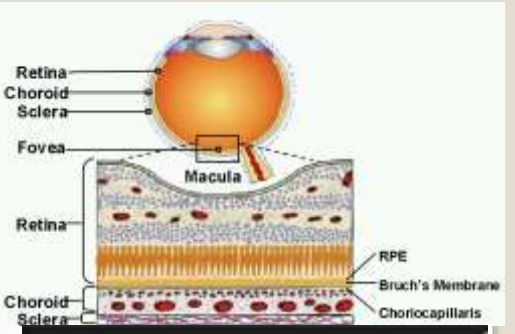
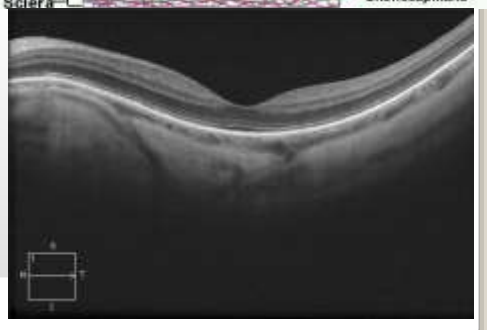


Figure courtesy of Novartis.

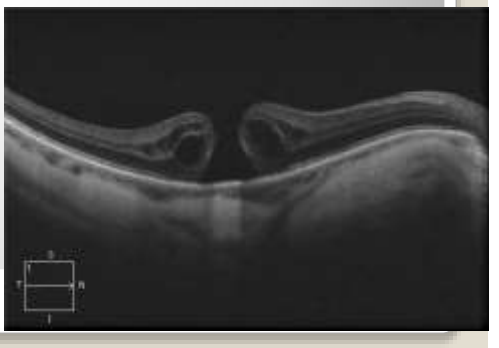




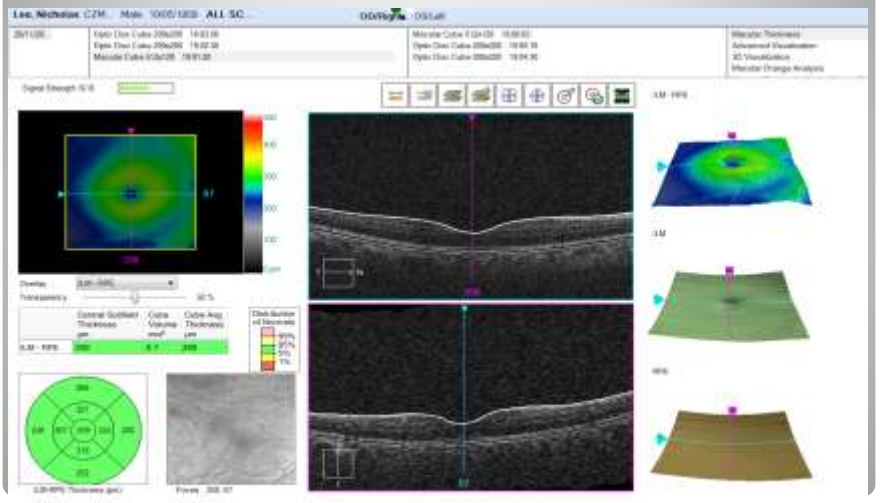


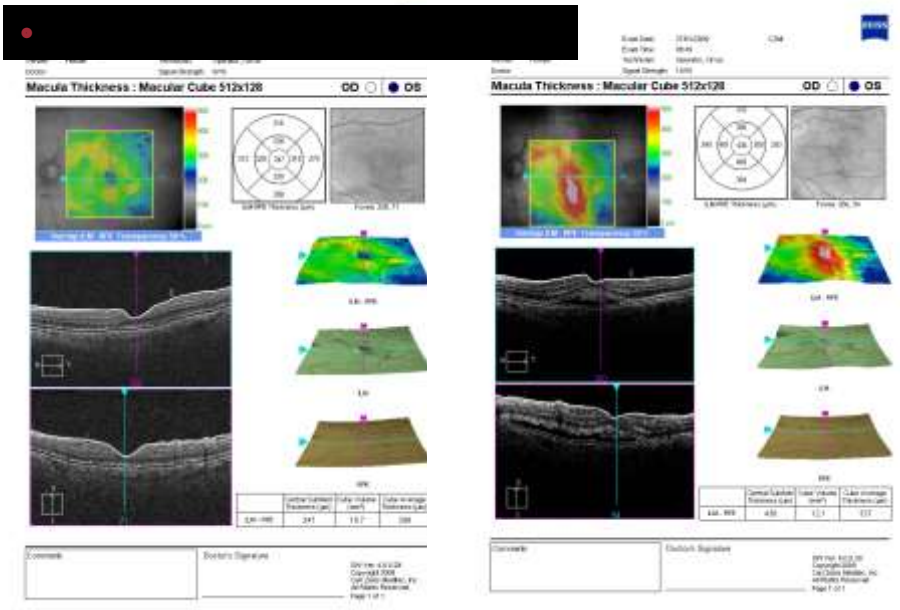


Normal Optical Coherence Tomography Scan



Standard Macular Analysis view

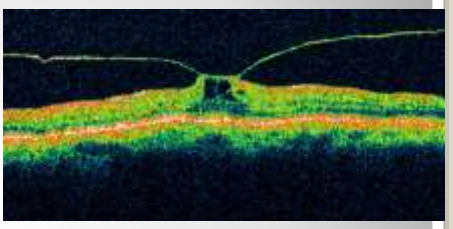




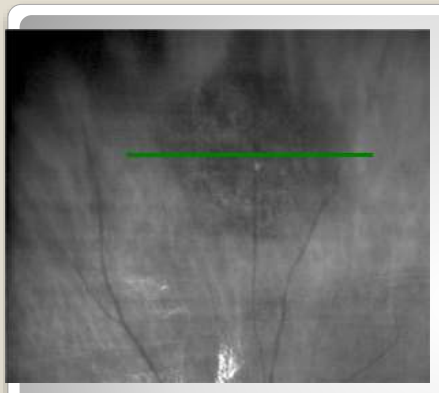
Central Vitreo-Retinal Adhesion Theory of Wet AMD Formation

- Number with adhesion
- Exudative AMD 36%
- Dry ARMD 7%
- Controls 10%

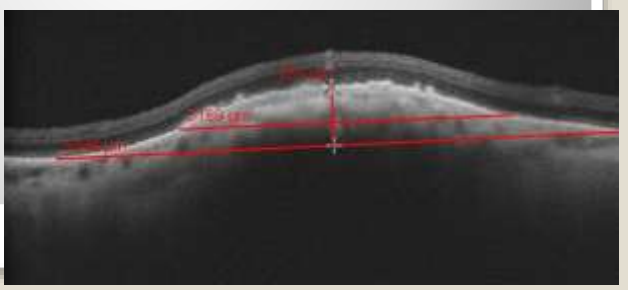
- Chronic VR traction may lead to increased chemical changes leading to wet AMD.
