



Università di Verona
Dipartimento di Scienze Neurologiche e della Visione
Clinica Oculistica
Direttore: Prof. G. Marchini

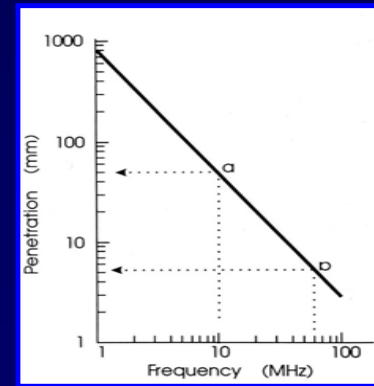
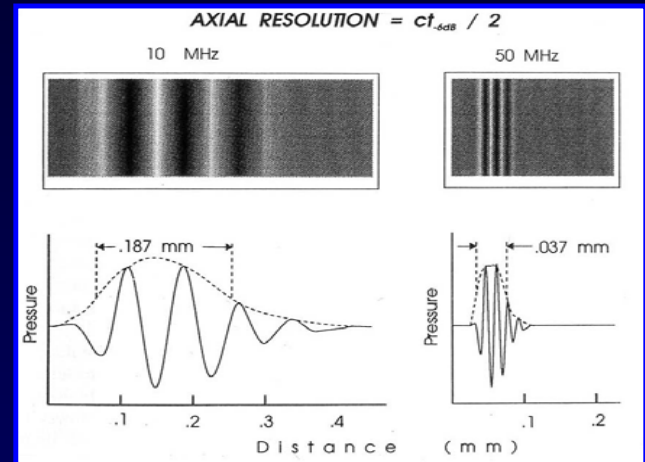
L'UBM nella diagnostica e terapia dei glaucomi secondari

Giorgio Marchini

60° Convegno della Società Oftalmologica Lombarda – Milano, 16 e 17 Dicembre 2005

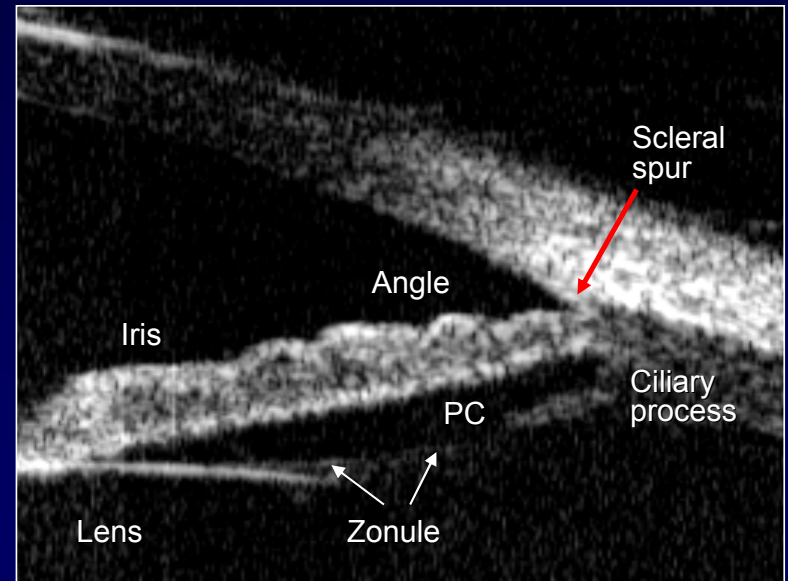
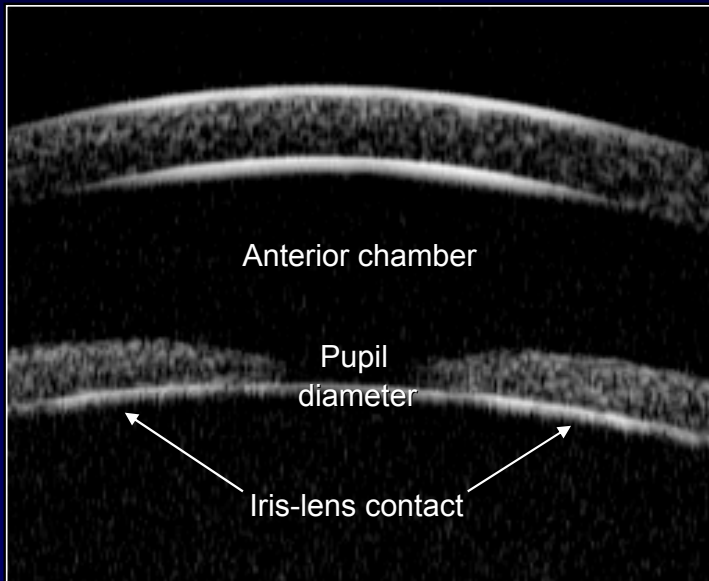
Technical characteristics of the UBM

- 50 MHz: frequency
- 5 mm: focus of the us beam
- 50 microns: axial resolution
- 50 microns: lateral resolution
- 5 mm: exploration depth
- Linear scanning mode



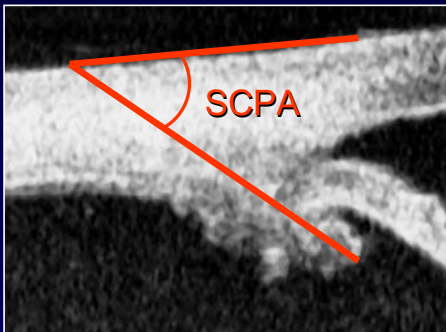
Qualitative evaluation

5 x 5 mm high-definition images of the anterior segment
Anatomic changes of different structures and their relationship

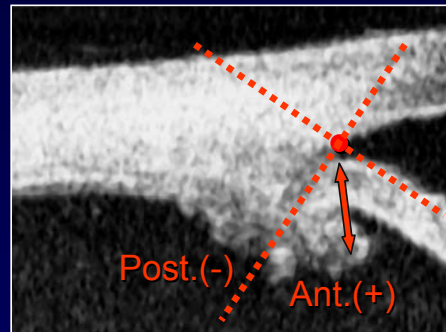


Anterior segment anatomy in vivo

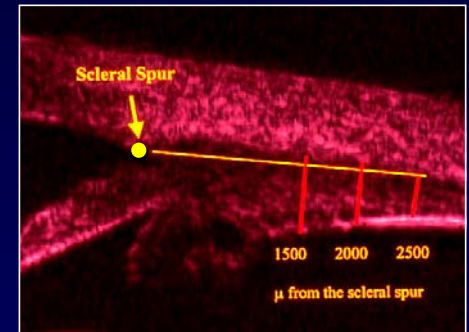
Ciliary body (ciliary process) variability



