

# Ocular Oncology Demystified

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# Objectives

Objective 1: Identify the key clinical features, diagnostic approach and treatment modalities

- Choroidal Melanoma
- Conjunctival Cancer

Objective 2: Recognize common complications of radiation delivered to the eye

I see some pigments in the fundus...

**Melanoma ?**

Melanocytoma ?

Nevus?

IML?

Atypical nevus?

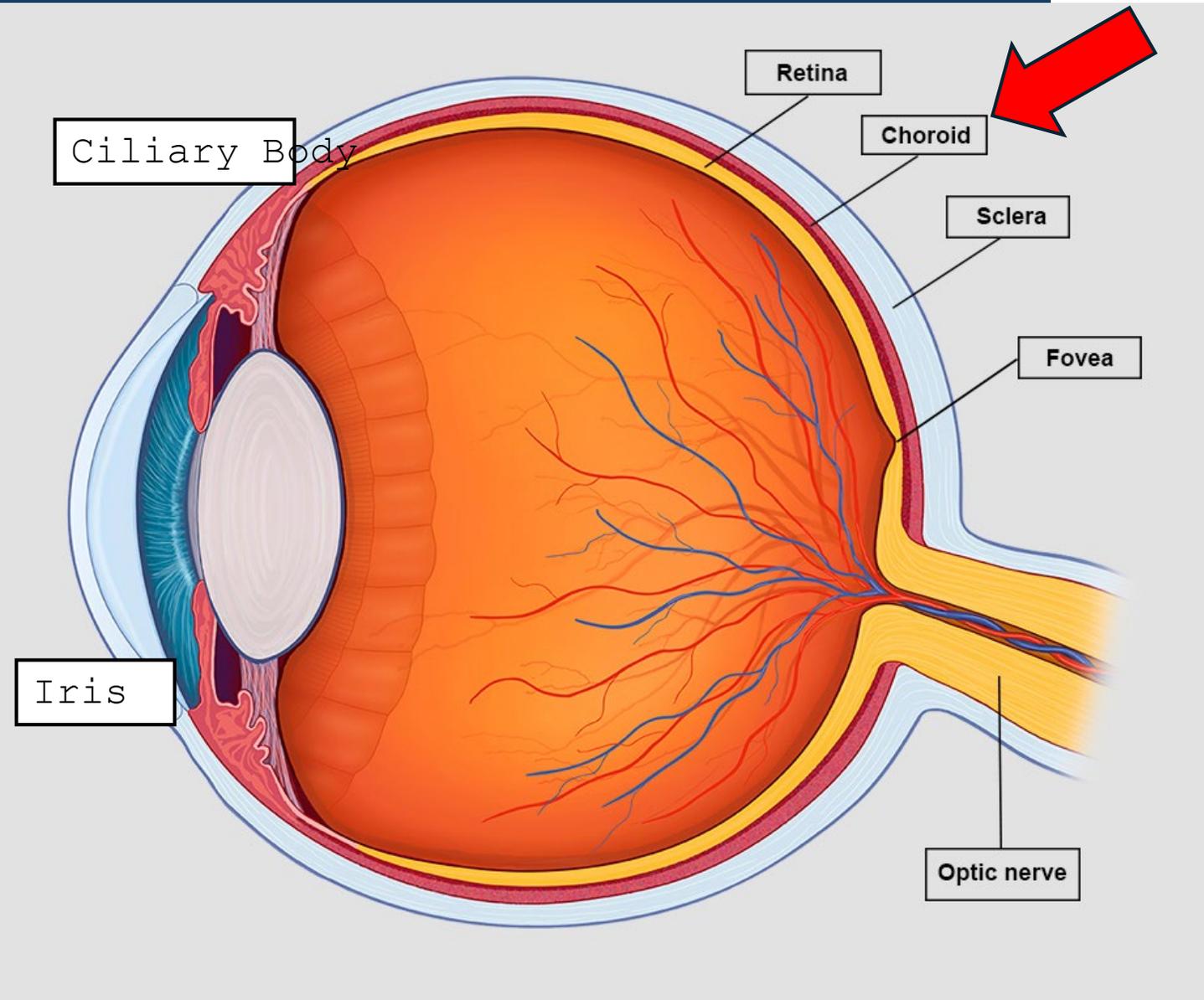
Melanocytosis ?

