

# Examination techniques in ophthalmology

V. Matušková

# Basic examination techniques

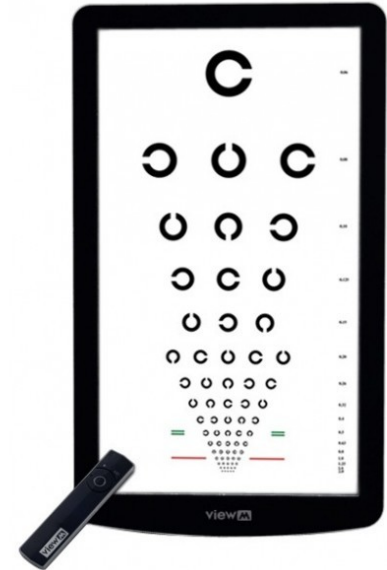
- Visual acuity (natural, best corrected)
- Measurement of intraocular pressure
- Slit lamp examination
- Fundus examination



# Visual acuity

- Visual acuity (natural, best corrected)
- Distance vision
- Near vision
- **Charts**
  - Snellen
  - Landolt ring
  - Pictures
  - ETDRS
- **Jaeger**

# Charts



VISUAL ACUITY CHARTS	
Standard Snellen chart	Bailey-Lovie chart
<p><b>E</b> 1</p> <p><b>F P</b> 2</p> <p><b>T O Z</b> 3</p> <p><b>L P E D</b> 4</p> <p><b>P P C F D</b> 5</p> <p><b>K H F C E F</b> 6</p> <p><b>VELOPED</b> 7</p> <p><b>DEVELOPED</b> 8</p> <p><b>XXXXXXXXXX</b> 9</p> <p><b>XXXXXXXXXX</b> 10</p>	<p><b>D S R K N</b></p> <p><b>C K Z O H</b></p> <p><b>O N R K D</b></p> <p><b>K Z V D C</b></p> <p><b>V S H Z O</b></p> <p><b>H D K C R</b></p> <p><b>O S N H N</b></p> <p><b>S Y Z D K</b></p> <p><b>XXXXXXXXXX</b></p> <p><b>XXXXXXXXXX</b></p>

# Near vision

## Jaeger chart

VODS: s +2,5 Dsf  
J.No. 1

### Jaeger Eye Chart

No. 11  
.25 M

in the preceding generation, the state of this country is reduced from a republic and a democracy to a despotic monarchy, and the people are reduced to a state of slavery and oppression.

No. 10  
.30 M

the public administration was conducted by the wise and able of every tribe, and by the aid of the people, it is the hope of the author, to show the progress of the state, and the manner in which it is to be conducted, in the most advantageous manner, and to show the manner in which it is to be conducted, in the most advantageous manner, and to show the manner in which it is to be conducted, in the most advantageous manner.

No. 9  
.40 M

the nature of the earth. The principal object of the author was to show the manner in which the state is to be conducted, in the most advantageous manner, and to show the manner in which it is to be conducted, in the most advantageous manner, and to show the manner in which it is to be conducted, in the most advantageous manner.

No. 8  
.50 M

invented by Augustus to relieve the ambitious design of subduing the whole earth, and to introduce a spirit of moderation into the public councils, (which is just by his temper and situation, it was very easy for him to discover that Rome, in her present exalted situation, had much less to lose than to have the chance of success, and that, in the present situation.

No. 7  
.75 M

the undertaking became every day more difficult, the event more doubtful, and the preparation more precarious, and less beneficial. The experience of Augustus added weight to these salutary reflections, and effectually convinced him that, by the present vigor of

No. 6  
1.25 M

his accounts, it would be easy to secure every advantage which the safety or the dignity of Rome might require from the most formidable barbarians. Instead of exposing his person or his legions to the arrows of the Parthians, he obtained, by an honor-

No. 1  
1.50 M

able treaty, the restitution of the standards and prisoners, which had been taken in the defeat of Crassus. His generals, in the early part of his reign, attempted the reduction of Ethiopia and Arabia Felix. They marched near a thousand miles to the south of the tropic; but the heat of the climate soon repelled the invaders, and protected the warlike natives of those sequestered regions.

No. 8  
1.75 M

and miles to the south of the tropic; but the heat of the climate soon repelled the invaders, and protected the warlike natives of those sequestered regions.

No. 9  
2.00 M

The northern countries of Europe scarcely deserved the expense and labor of conquest. The forests and morasses of Germany were

No. 9  
2.50 M

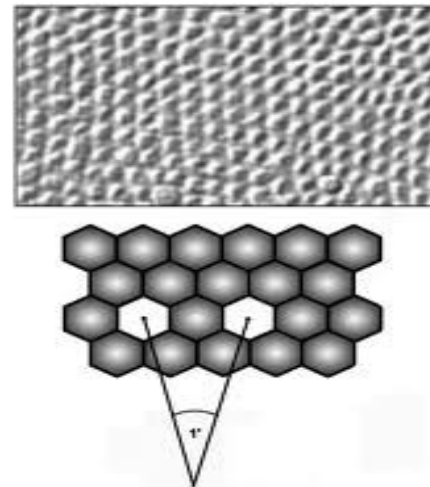
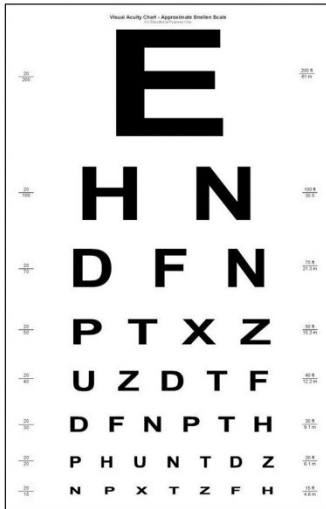
filled with a hardy race of barbarians who despised life when it was separated from freedom; and though, on the first

No. 10  
2.25 M

attack, they seemed to yield to the weight of the Roman power, they soon, by a signal

# Visual Acuity

- 5/50 (metres, feet 20/200)
- 0,1
- Minimum separabile – minimum angle of resolution



# Visual acuity

- Counting finger (metres )
- Hand movement
- Light perception
- Amaurosis
- Practical blindness



# Refraction

- Refractive error is an optical abnormality in which the shape of the eye fails to bring light into sharp focus on the retina, resulting in blurred or distorted vision.
- In optometry, a "refraction" procedure is the measurement of refractive error
- **Autorefractor**





# Autorefractor



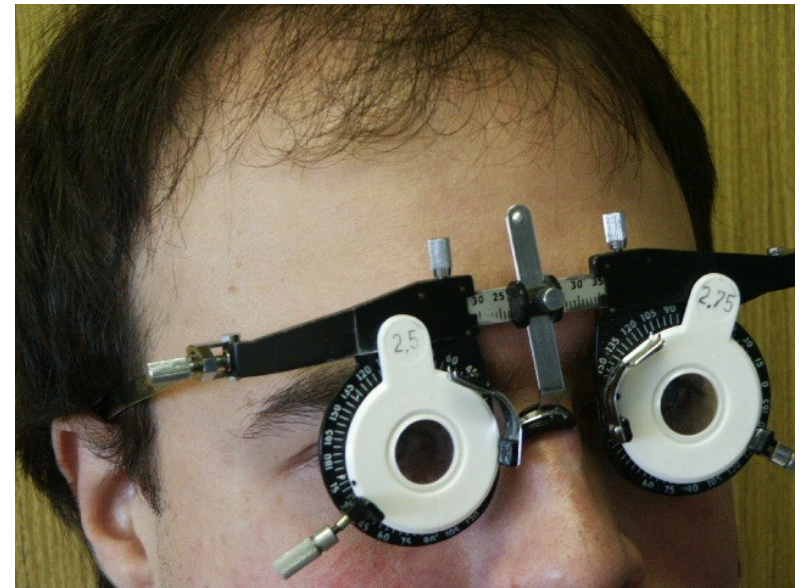
# Visual acuity

- VOD: 5/50, s – 2,0 Dsf a -1,0 Dcyl ax 90 5/5
- VOS: 5/30, s – 2,5 Dsf a -1,5 Dcyl ax 100 5/7,5,

- 
- VOD: visus oculi dextri
  - VOS: visus oculi sinistri
  - Dsf: dioptry sferic
  - Dcyl: dioptry cylindric
  - Ax: axis

# Visual acuity

- Frame
- Lenses
- Axis



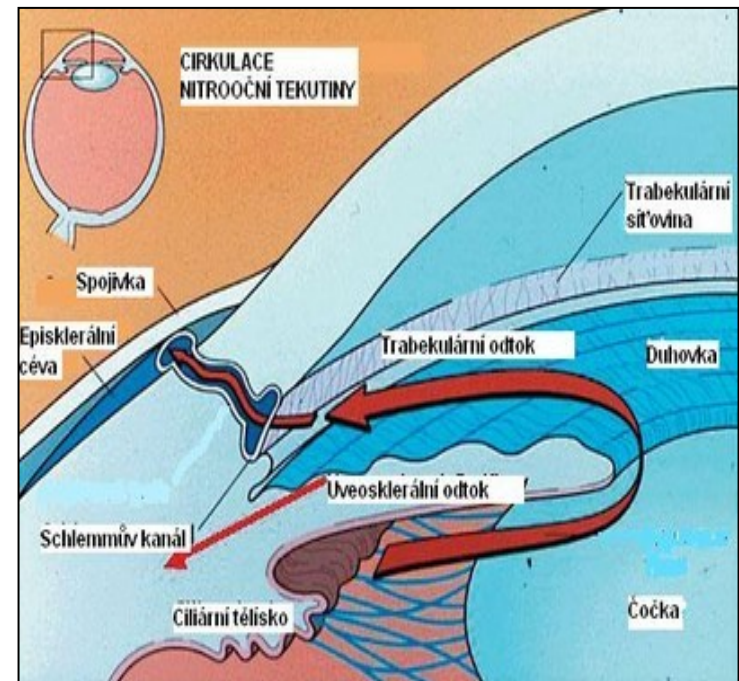
# Tonometry

## Contact techniques

- Schiötz tonometry
- Goldmann applanation tonometry

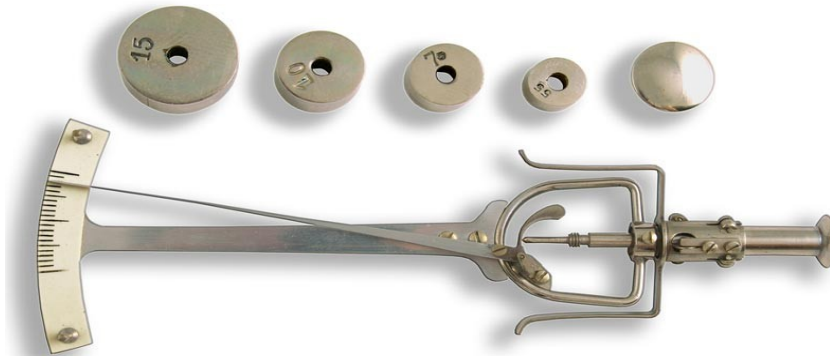
## Non contact techniques

- Jet air (air puff)