Anterior-Posterior
Rotation
(Scleral-cil.proc.angle)

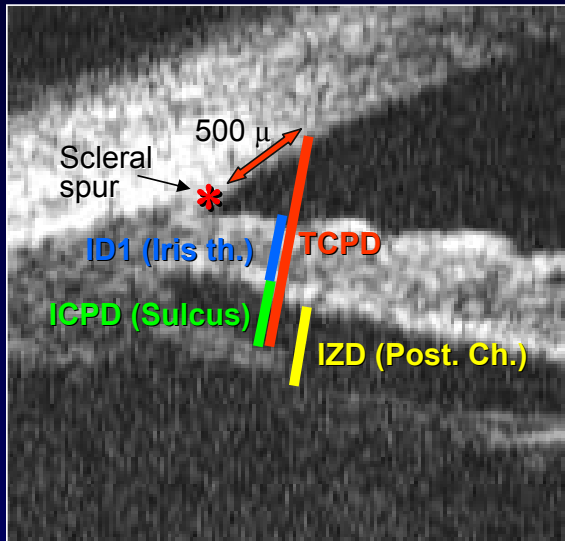


Anterior-Posterior
Position
(Scleral spur as marker)

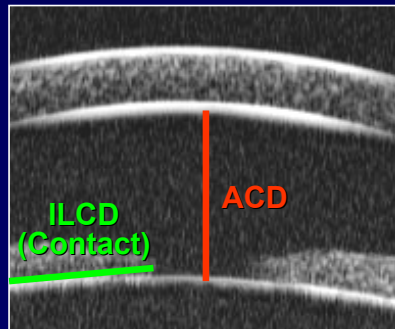


Ciliary body
Thickness
(Away from pars plicata)

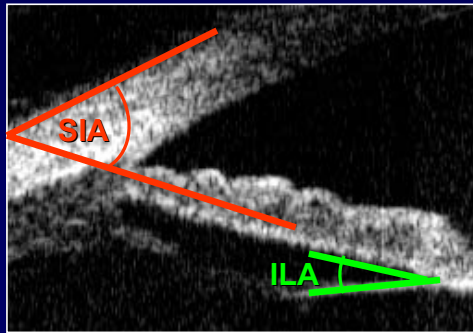
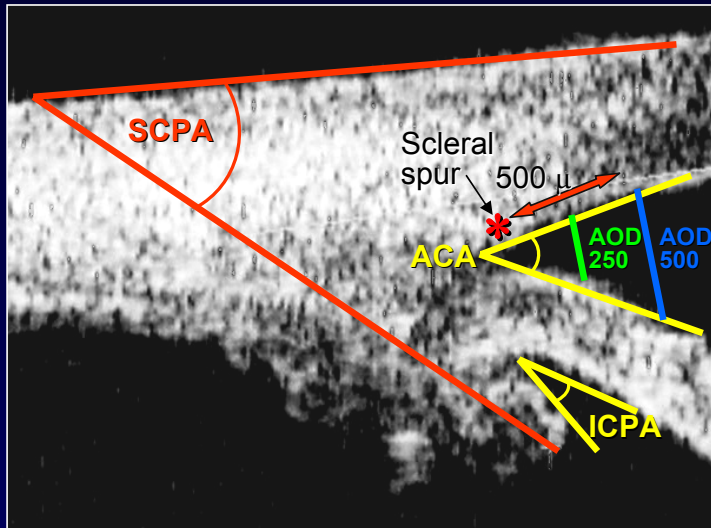
Quantitative UBM parameters (1)



- Trabec.-ciliary proc. distance: TCPD
- Sulcus ciliaris: ICPD
- Posterior chamber: IZD
- Iris-lens contact: ILCD
- Iris thickness: ID1, ID2, ID3
- Scleral thickness: SD
- Anterior chamber depth: ACD



Quantitative UBM parameters (2)



- Anterior chamber angle: ACA (β 1)
- Angle opening distance: AOD 250 and AOD 500
- Iris-lens angle: ILA (β 2)
- Scleral-iris angle: SIA (β 3)
- Scleral-cil.proc. angle: SCPA (β 4)
- Iris-cil.proc.angle: ICPA

Previous studies

- Marchini G. et al., *Docum Ophthalmol* 1997
- Marchini G. et al., *J Ocul Pharmacol* 1999
- Marchini G. et al., *J Ocul Pharmacol* 2001
- Marchini G. et al., *J Glaucoma* 2003
- Marchini G. et al., *IOVS* 2003
- Marchini G. et al., *J Cataract Refr Surg* 2005

Coefficients of variation (%)

Tello et al. (1994)

Marchini et al. (1997)

ACD	0.3 - 0.5	1.4
ACA	4.5 - 11.1	12.4
TCPD	1.8 - 4.7	5.9
AOD 500	5.1 - 9.2	8.0
ID 1	3.7 - 8.3	10.5
ICPD	3.7 - 6.7	15.6
IZD	2.6 - 7.1	6.6
ILCD	2.9 - 3.3	14.2
SCPA	not reported	8.6
SIA	not reported	7.5

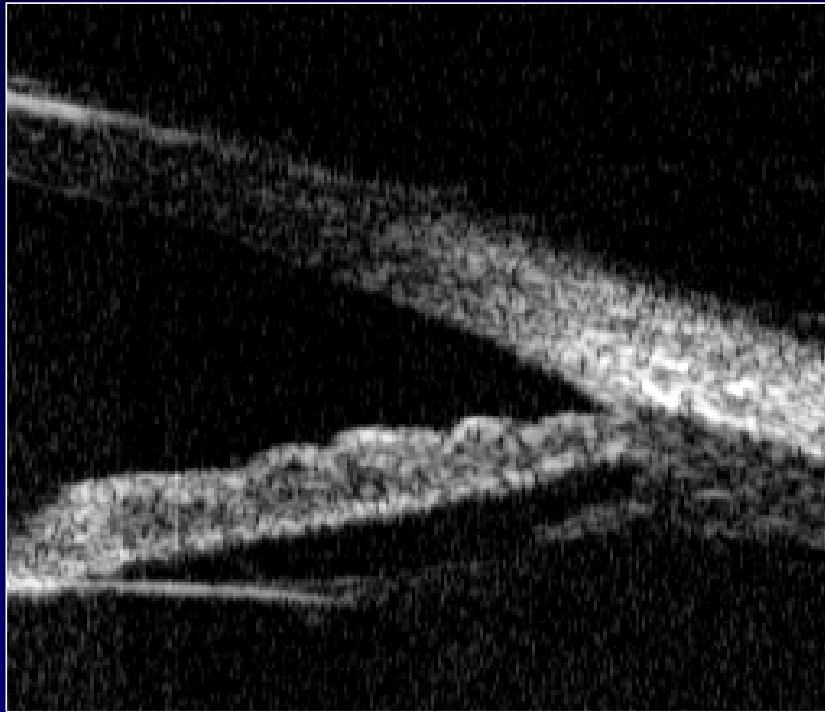
Reliability of the measurements

	<i>Agreement</i>
➤ Same observer, same image	Good-Excellent
➤ Different observers, same image	Sufficient
➤ Same observer, different images	Good-Sufficient
➤ Different observers, different images	Unacceptable