CHRPE

Choroidal Freckle

**I don't know**

# Anatomy | Uvea



Pigmented

**Melanoma**

Malignant/cancer

Not-Pigmented

Metastasis  
Medulloepithelioma  
Lymphoma

Uveal tumors

Pigmented

**Nevus**

Iris Freckle  
Melanocytoma  
CHRPE

Benign

Not-Pigmented

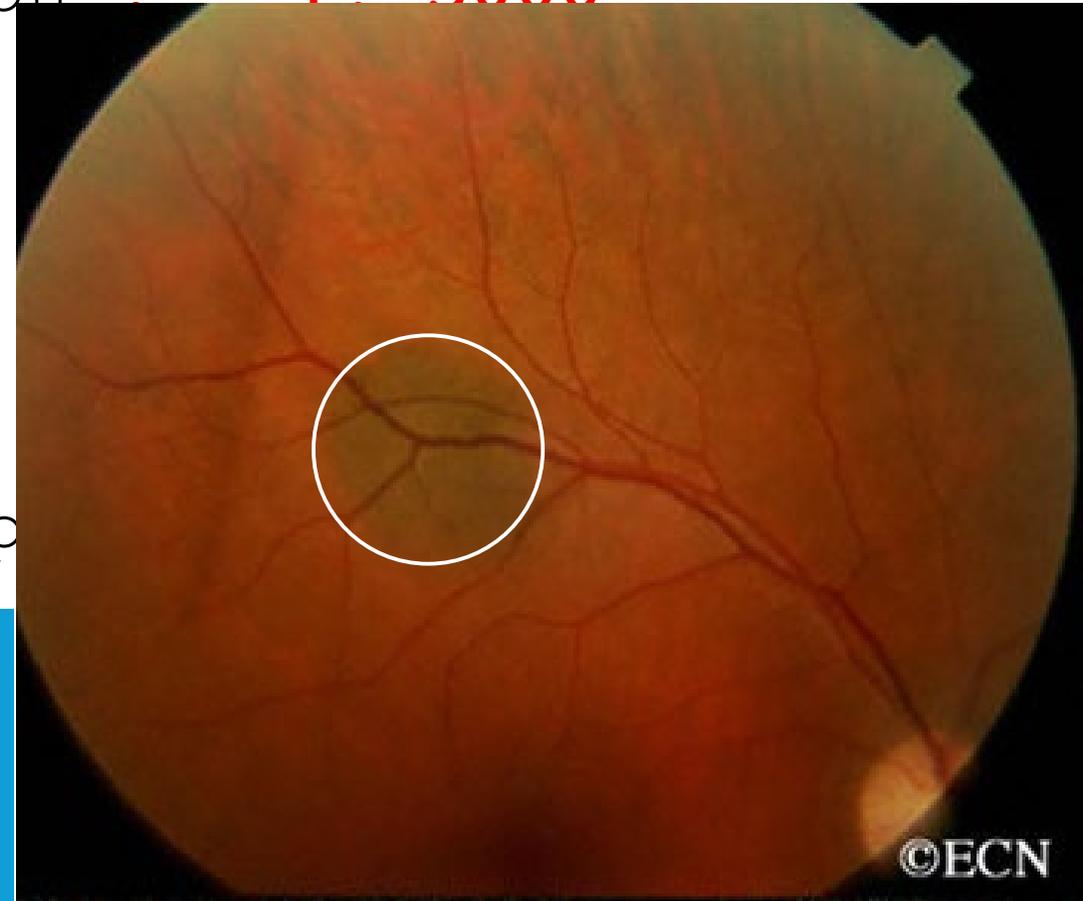