# Schiötz tonometry

- 7/7,5
- Topical aneesthesia



# Schiötz tonometry

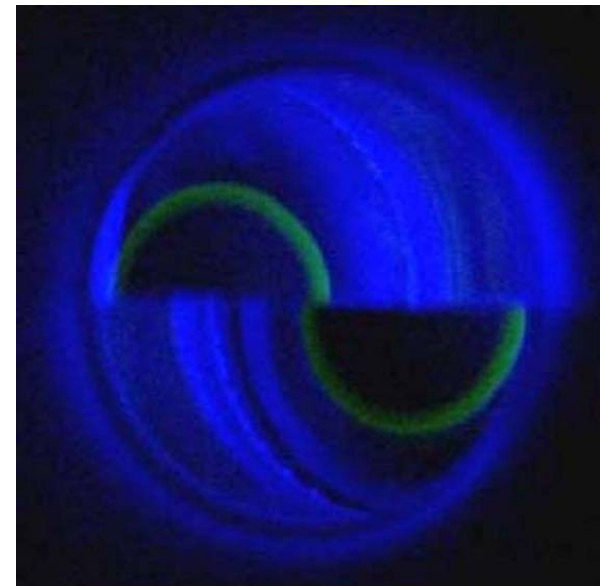
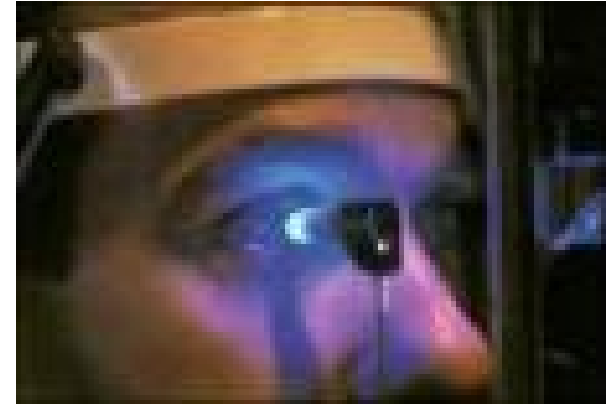
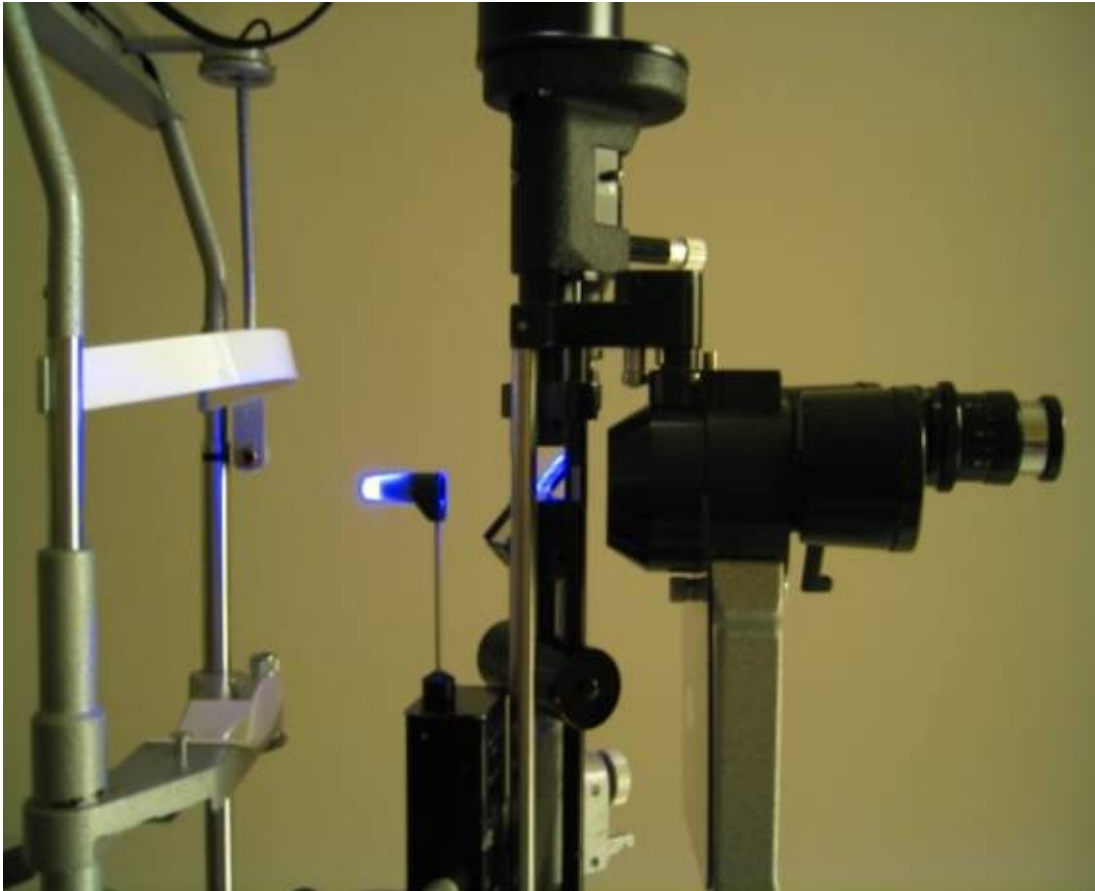


# Goldmann tonometry

- The normal range is 10-21 mmHg
- Topical anesthesia, fluorescein
- Force required to flatten the cornea