- ? Injection of Microplasmin to separate VR? Role



- ? Also pathogensis of Macular holes
- Microplasmin Trials underway 12/08 -2010
- 125ug Microplasmin Intravitreal injection.

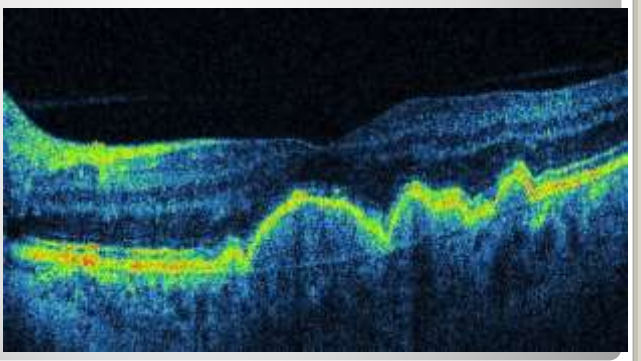


- Choroidal Naevi on HD Optical Coherence Tomography

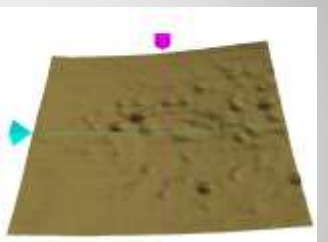


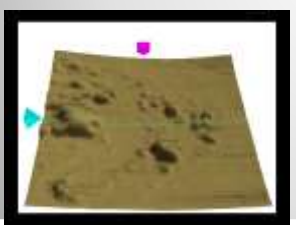
Drusen

- Beginning early in life,.
- Remnants of the incomplete degradation of abnormal molecules which have been damaged within the RPE cells or derived from phagocytized rod and cone membranes.
- Further deterioration of the RPE.
- Dry AMD
- Wet AMD