Hemangioma  
Osteoma

# Choroidal Nevus

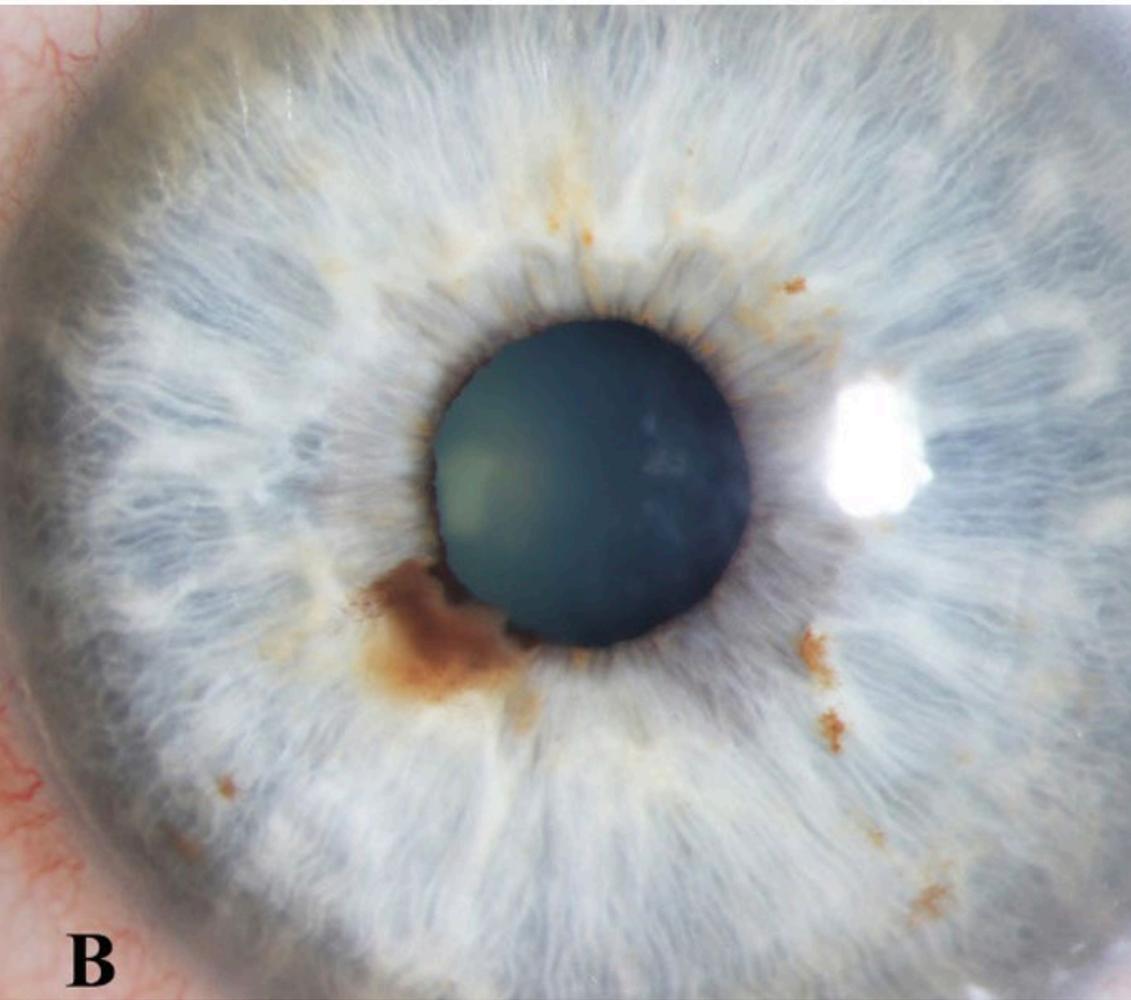
- Prevalence in white patients in the USA **4.6 to 7.9%**
- Chance of melanoma transformation : **~ 1 : 5000 - 1 : 8'000**
- **Typical nevi**
  - **Base < 5 mm**
  - **Flat**
  - Gray
- Observe q1-2 years with fundus p