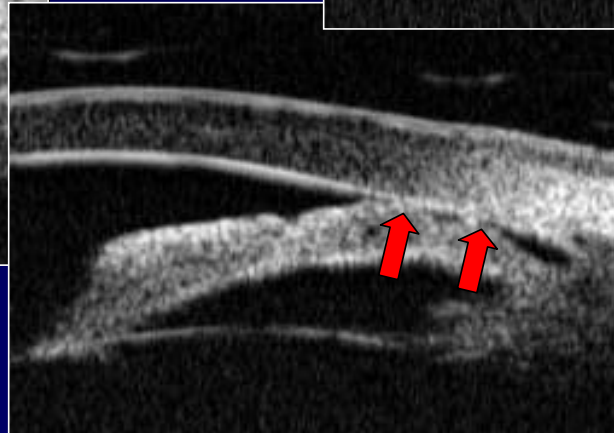
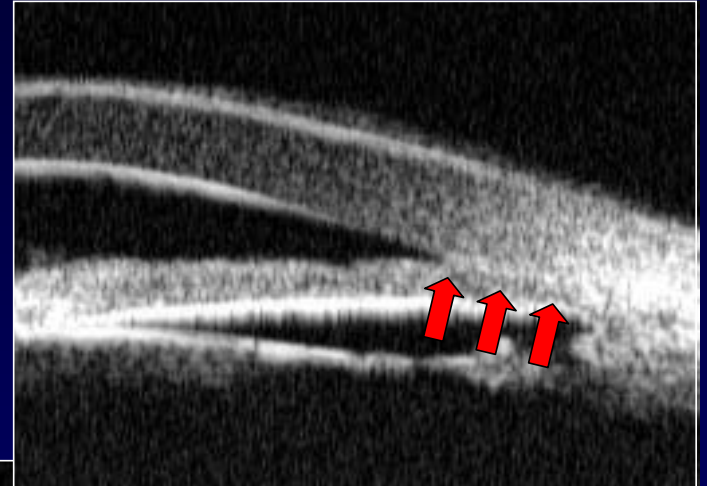
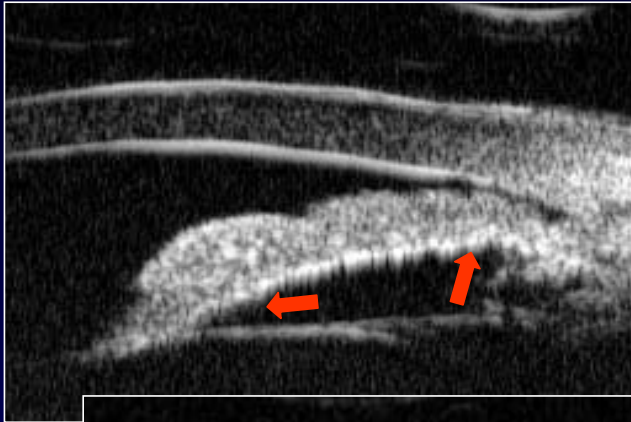
UBM and secondary glaucomas

- Angle closure glaucomas
- Malignant glaucoma
- Traumatic glaucoma
- Pigment Dispersion Syndrome

Normal angle



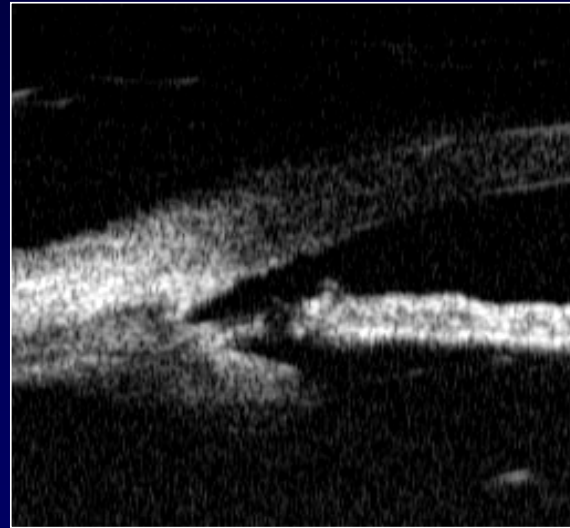
Acute PACG (pupillary block)