# Goldmann tonometry





# Non contact tonometry



# Examination of anterior segment

## Aspection



Ectropium



Ptosis



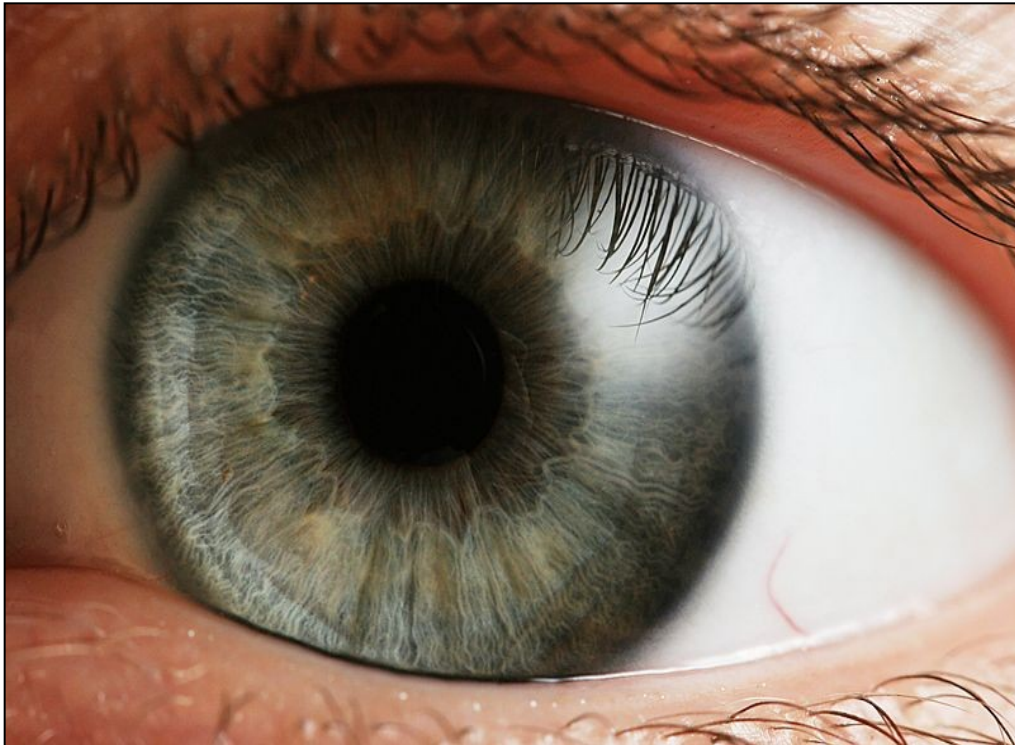
Lagophtalmus



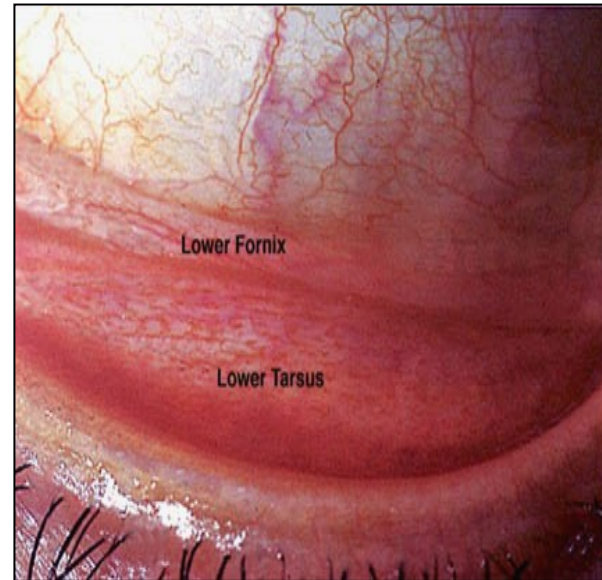
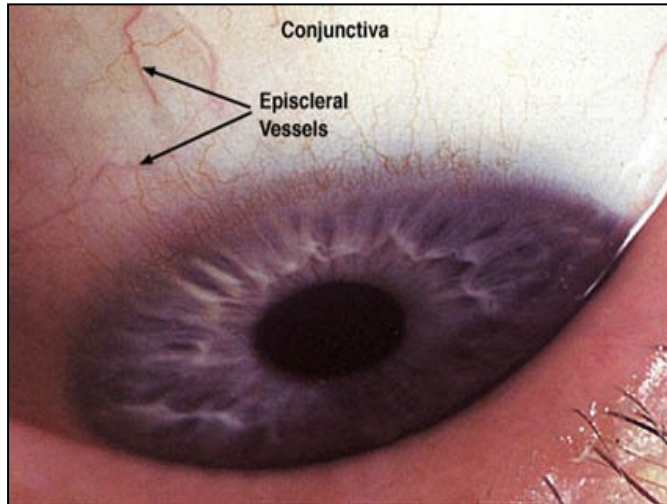
Entropium

# Slit lamp biomicroscopy

- table mounted microscope with a special adjustable illumination source attached



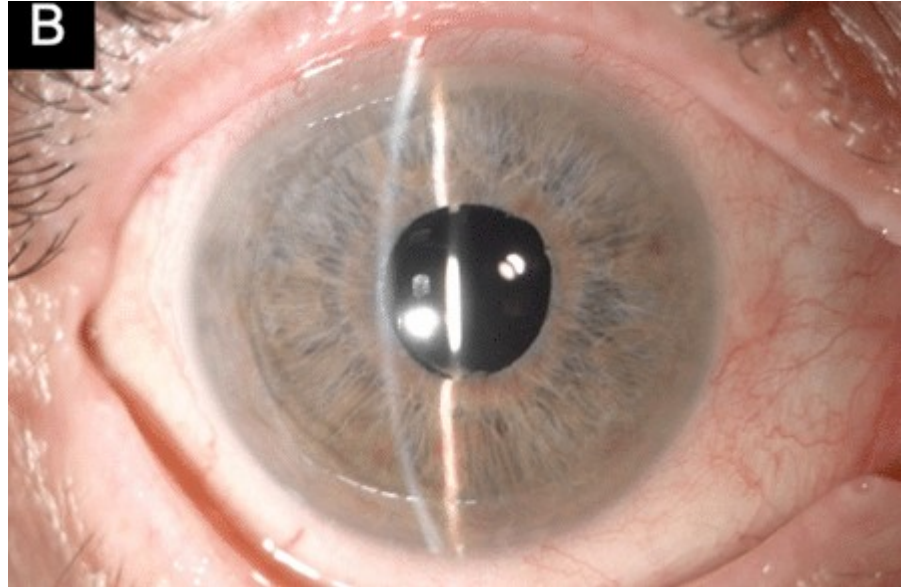
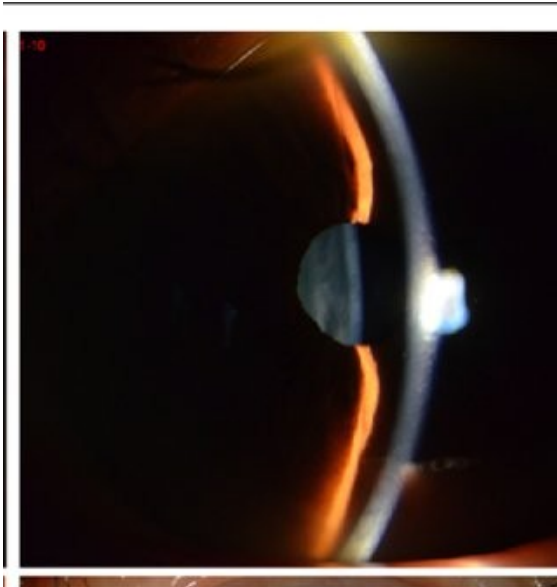
# Slit lamp biomicroscopy



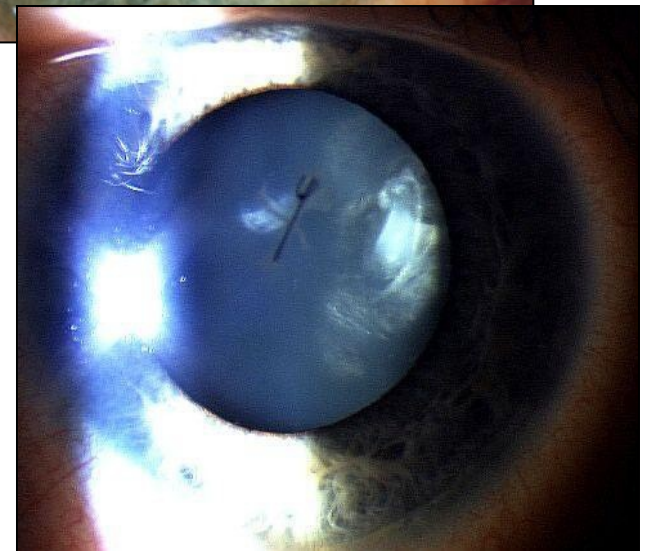
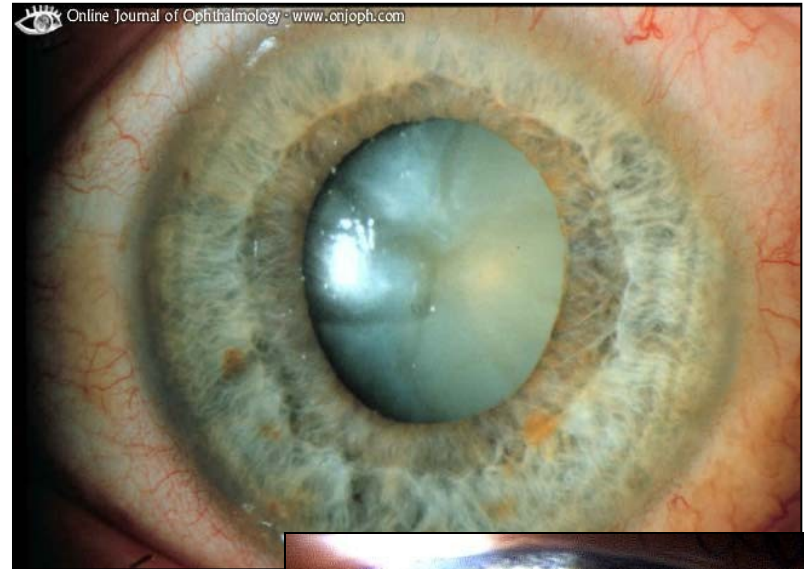
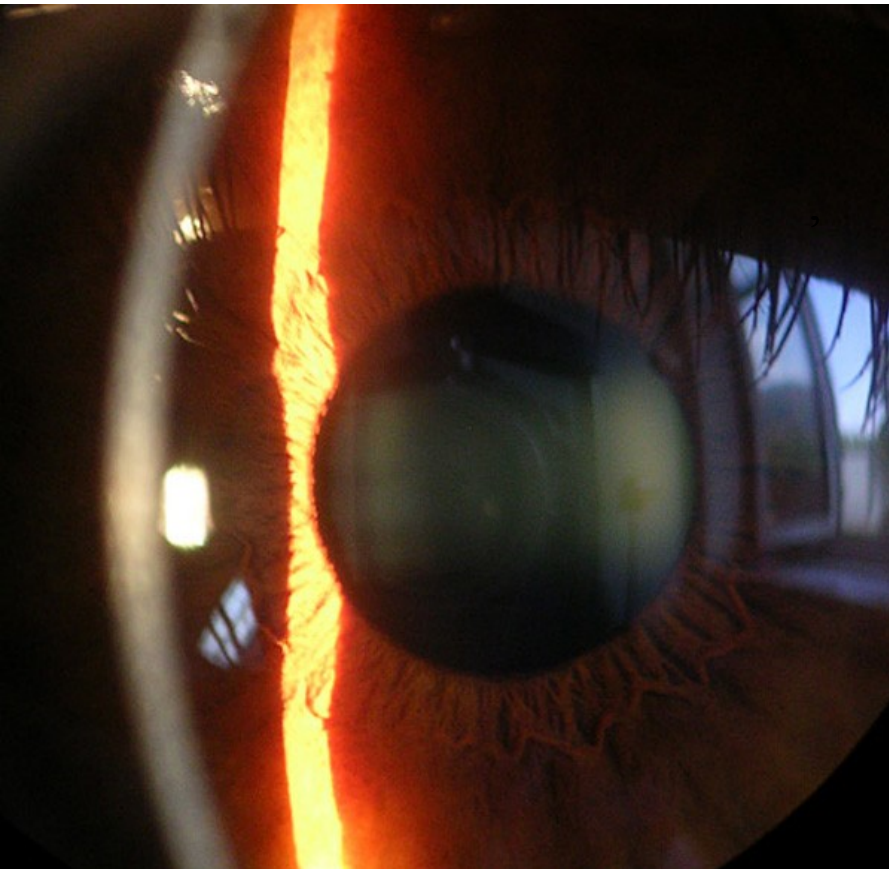
# Slit lamp biomicroscopy