**Normal** cells in increased number

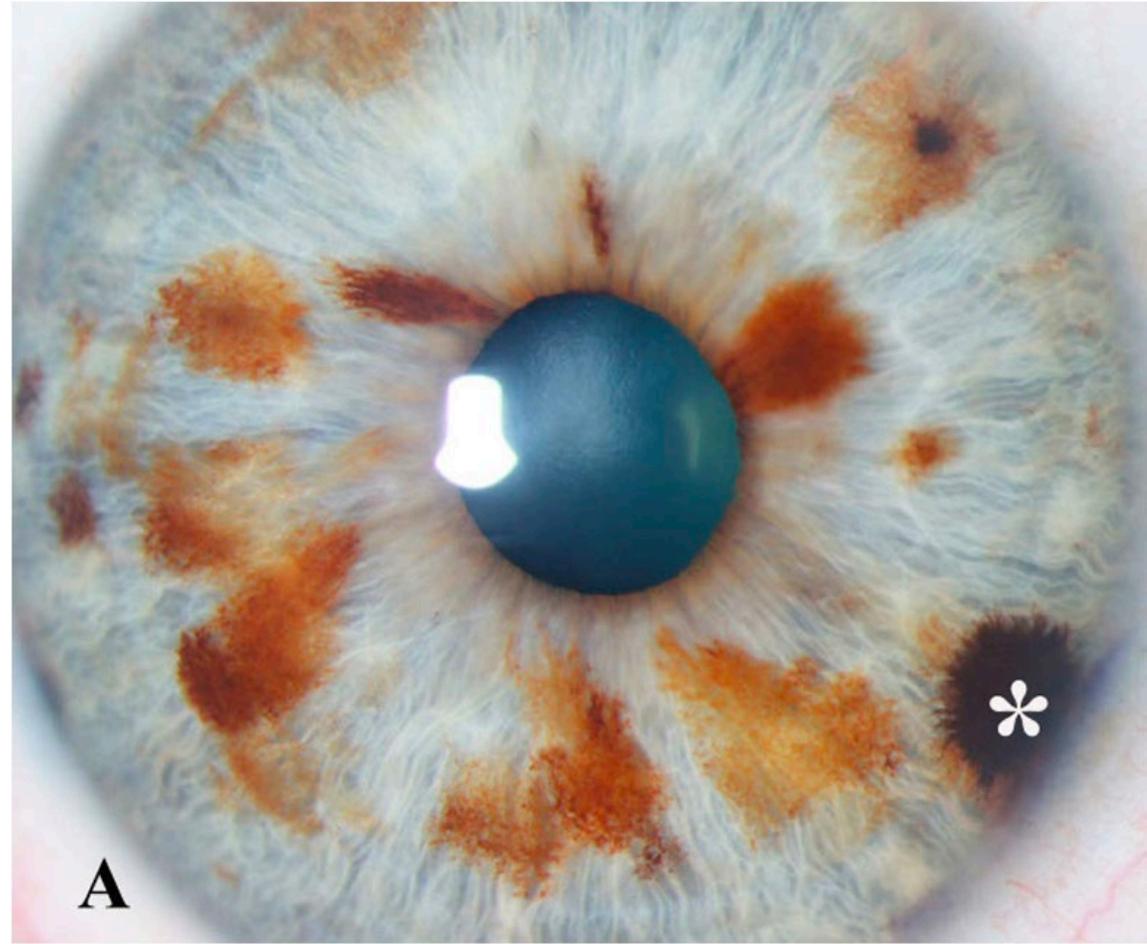
Tumor does not grow rapidly \*



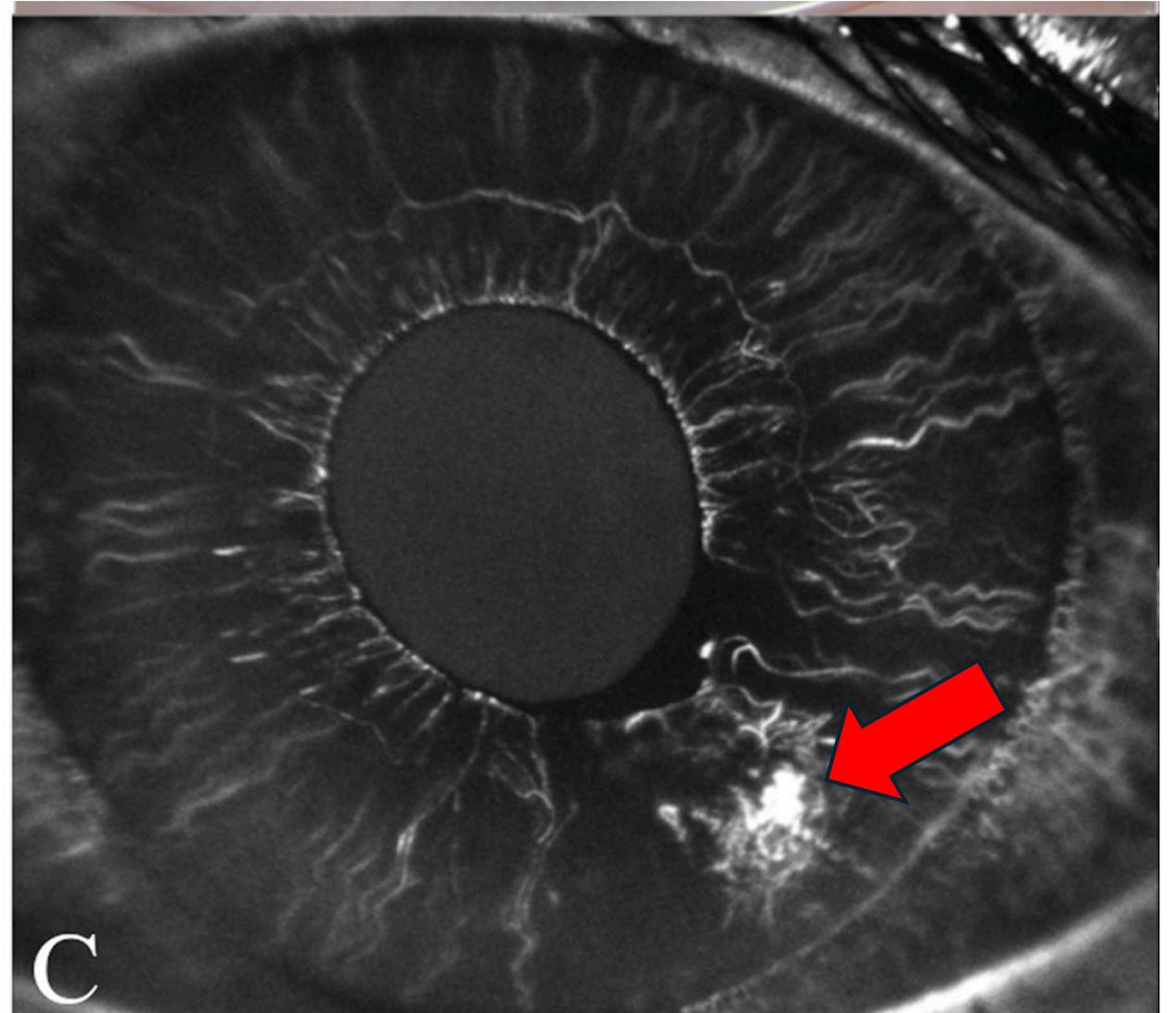