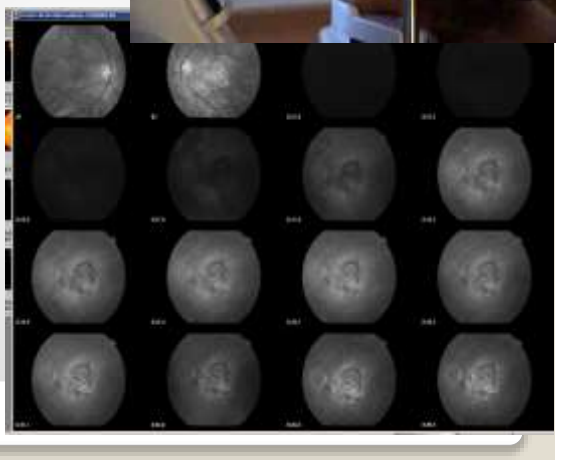
Change in drusen over one year

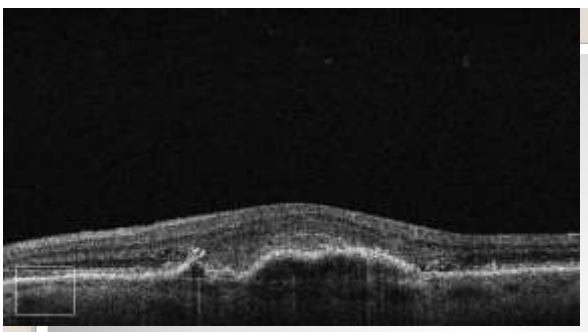




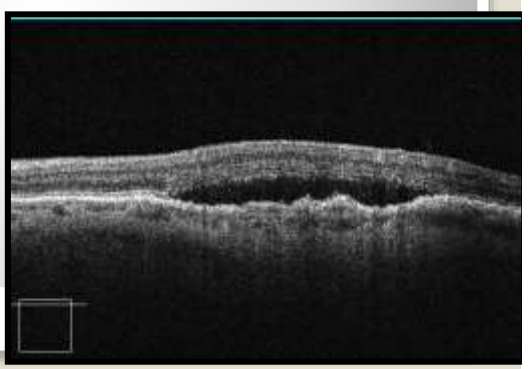
Fundus fluorescein angiography

- Key investigation
- Looks at Retinal circulation
- BUT do not delay treatment for FFA!





Wet AMD formation



Rapid change
1 Week!
Warn Patients of rapid Onset
DO not wait till next appointment/exam

Regimes

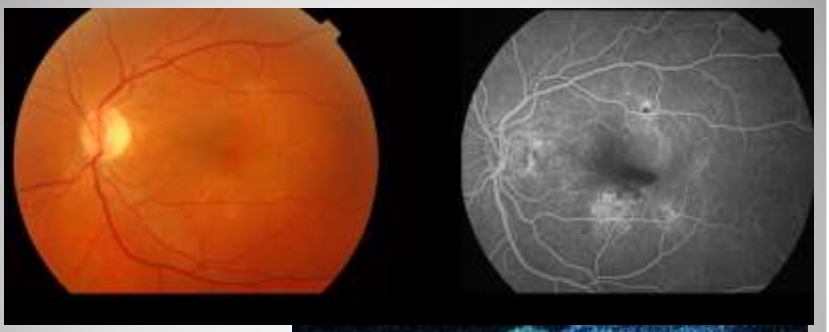
Lucentis / Avastin Pre loaded

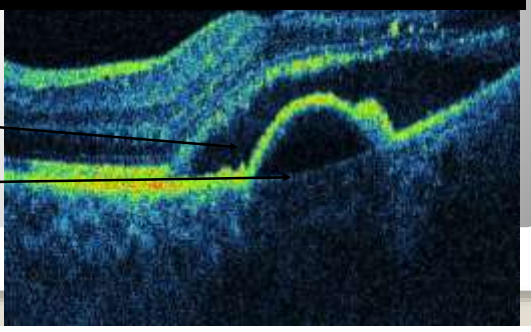
- 3 loading doses
- Variety of regimes
  - Monthly
  - PRN
  - Treat and Extend
  - X 3 on month apart ie repeat loading doses
  - Bi monthly or tri monthly
  - 2 weekly
  - Customised to patient

Eyelea Bottle

- 3 doses one month apart
- Every other month for 9 months ie 4 doses
- Review Month 12
- Bimonthly on PRN
- No option of monthly
- ?When to review
  - Other eye?

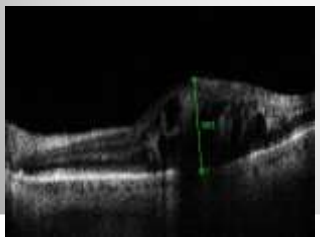
Wet AMD 6/12+2 62 F

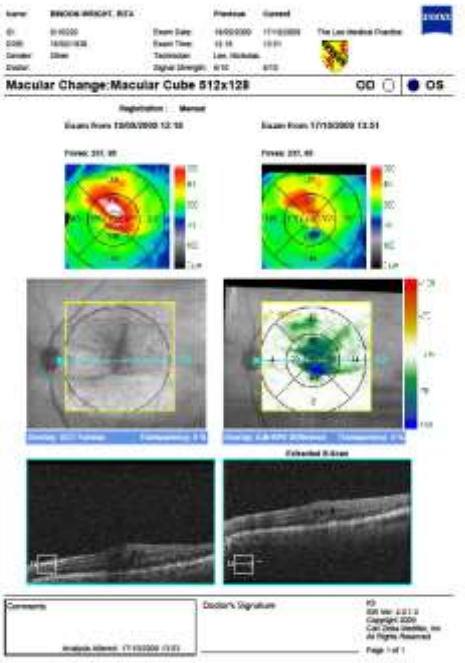


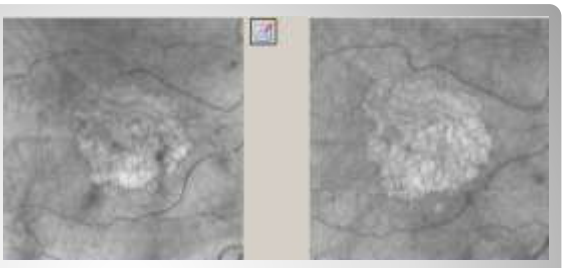


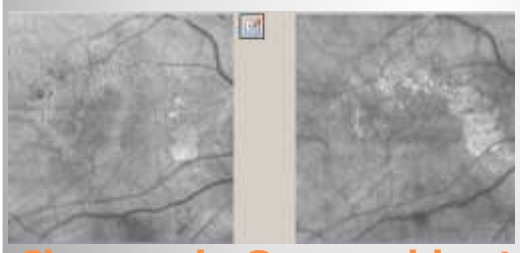
- Sub retinal Fluid
- PED
- Invisible to direct