# Slit lamp biomicroscopy



# Slit lamp biomicroscopy

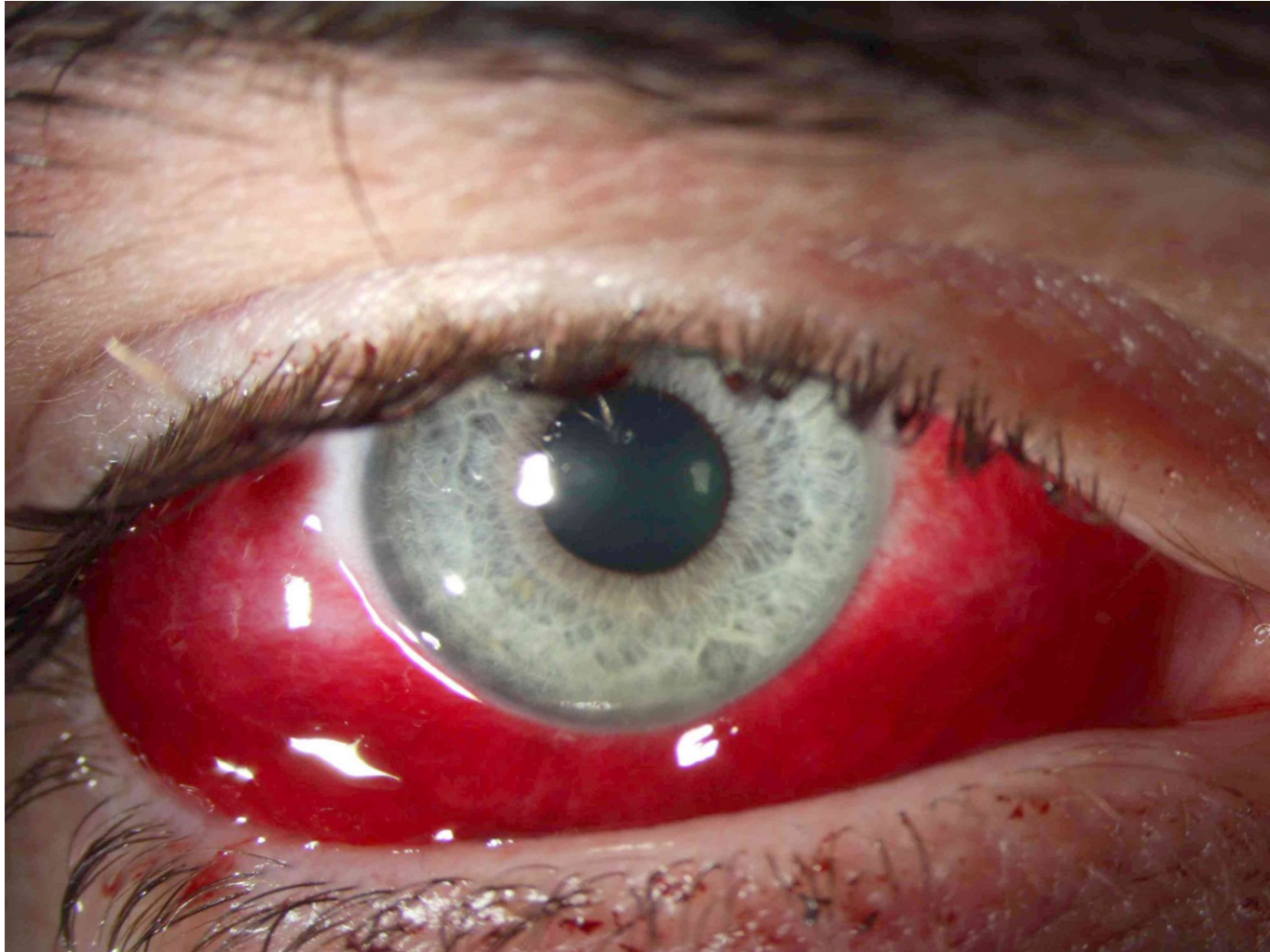


# Synechia posterior

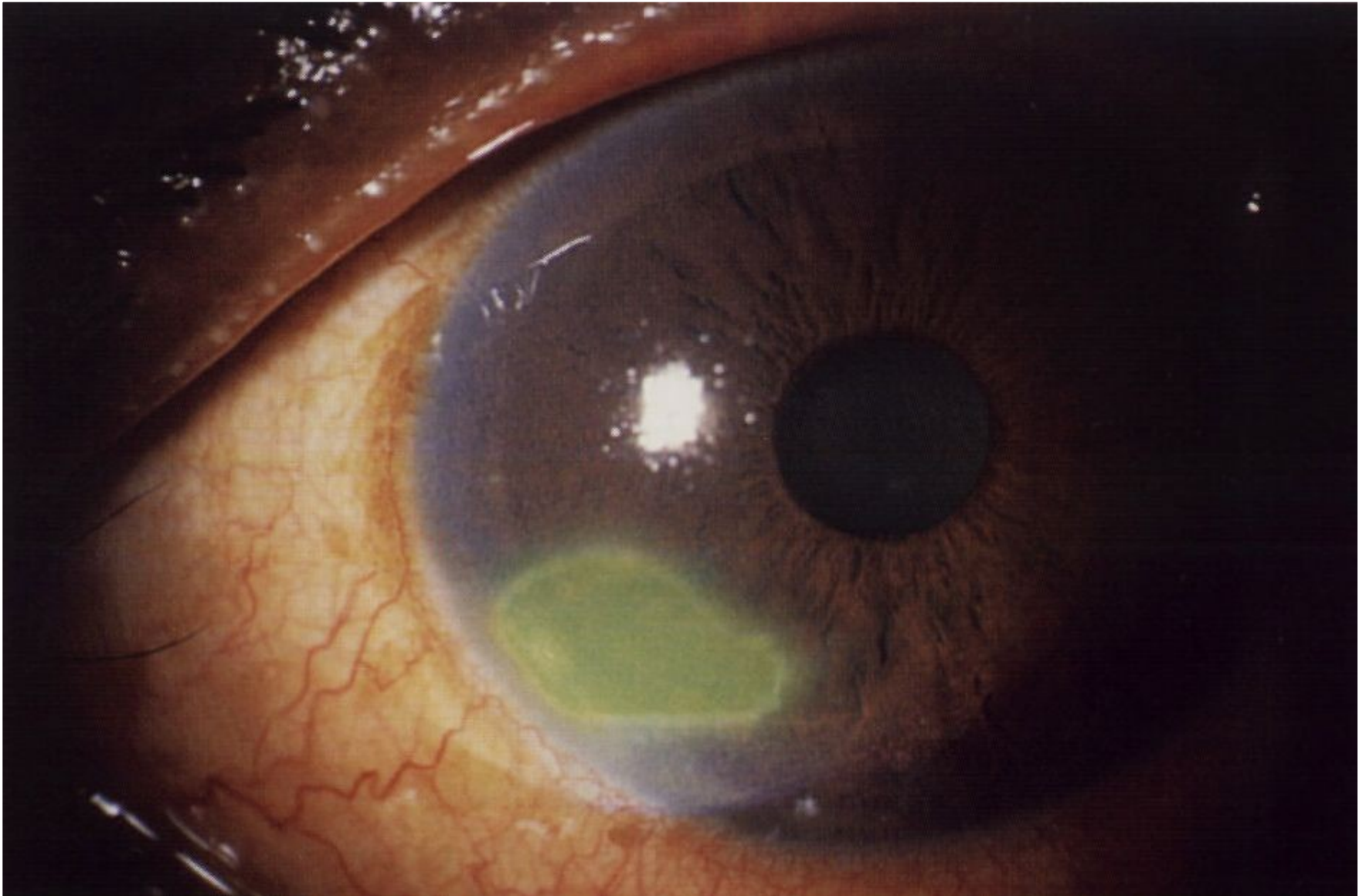




# Sunconjunctival haemorrhage



# Corneal abrasion



# Hyphema

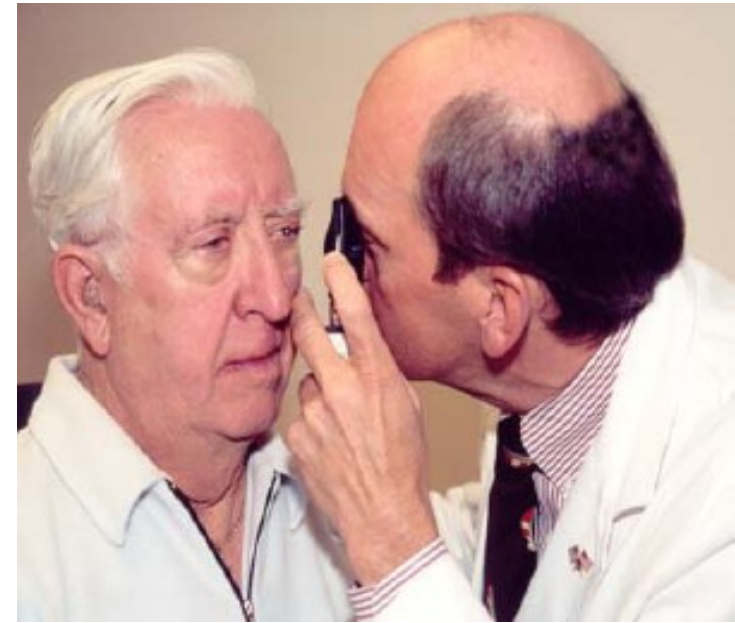


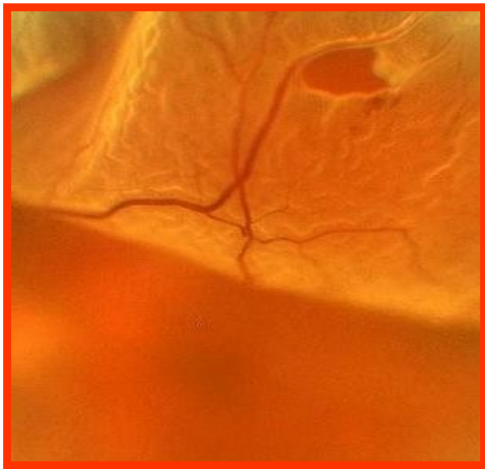
# Hypopyon



# Examination of fundus

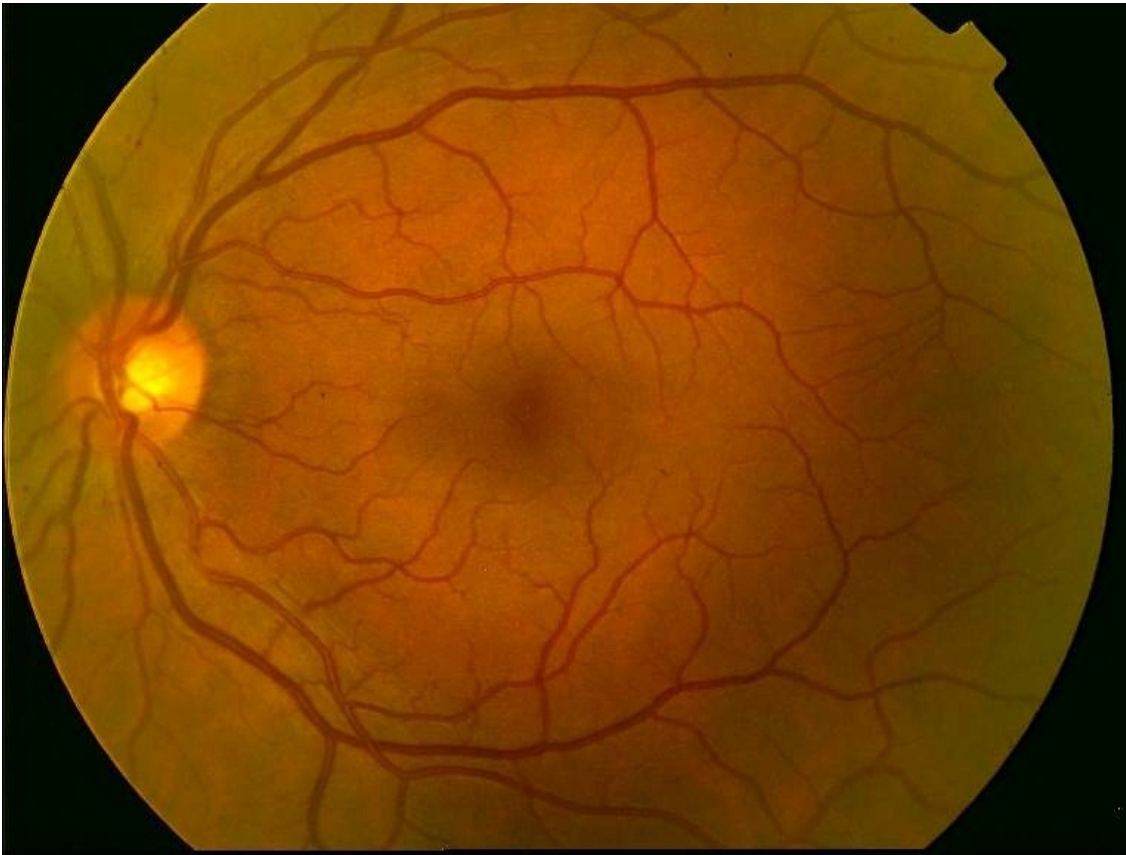
- **Ophthalmoscopy - direct (no stereopsis, worse for periphery)**  
- indirect
- **Slit lamp biomicroscopy**  
(high power convex lens, the image is vertically inverted and laterally reversed)
- **Mydriasis is necessary !**