Effect of Yag-laser iridotomy

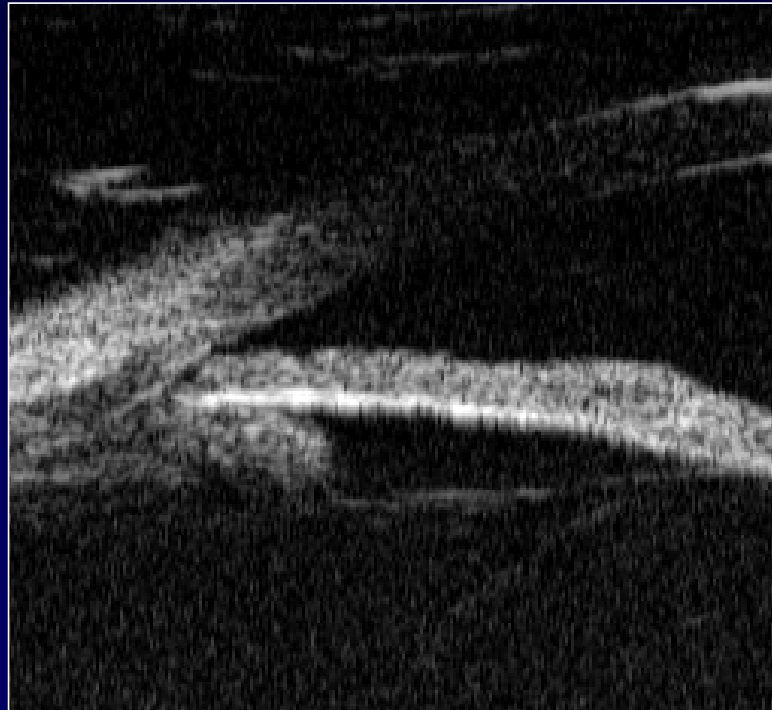


Pre



Post

Plateau iris ACG



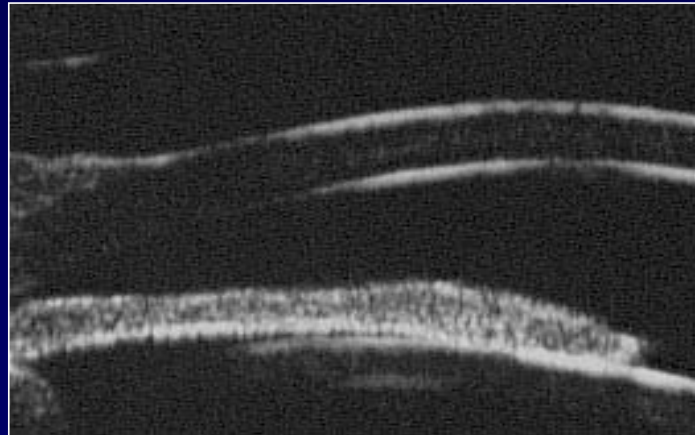
Glaucoma maligno fachico

Fattori anatomici predisponenti

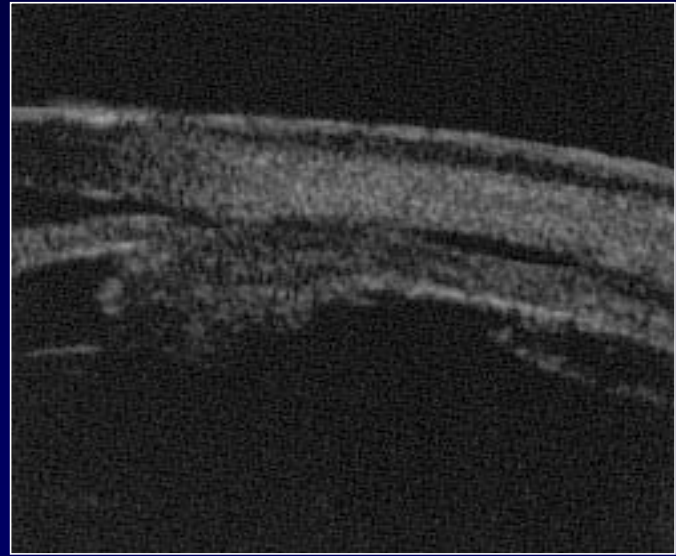
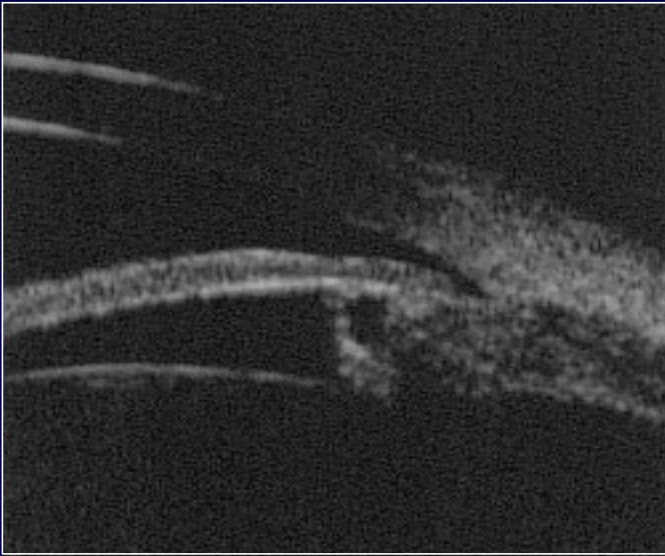
- Occhi piccoli (ipermetropi elevati, nanofthalmi)
- Cristallini grandi e piu' curvi
- Processi ciliari anteriorizzati e ruotati anteriormente

Riduzione di

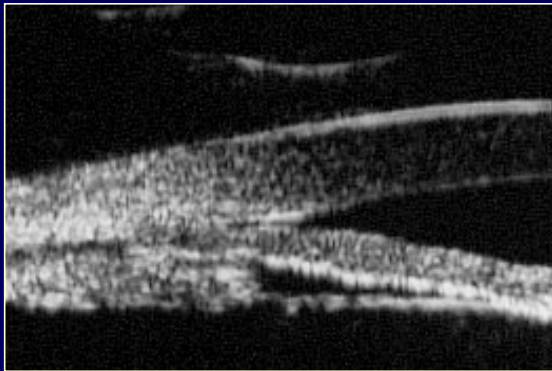
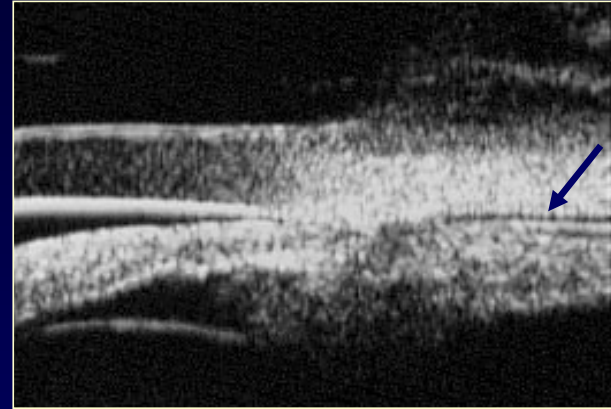
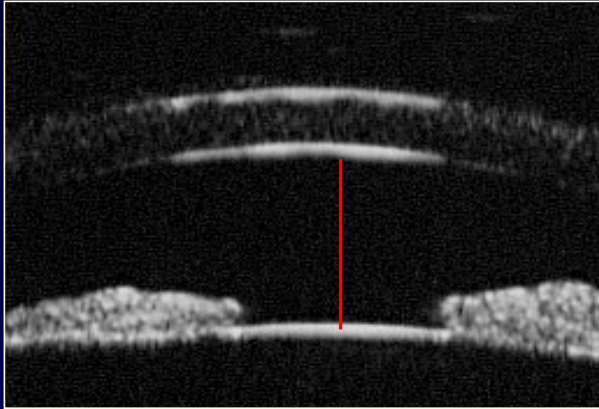
- Diametro dell'anello ciliare interno
- Spazio cilio-lenticolare
- Profondità della camera posteriore