Zeiss Cirrus HD-OCT Change analysis

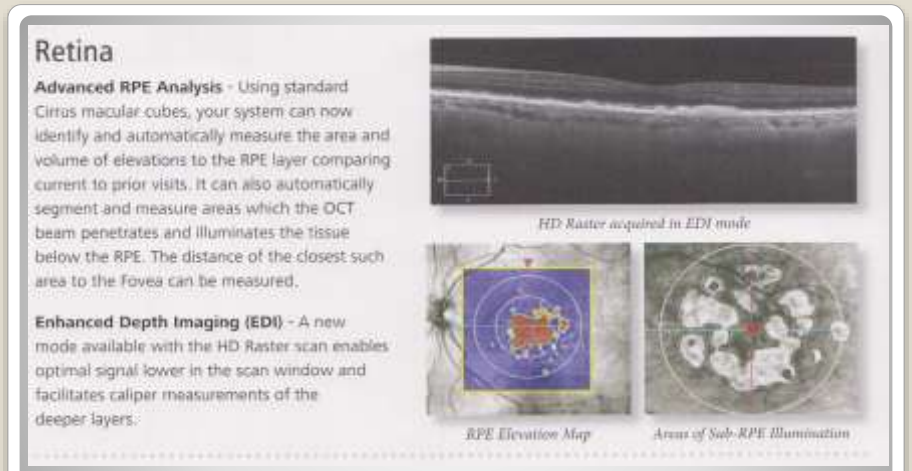








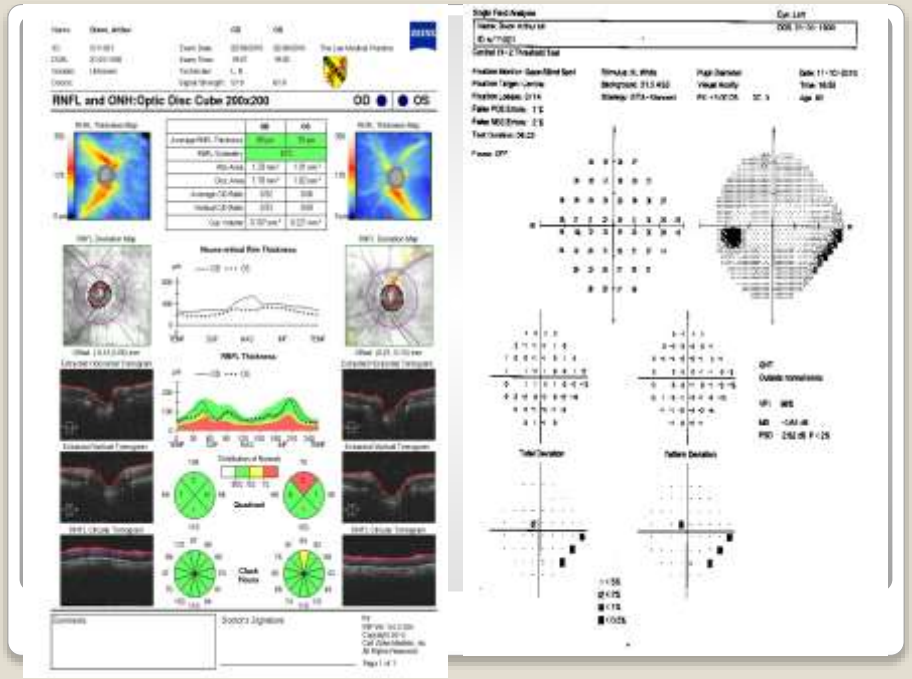
Changes in Geographic atrophy Area measurments in V6 Lampalizumab