Features	Simple Myopia (Low myopia)	Mild Myopia (Low to mid)	High Myopia (High)
Field	Normal	Mild degree	M degree
Examination findings (low power)	Normal and normal to short retinal vessels	same length	same length
Findings in farward images	No	No	Yes
Shape of disc	Intermediate	Optical	High

# Ocular fundus



# Status of the lens

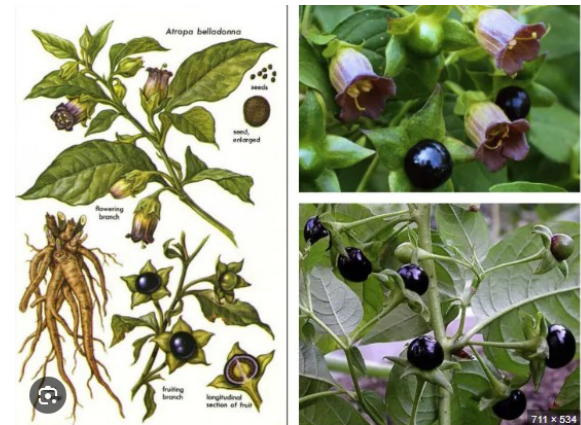
- Phakic eye (own lens)
- Pseudophakic eye (arteficial intraocular lens)
- Aphakic eye (without any lens)





# Farmacology

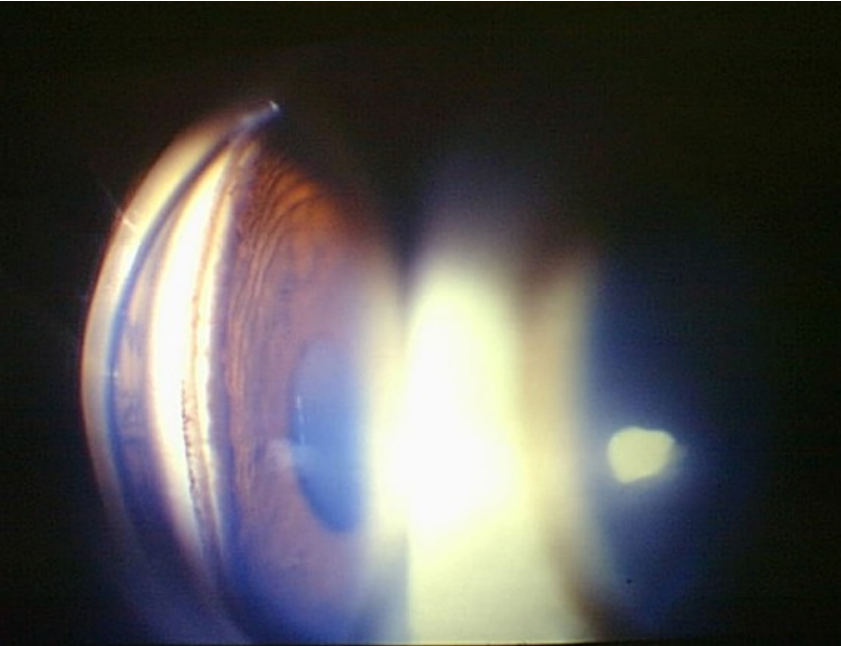
- Pilocarpin - parasympatomimetics
- Atropin – parasympatolyticum (anticholinergicum)
- Scopolamin, tropikamid