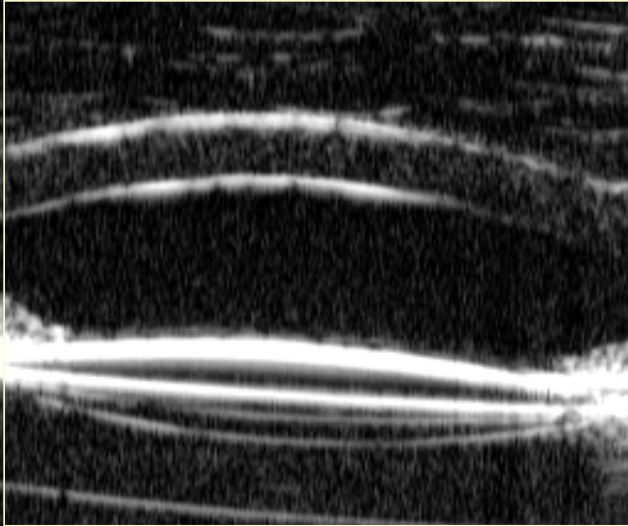
Nanoftalmo



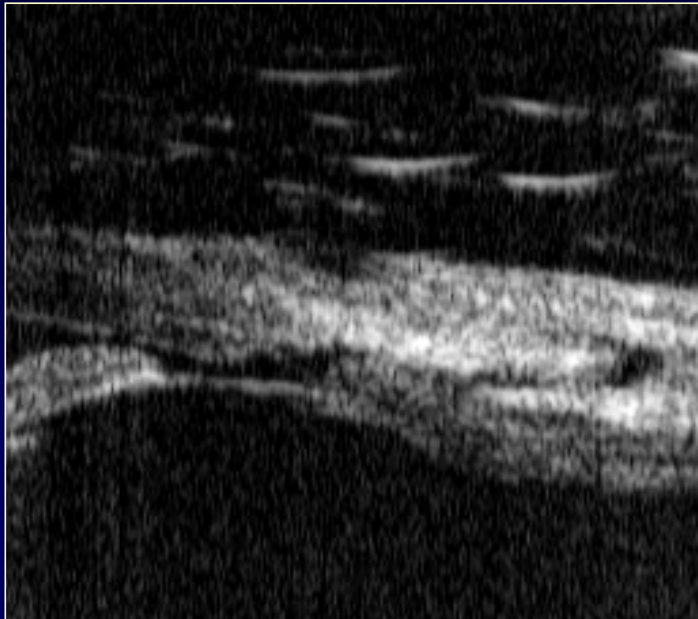
Glaucoma maligno fuchico



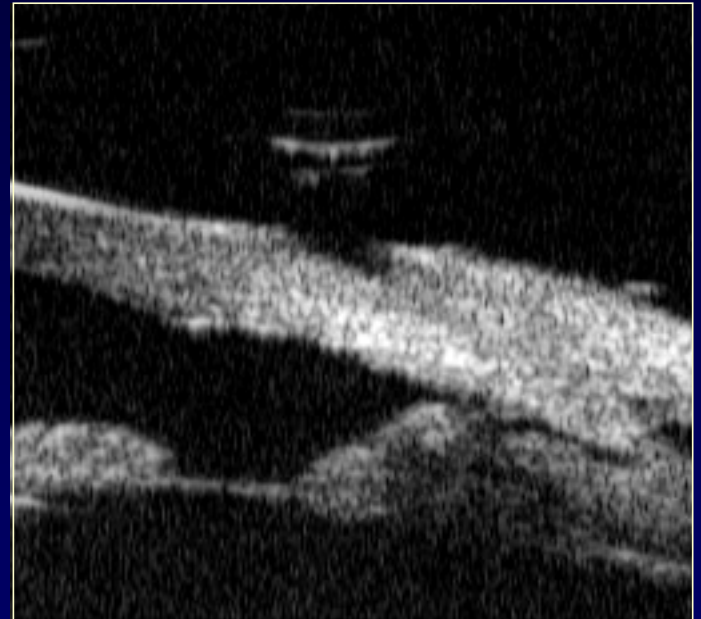
Glaucoma maligno pseudofachico



Glaucoma maligno pseudofachico

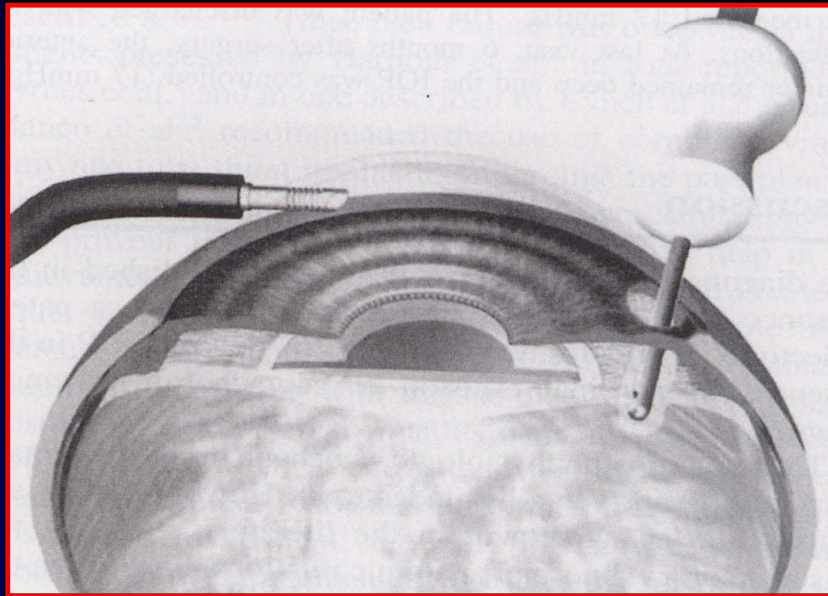


Pre-YAG

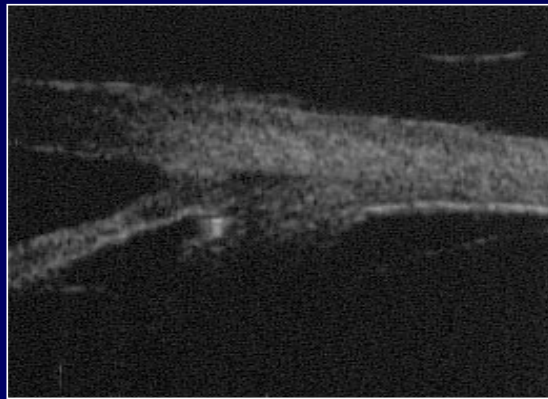