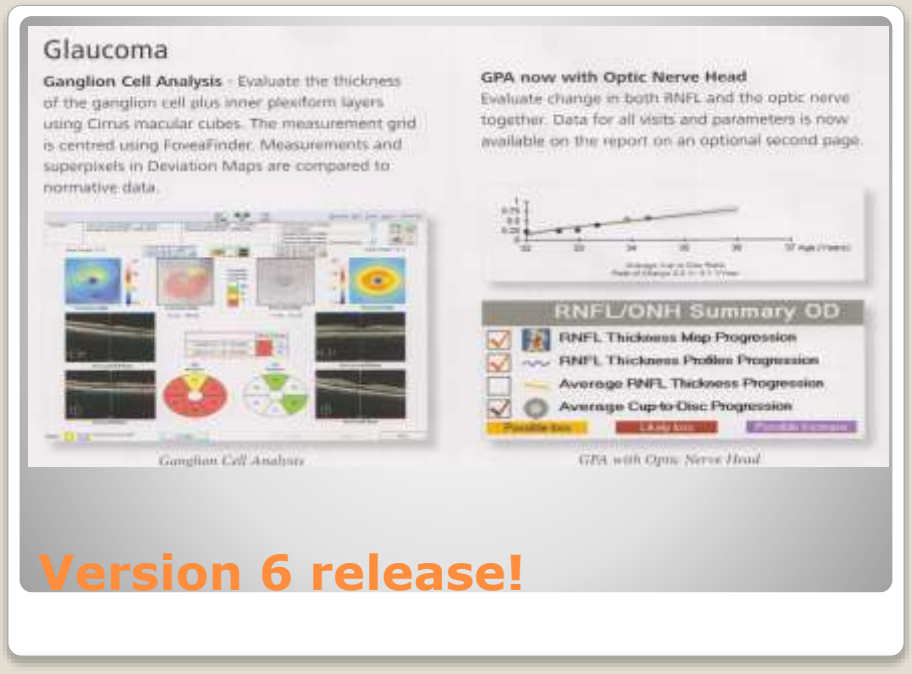


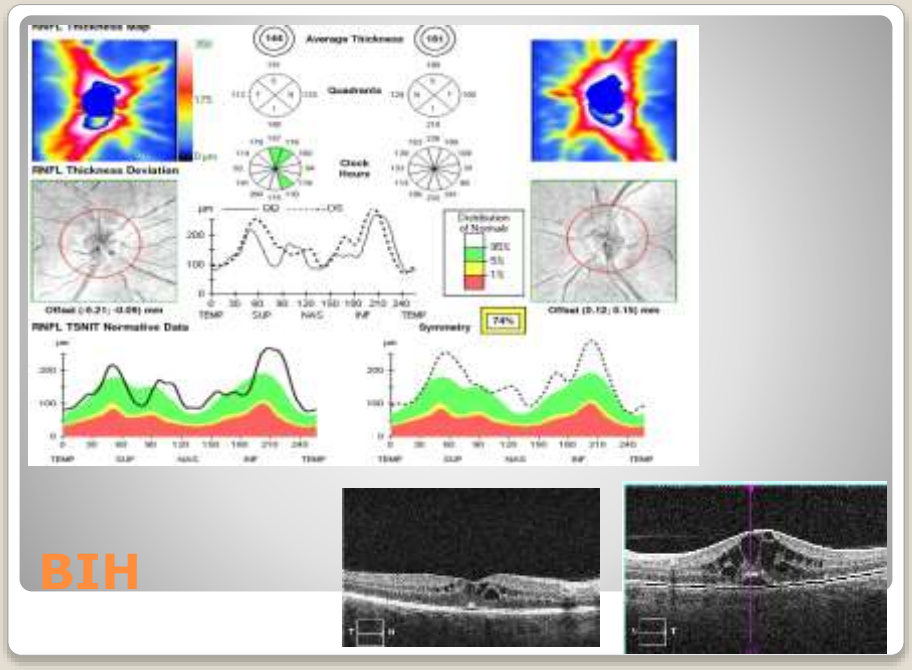
Version 6

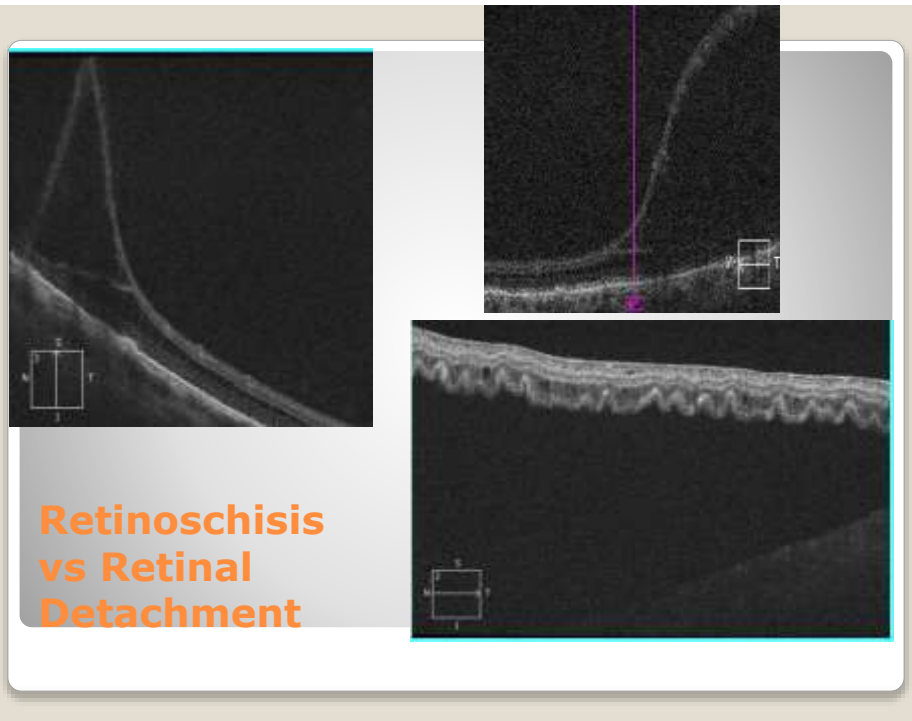
- Mahalo II – 20% reduction in GA
  - Monthly – 18 months
  - No intraocular or systemic side effects
- Chroma / Spectri Phase III
  - IVT vs Sham 936 Patients -1 Year / 2 Years
  - Hillingdon, Southampton
  - 6/36, 1 – 7 Discs areas of GA
  - No wet AMD