Atropa belladonna - Deadly Nightshade, Atropa Belladonna - Quinta dos Ouriques

# **Special examination techniques**

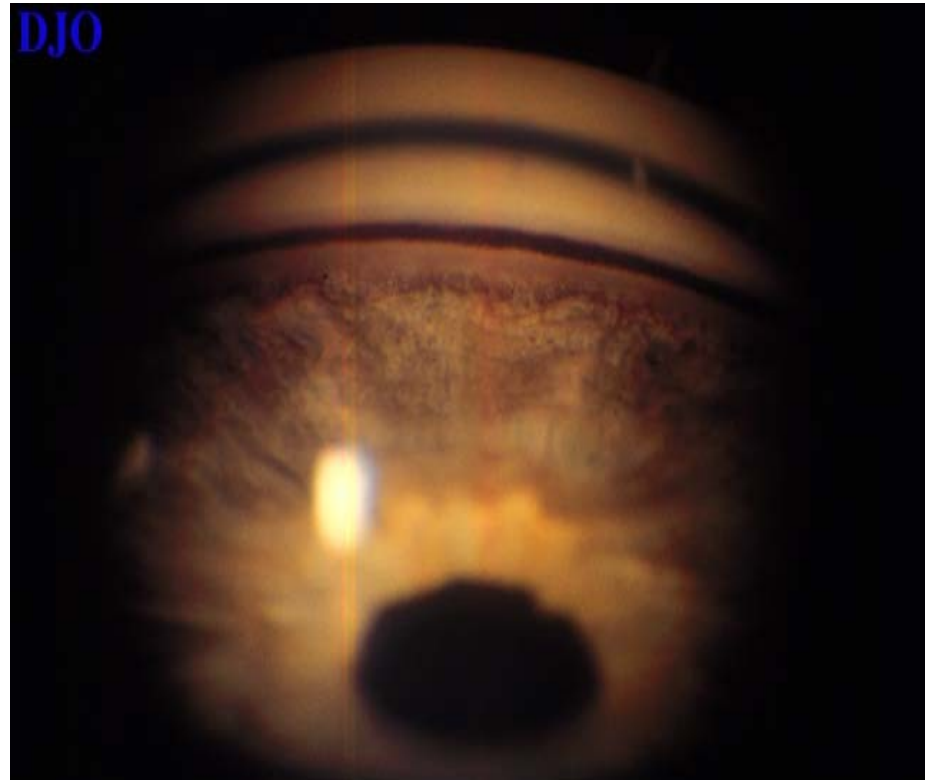
# Gonioscopy

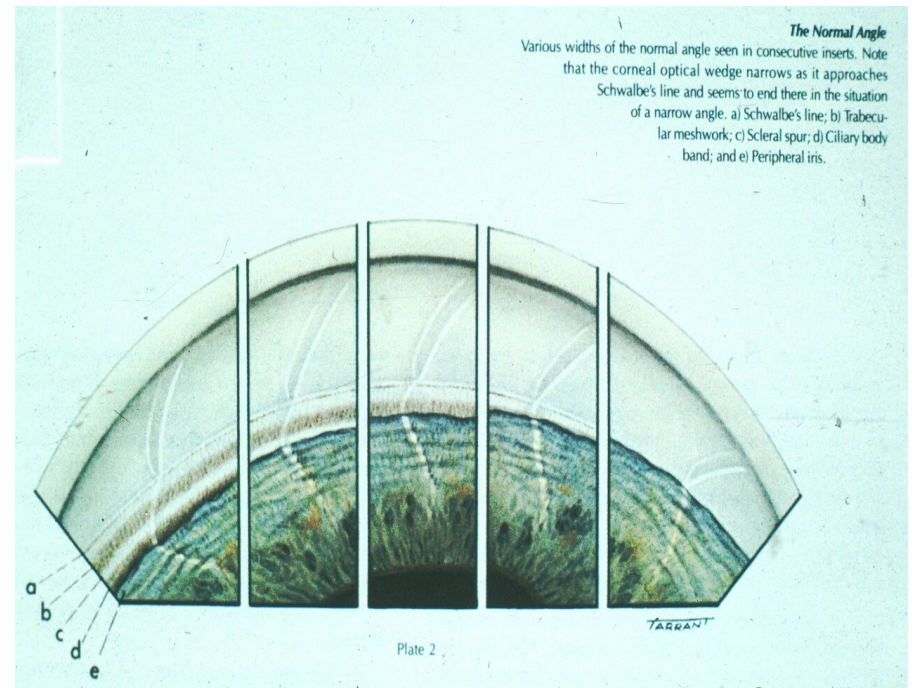
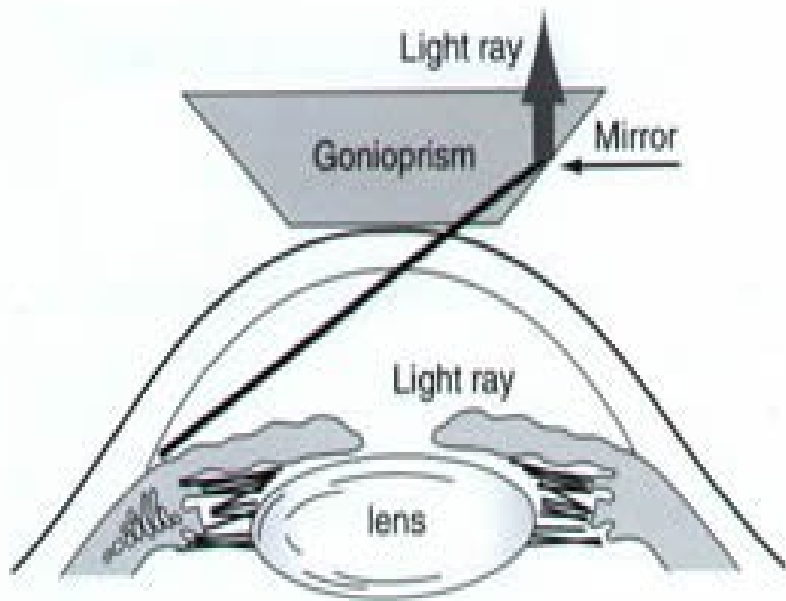


- Gonio lens ( mirrors)
- Angle structures
- Fundus examination



DJO



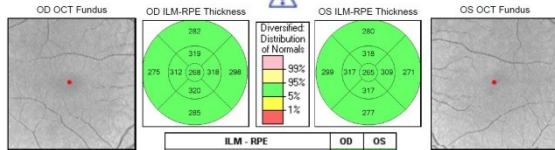
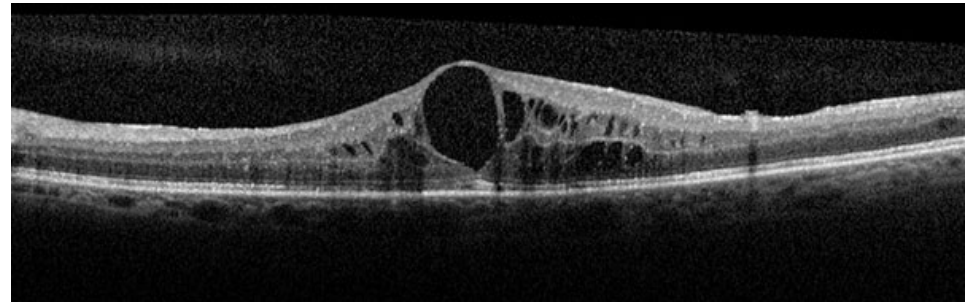
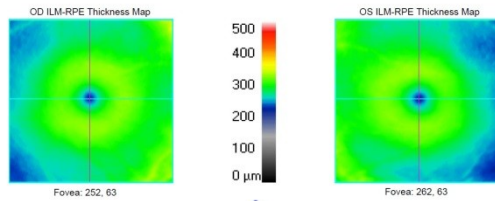


# Optical coherence tomography

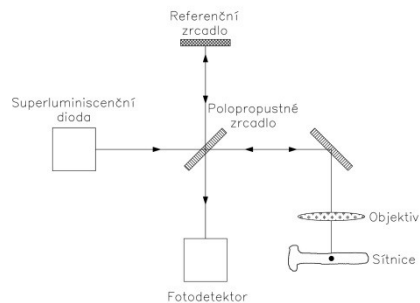
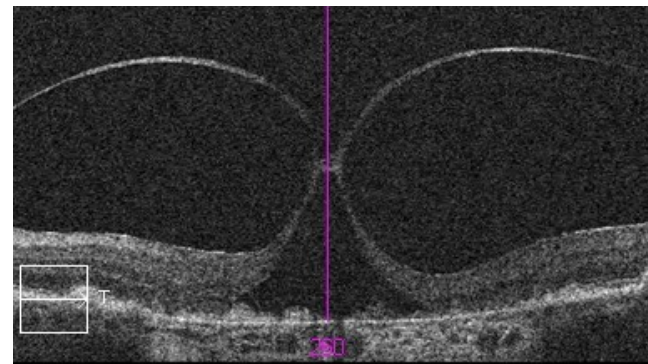
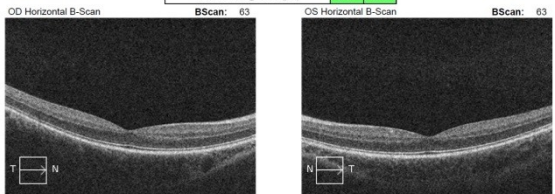
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 ID: **XXXXXXXXXX** Exam Date: **XXXXXXXXXX** **XXXXXXXXXX** CZMI  
 DOB: **XXXXXXXXXX** Exam Time: **XXXXXXXXXX**  
 Gender: Unknown Serial Number: 4000-11302 4000-11302  
 Technician: Operator, Cirrus Signal Strength: 9/10 9/10



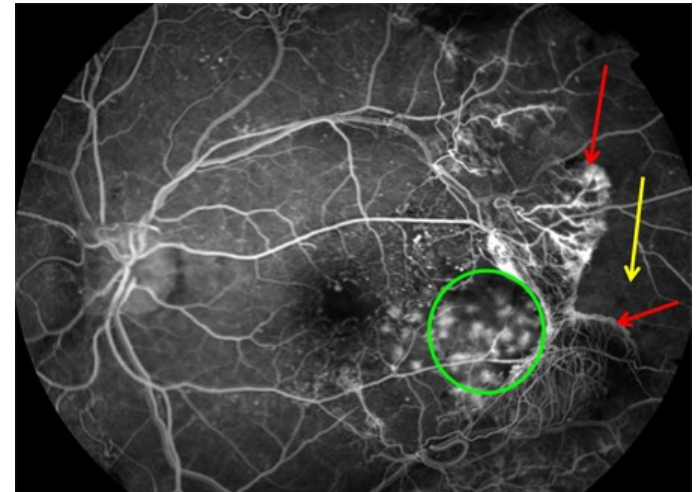
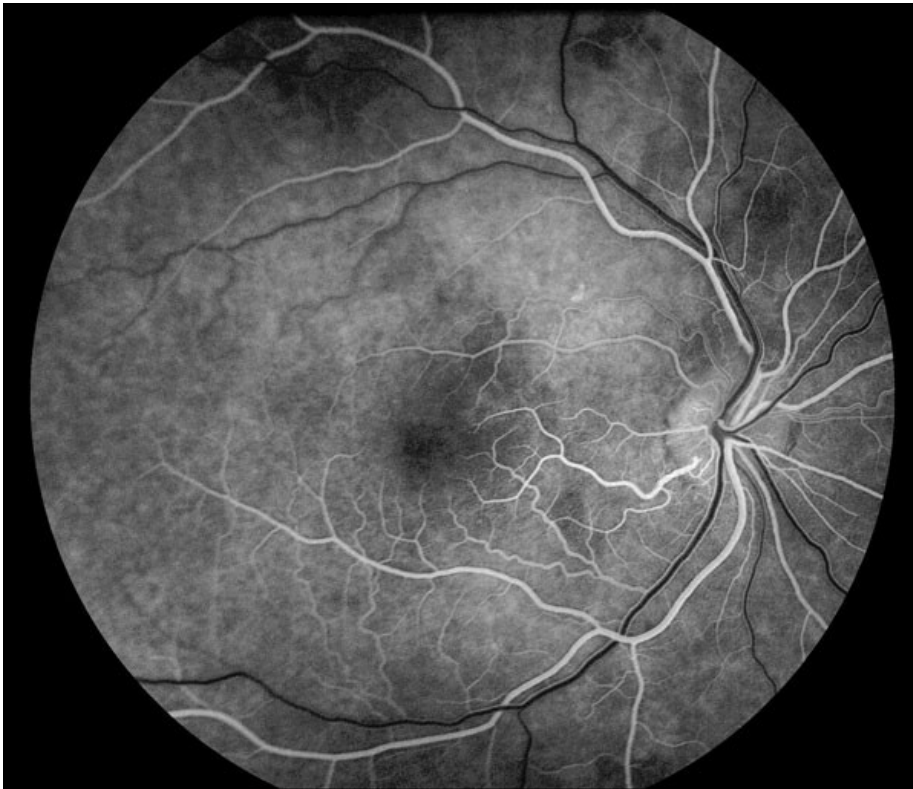
Macula Thickness OU: Macular Cube 512x128 OD OS