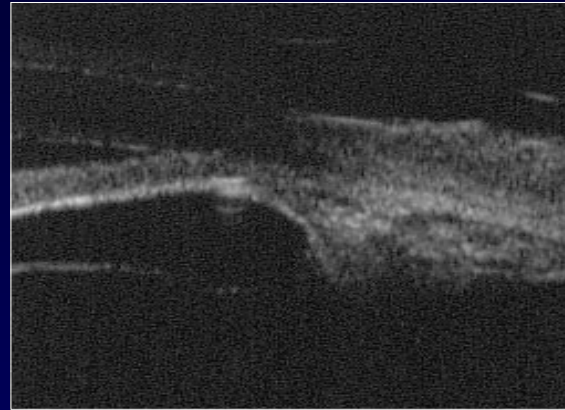
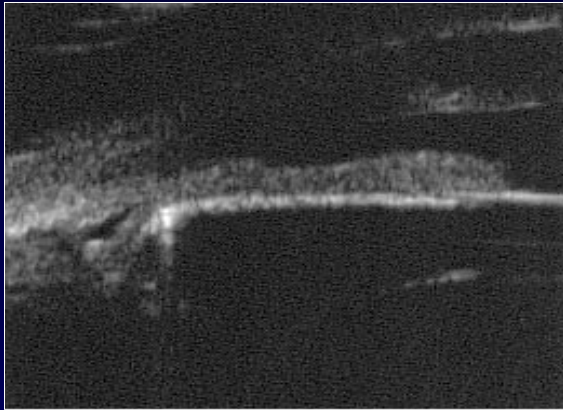


Post-YAG

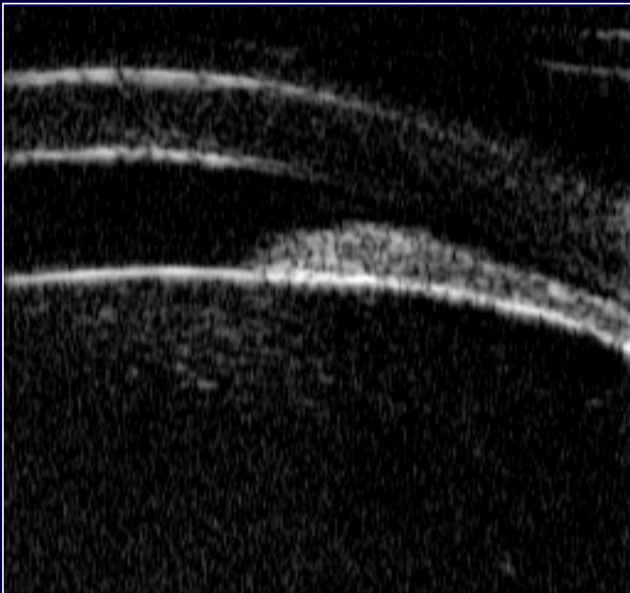
Terapia



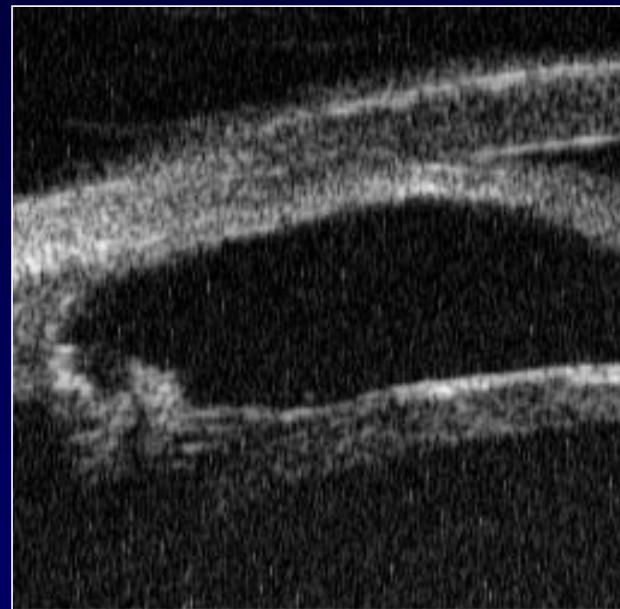
GCA da lussazione anteriore della IOL



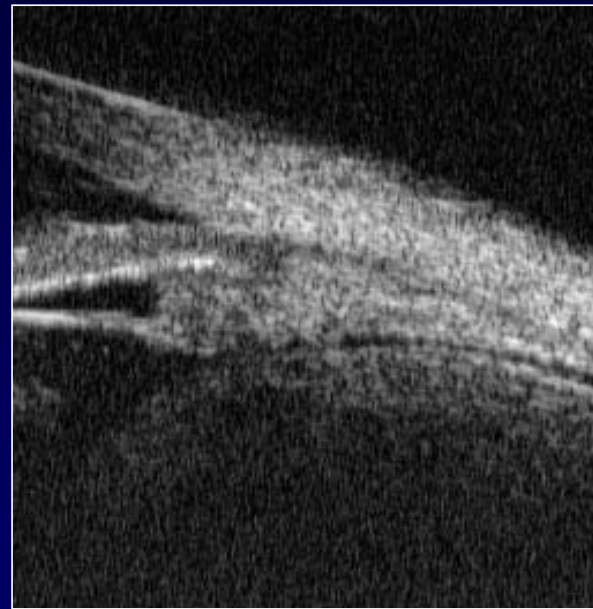
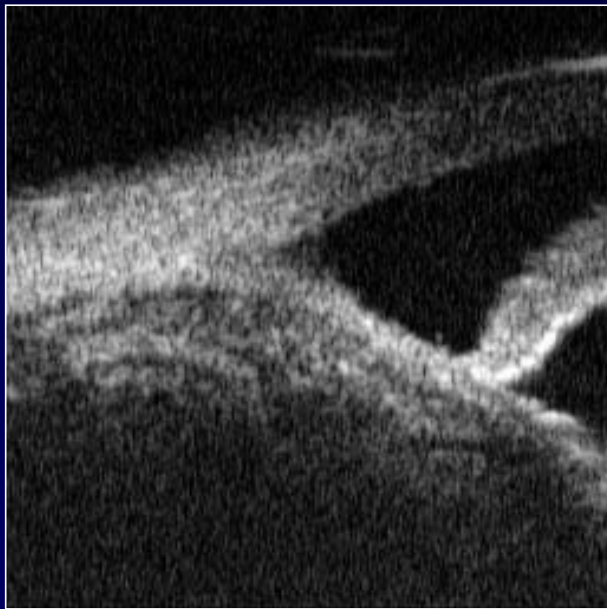
Glaucoma secondario a effusione uveale