Lampalizumab 10mg IVT
Roche


RNFL and ONH:Optic Disc Cube 200x200
OD
OS

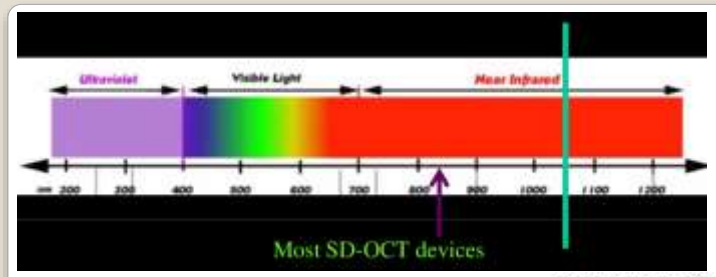

Glaucoma
Ganglion Cell Analysis - Evaluate the thickness of the ganglion cell plus inner plexiform layers using Cirrus macular cubes. The measurement grid is centred using FoveaFinder. Measurements and superpixels in Deviation Maps are compared to normative data.
GPA now with Optic Nerve Head
Evaluate change in both RNFL and the optic nerve together. Data for all visits and parameters is now available on the report on an optional second page.
RNFL/ONH Summary OD
RNFL Thickness Map Progression
RNFL Thickness Profiles Progression
Average RNFL Thickness Progression
Average Cup-to-Disc Progression
Ganglion Cell Analysis
GPA with Optic Nerve Head
Version 6 release!

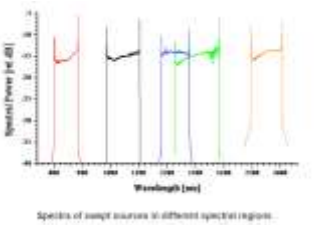

Average Thickness
Quadrants
Clock Hours
RNFL Thickness Deviation
RNFL TSNIT Normative Data
Symmetry
74%
BIH


Retinoschisis vs Retinal Detachment

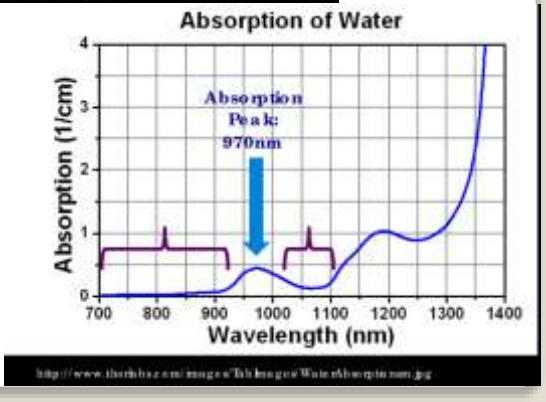
Swept Source 1050nm Next geneneration

- 100,000 to 200,000 Scans per second gives 7.5mm range at 6 um resolution
- Dual Spot 400,000 scans per second gives 4mm Range with 5.3um Resolution.
- Dual spot 2 – 20 x faster
- Can achieve up to 12mm x 12mm cubes.
- 1010 nm Vs 800nm
- Large areas Scanned Quickly
- 10x cheaper than SD OCT.





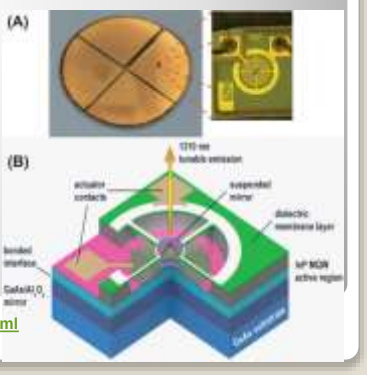
Spectra of swept sources in different spectral regions