ILM - RPE		OD	OS
Thickness Central Subfield (µm)		258	265
Volume Cube (mm³)		10.4	10.3
Thickness Avg Cube (µm)		283	296



# Fluorescein angiography

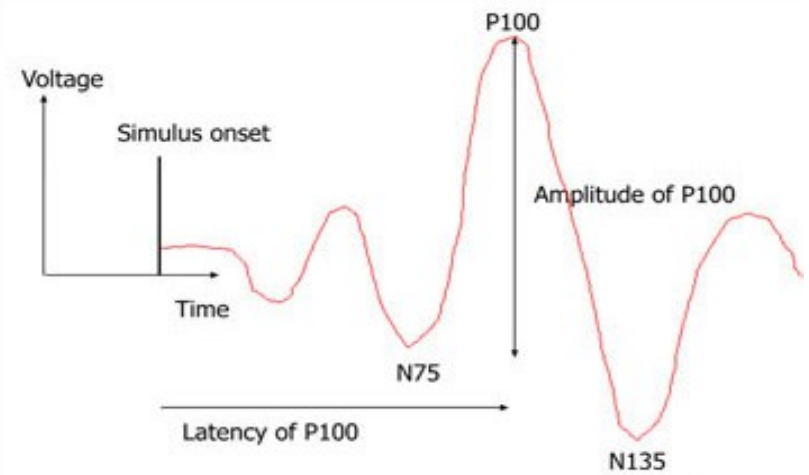
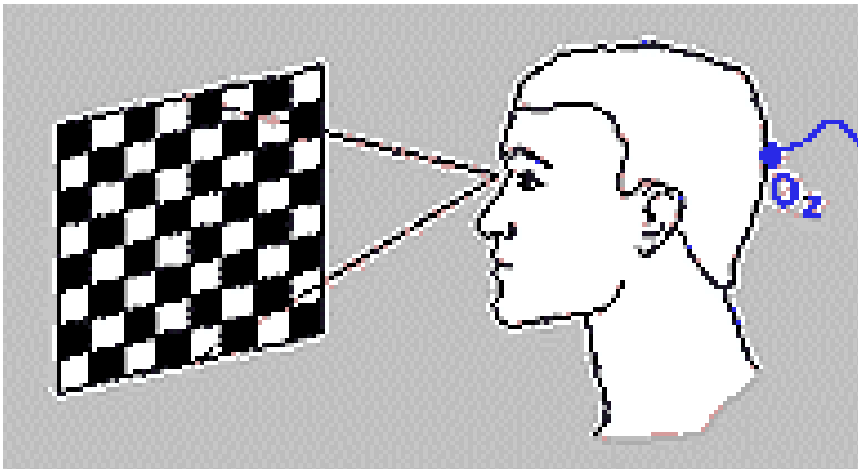


# Electrophysical tests

- **ERG (electroretinography)**  
diagnosis of functional defects of retina
- Record of an action potential produced by the retina when it is stimulated by light
  
- **VEP (visual evoked potential)**  
-diagnosis of functional defects of visual pathways
- Record of electrical activity of the visual cortex created by stimulation of the retina



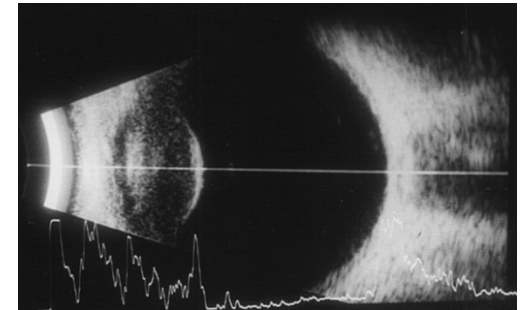
# Electrophysical tests



# Electrophysical tests

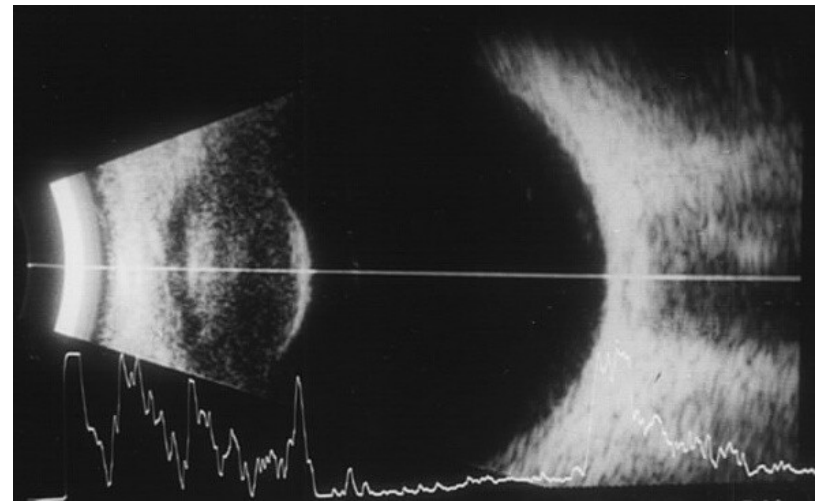
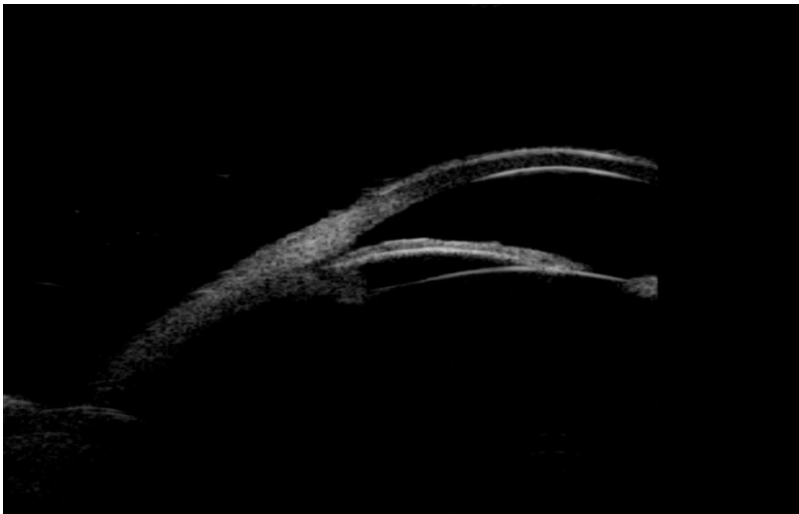


# Ultrasound



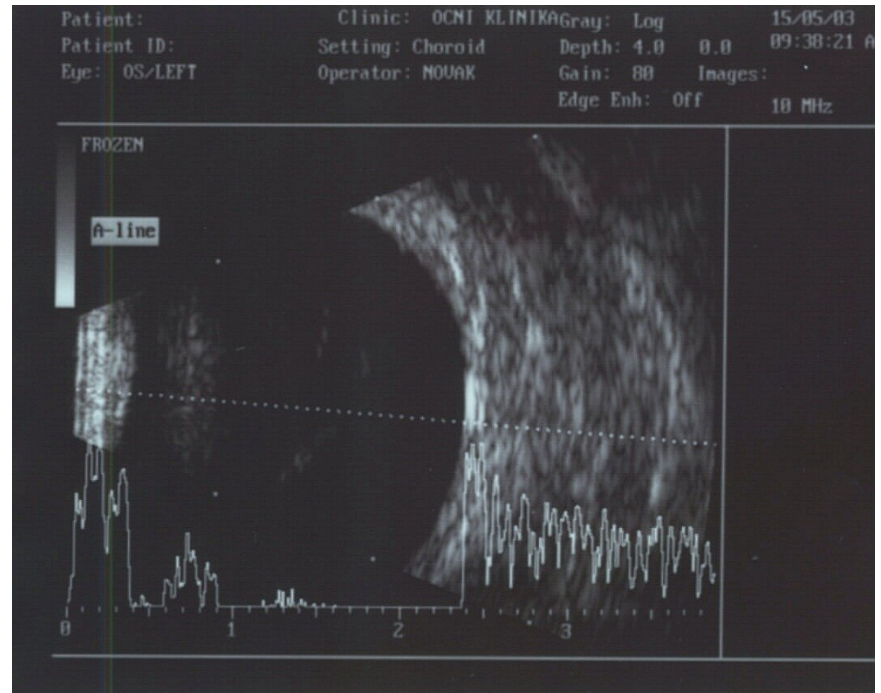
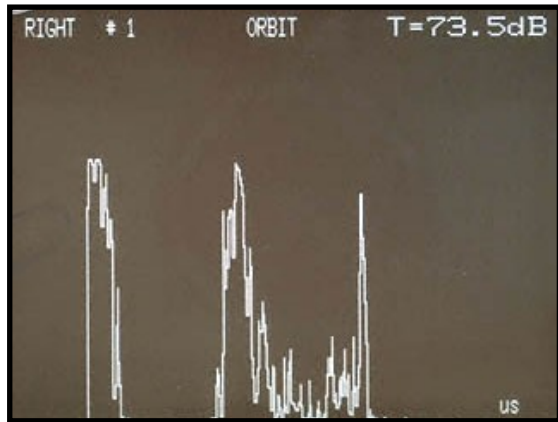
# Ultrasound

- Non transparent optical media
- UBM- high frequency ultrasound – imaging of anterior segment