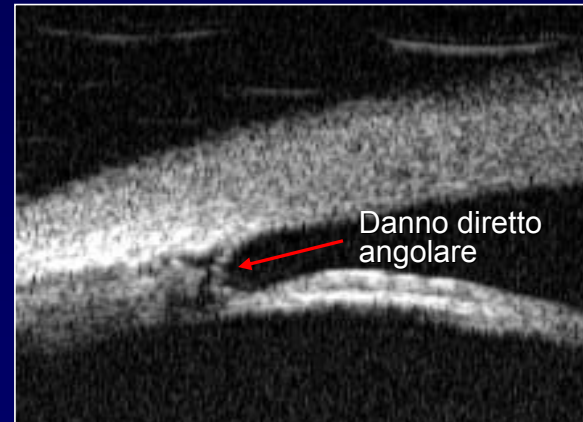
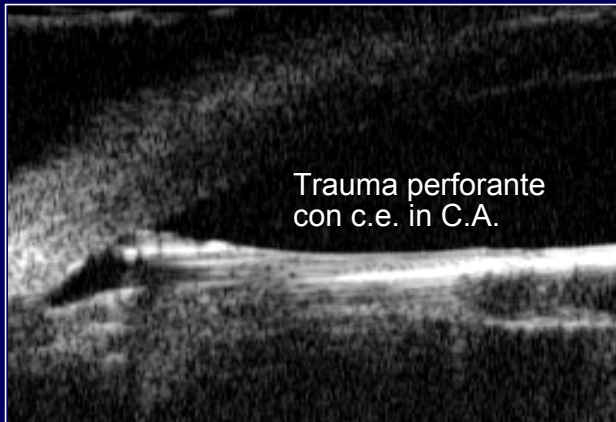
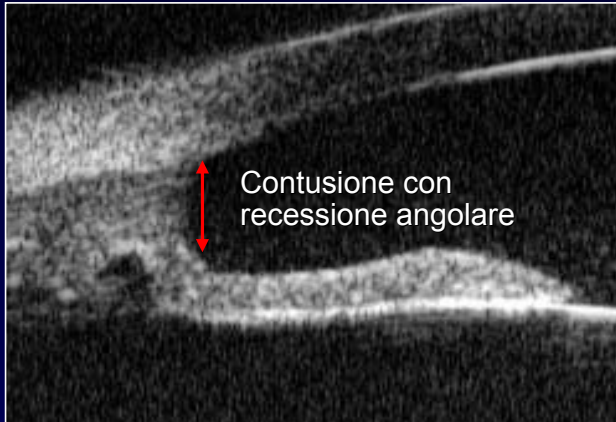
GCA secondario a seclusione pupillare (uveite)



GCA secundario a neoplasia



Glaucoma post-traumatico



Pathogenesis of PDS

- The release of pigment granules is due to the mechanical rubbing between the concave posterior iris surface and the anterior zonular packets.

(Campbell's theory, 1979)

- UBM studies confirm the Campbell's theory and show that the concave profile of the iris is determined by the inverse pupillary block.

(Liebmann et al., Ophthalmology 1995)

(Pavlin et al., Ophthalmic Surg Lasers 1996)

UBM characteristics of PDS



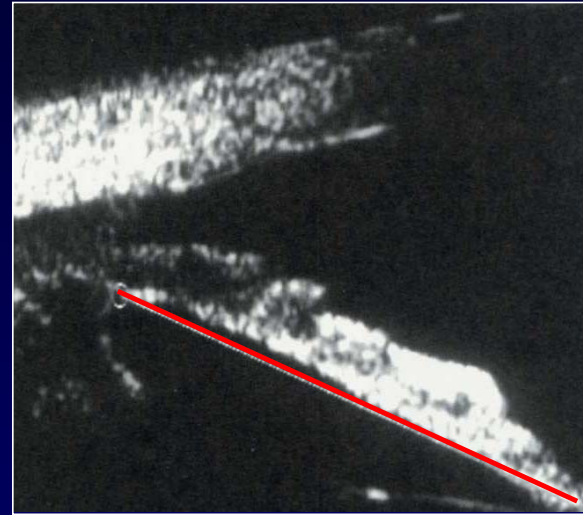
- Concave peripheral iris
- Iris-zonule contact
- Iris-lens contact
- Possible iris-ciliary process contact

Inverse pupillary block



- The gradient of pressure from AC to PC pushes backwards the peripheral iris.
- This is possible when aqueous is suddenly pushed and trapped in the AC. The iris is pushed against the lens determining a valve mechanism.
- The valve mechanism maintains the gradient of pressure between AC and PC

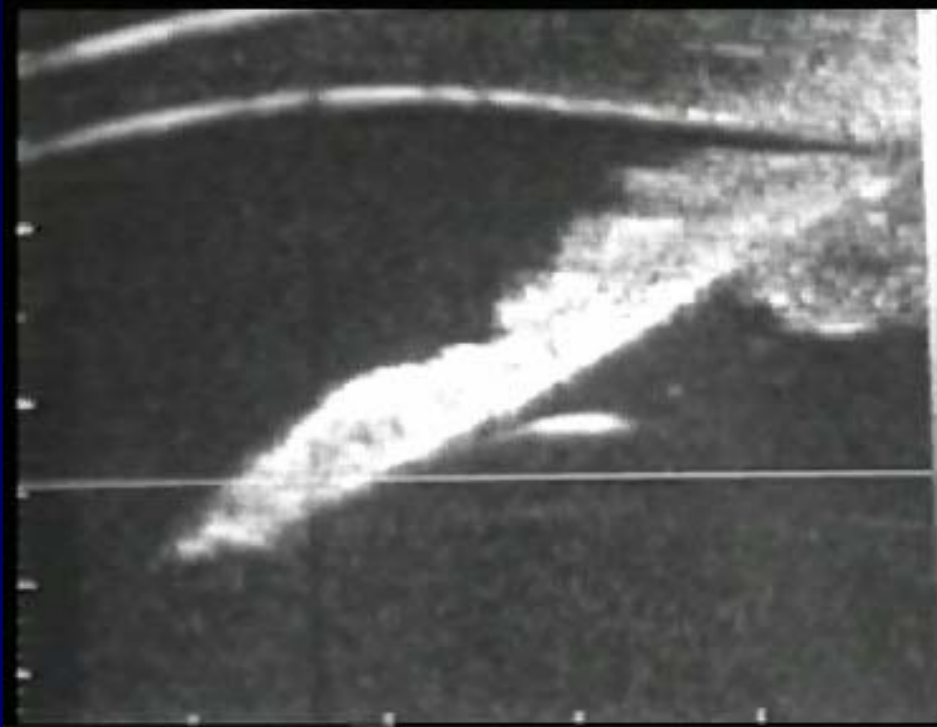
Blinking may induce inverse pupillary block