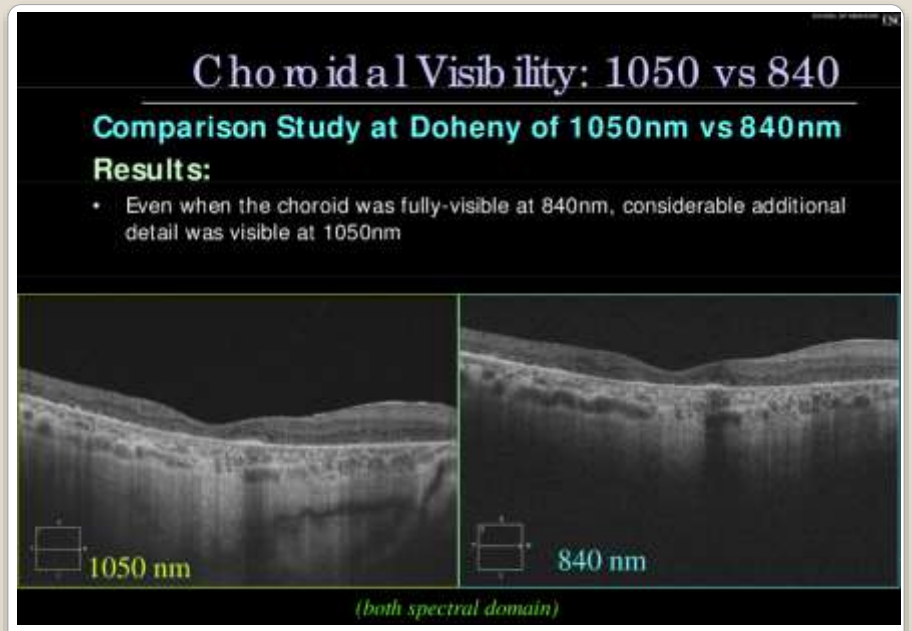
• http://www.exalos.com/swept-source/

- spectral-domain OCT (SD-OCT), uses a broadband light source along with an interferometer, a spectrometer, and a line-scan camera.
- swept-source OCT (SS-OCT), uses a wavelength-swept laser light source, that is, one whose emission sweeps back and forth across a range of wavelengths. An interferometer and a detector with a high speed analog-to-digital (A/D) converter complete the SS-OCT imaging system

- Deep tissue penetration
- Doppler OCT flow analysis
- Scanning speeds in MHz range!
- Low cost – Solid state
  - vertical-cavity surface-emitting laser (VCSEL)
  - Size of 1 Euro!

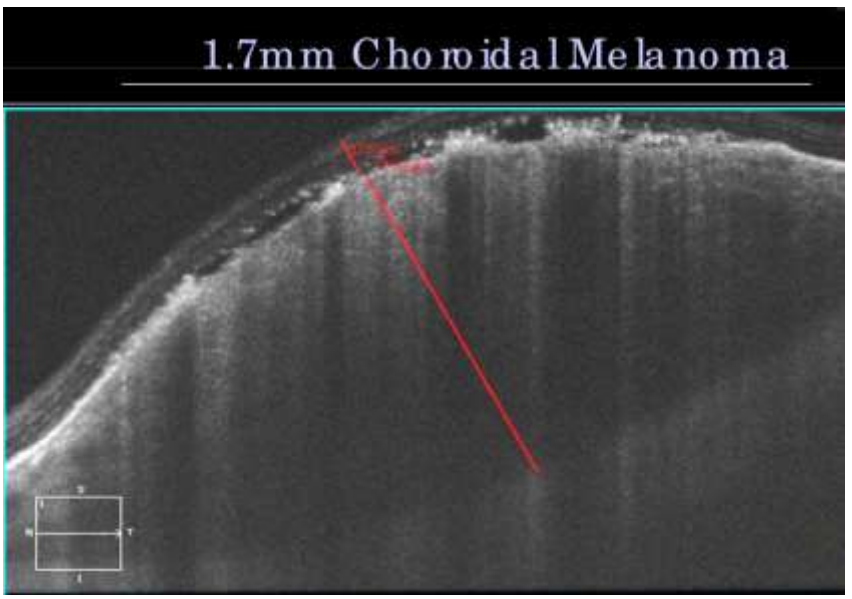


- http://english.ioe.cas.cn/ns/Sciencenews/201208/t20120828_90302.html
- http://www.exalos.com/swept-source/


Choroidal Visibility: 1050 vs 840
Comparison Study at Doheny of 1050nm vs 840nm
Results:
• Even when the choroid was fully-visible at 840nm, considerable additional detail was visible at 1050nm
1050 nm
840 nm
(both spectral domain)


12 x 9 mm volume scans are also easy
Large field OCT Imaging
12 mm B-scans are easy to obtain

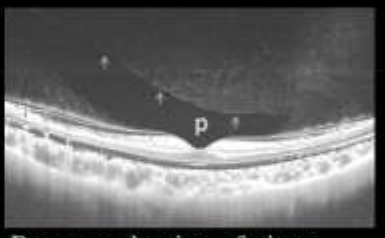
Wider view
Less Mag though
Larger File size



Vitreous imaging with SS-OCT

Observation of Posterior Precortical Vitreous Pocket Using Swept-Source Optical Coherence Tomography