# Ultrasound

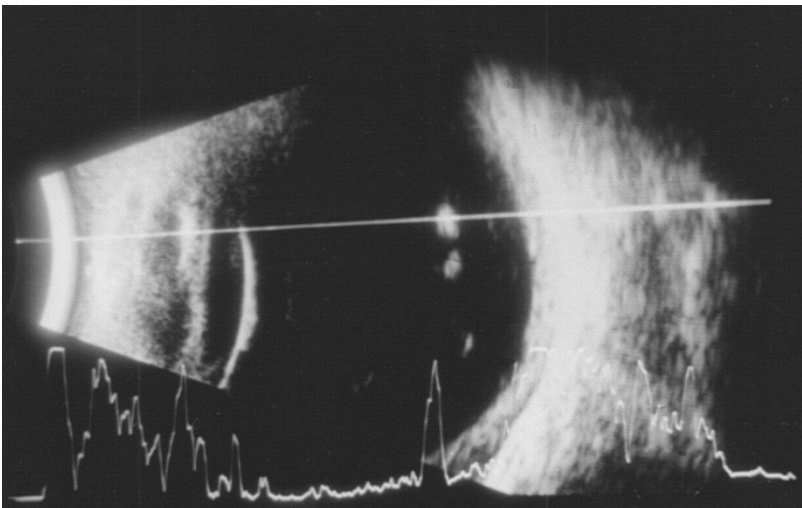
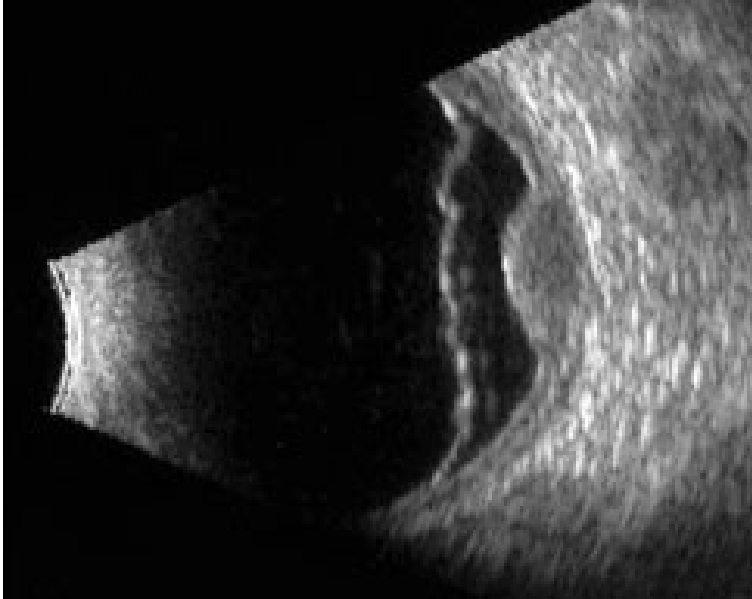
- **A scan ( biometry)**
- **B scan**



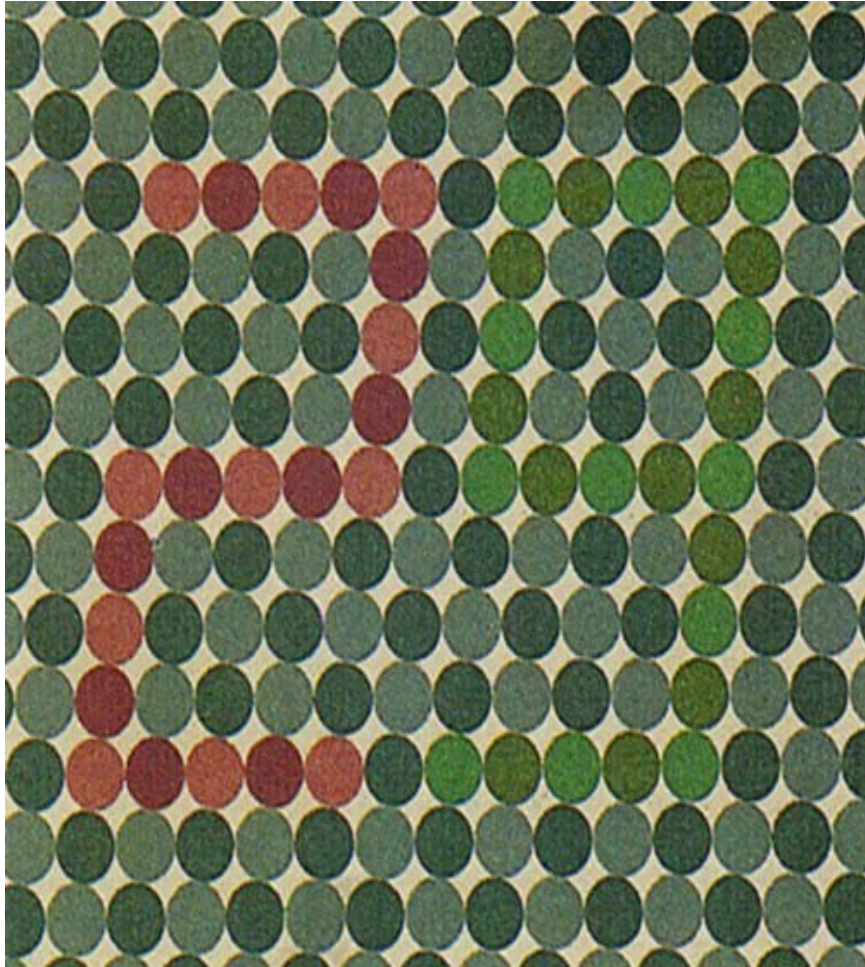
# Ultrasound

OS

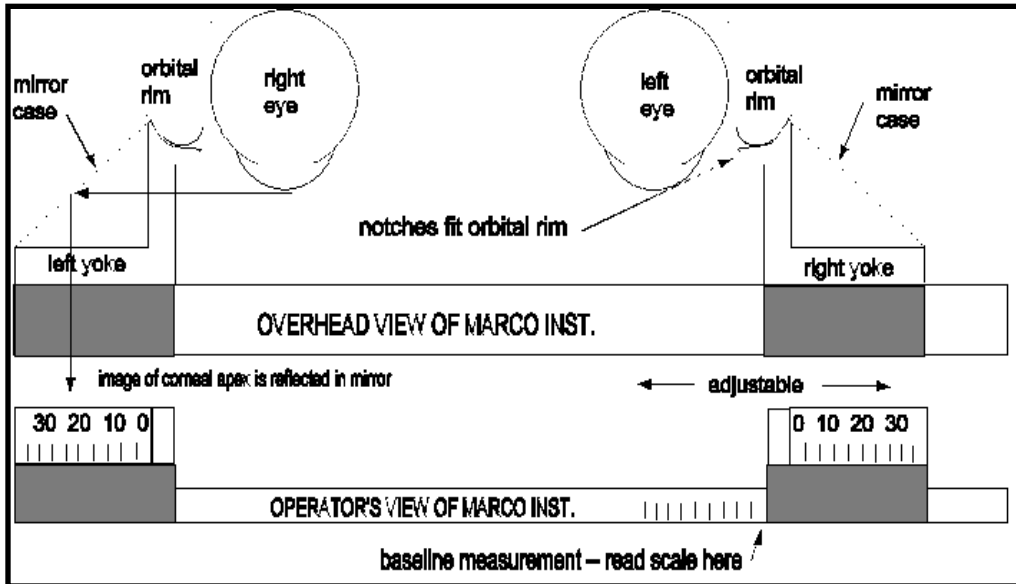
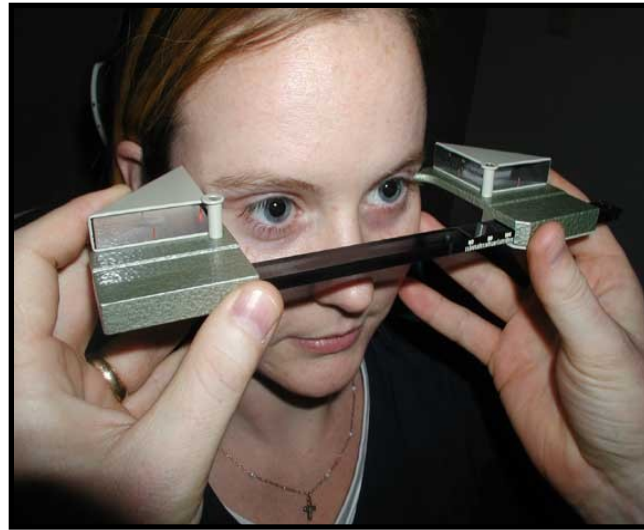
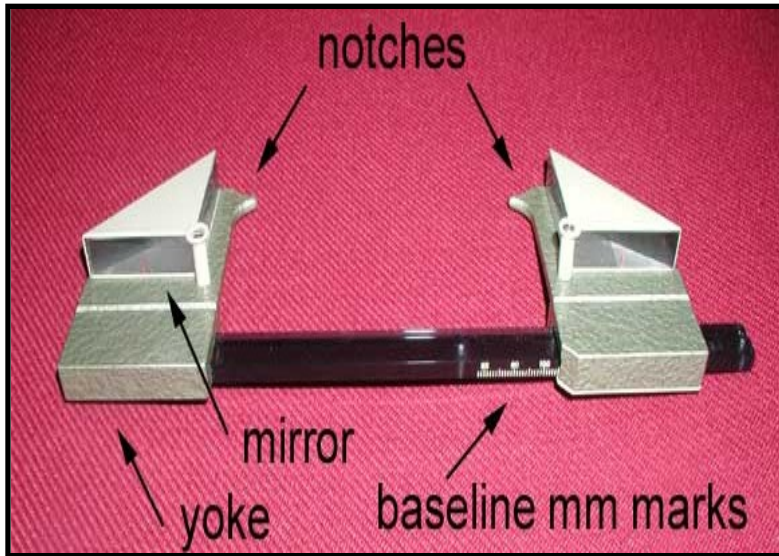
QM Aviso S V:3.0.0  
Gain=107dB Dyn=60dB Tgc=20dB



# Color vision – HUE test



# Hertl exoftalmometry





**Děkuji za pozornost!**