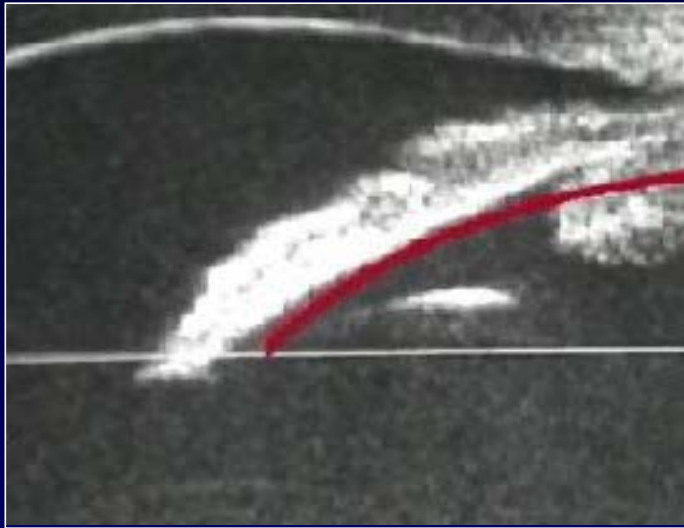
During UBM examination the eyelid blinking is stopped and after few minutes the change in iris profile is detectable.

(Liebmann, Tello, 1995)

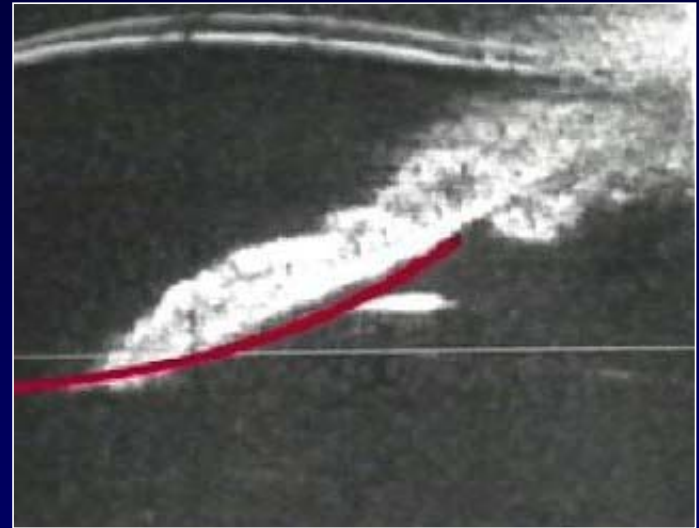
Accommodation in young phakic subjects



Accommodation may induce inverse pupillary block



Relaxed



Active

(Pavlin, 1996 – Marchini, 1998)

Pathogenesis of pigmentary glaucoma

- The deposition of pigment may obstruct the intertrabecular spaces and cause a two-stages trabecular meshwork (TM) damage.
- The first is reversible and the TM may undergo self-repair.
- When TM sclerosis and collapse occur an irreversible stage is reached and the prognosis of PG is unrelated to the continued pigment dispersion

(Richardson's theory, 1989)

Conversion rate of PDS to PG

- Previous data (1980-1990): 30%-46%
- Retrospective population-based study of all newly diagnosed cases
 - 13% at 5 years
 - 23% at 15 years

(Siddiqui et al., *ARVO* 2003)
- Prospective population-based study
 - 24% at 10 years

(Ungaro et al., *ARVO* 2003)

Three clinical features

PDS

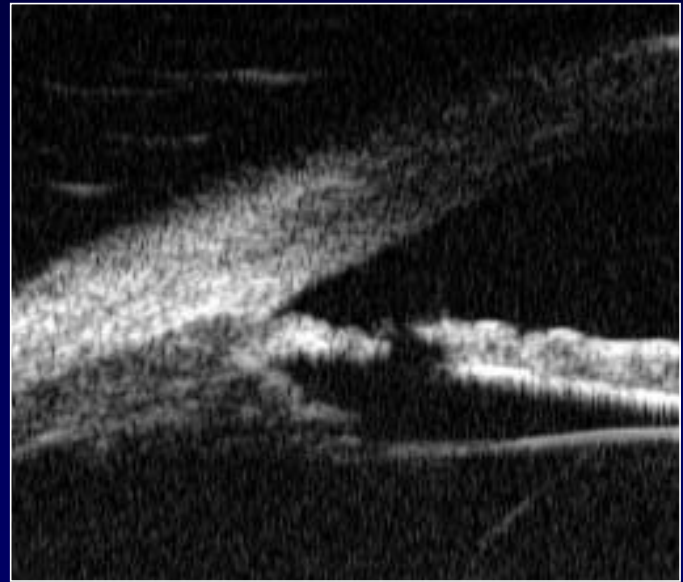
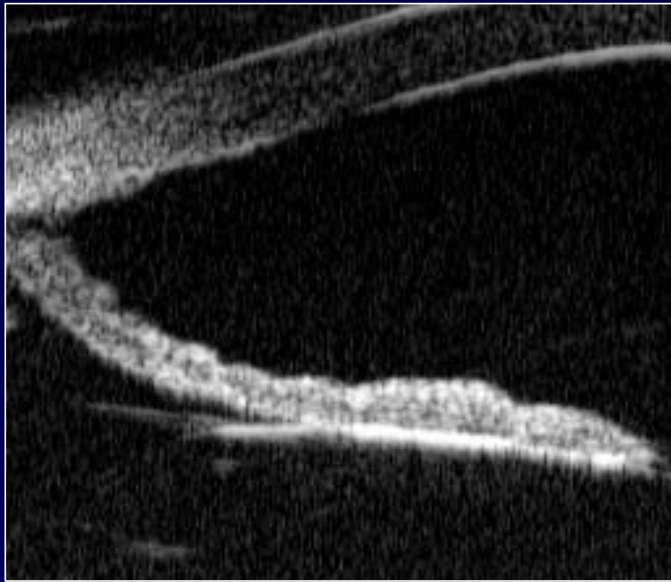
PDS + ocular hypertension

Pigmentary Glaucoma

Ideal approach

- To treat PDS in order to eliminate the cause of IOP elevation
- To treat PDS before the conversion in PG with optic nerve damage and visual field defects
- Treatment of PDS+OH and PG

Iridotomy in PDS



*Grazie
per
l'attenzione*