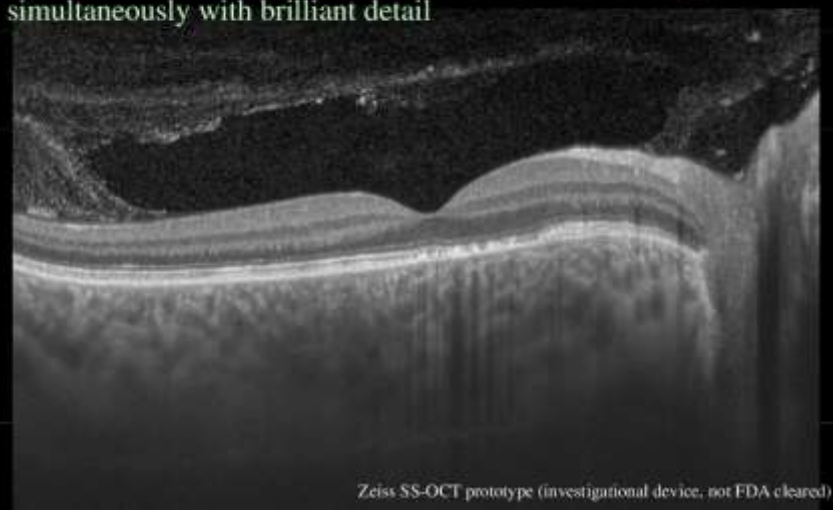
Better sensitivity means better visualization of subtle structures



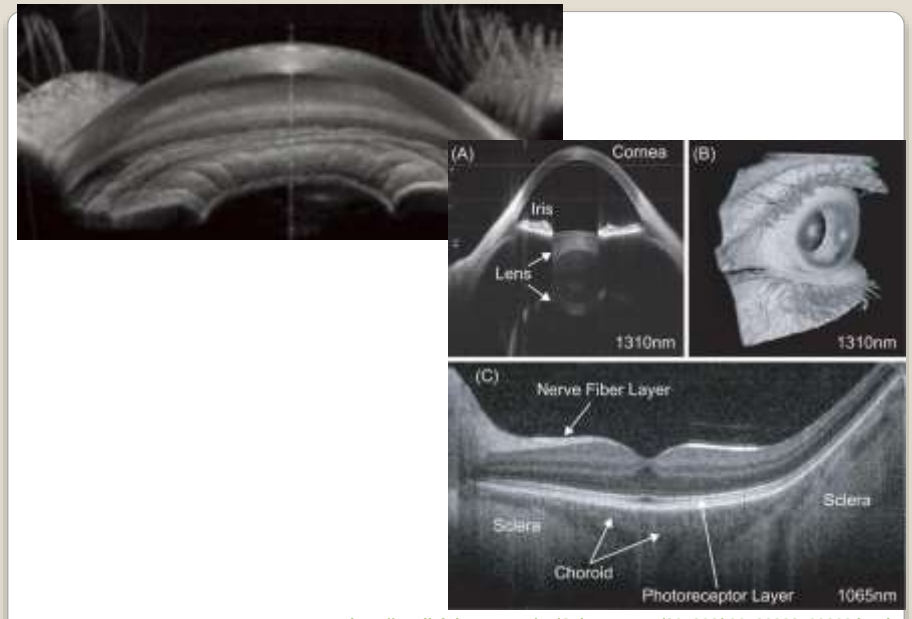
- Better evaluation of vitreo-macular interface disease and normal vitreous dynamics
- Possibility of quantification of vitreous cell

Vitreous imaging with SS-OCT

With SS-OCT, both the vitreous and choroid can be imaged simultaneously with brilliant detail



Zeiss SS-OCT prototype (investigational device, not FDA cleared)



• http://english.ioe.cas.cn/ns/Sciencenews/201208/t20120828_90302.html
• http://www.tomey.com/Products/OCT/SS-1000CASIA.html

Function Bleb

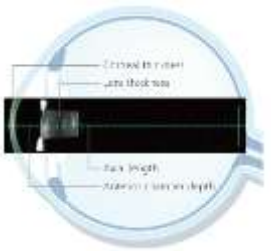
Case report 1 Limbal-based incision: 79-year-old woman with normal tension glaucoma

Filtration bleb having some vascular and avascular areas.[10 months post-surgery]
The internal aqueous space is clearly visible under the medium intensity of filtration bleb walls. In the anterior chamber, sections of trabeculectomy and iridectomy are observed connecting with the aqueous space under the scleral flap.

CASIA
SS-1000

• http://www.tomey.com/Products/OCT/SS-1000CASIA.html

- 19 D – Adjust for Refraction
- A scan Ultrasound
- Immersion Ultrasound
- Laser – A Scan – IOL master
- Swept Source B Scan – IOL Master 700



Biometry

Ability to cut through very dense cataracts is i5mmpressive.

K Axis – Toric IOL

- Space: the final frontier. These are the voyages of the starship Enterprise. Its five-year mission: to explore strange new worlds, to seek out new life and new civilizations, to boldly go where no man has gone before

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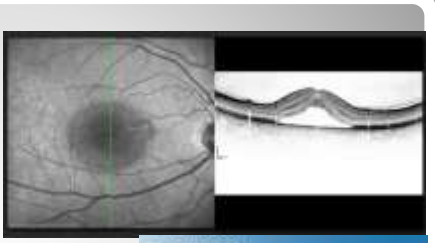
- Zeiss Cirrus 4000
- Zeiss Cirrus 400
- Heidelberg Spectralis
  - 7 Models to choose from
- Topcon 3D-OCT
- Nidek RS-3000 OCT/SLO



OCT Choices