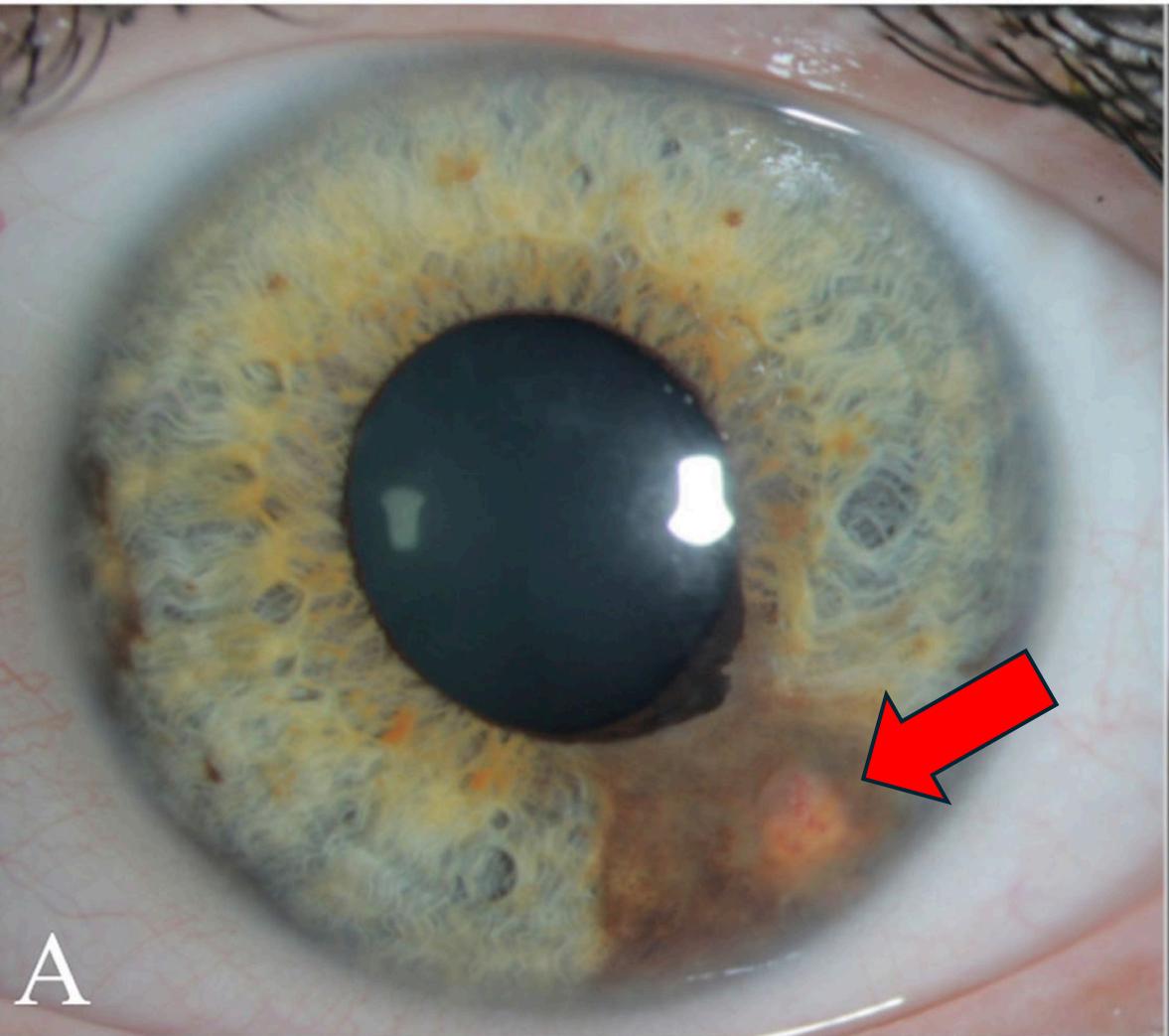
# Iris Nevus



# Iris Freckle



# Iris Melanoma



# Clinical Characteristics | Iris Melanoma

- Circumscribed or Diffuse
- Important points to note
  - Corectopia
  - Angle involvement
  - **Intrinsic vessels**
  - Pigment dispersion
  - Hyphema

## Test needed :

- UBM + AS-OCT
- Slit-lamp pictures
- Ant Seg Angio

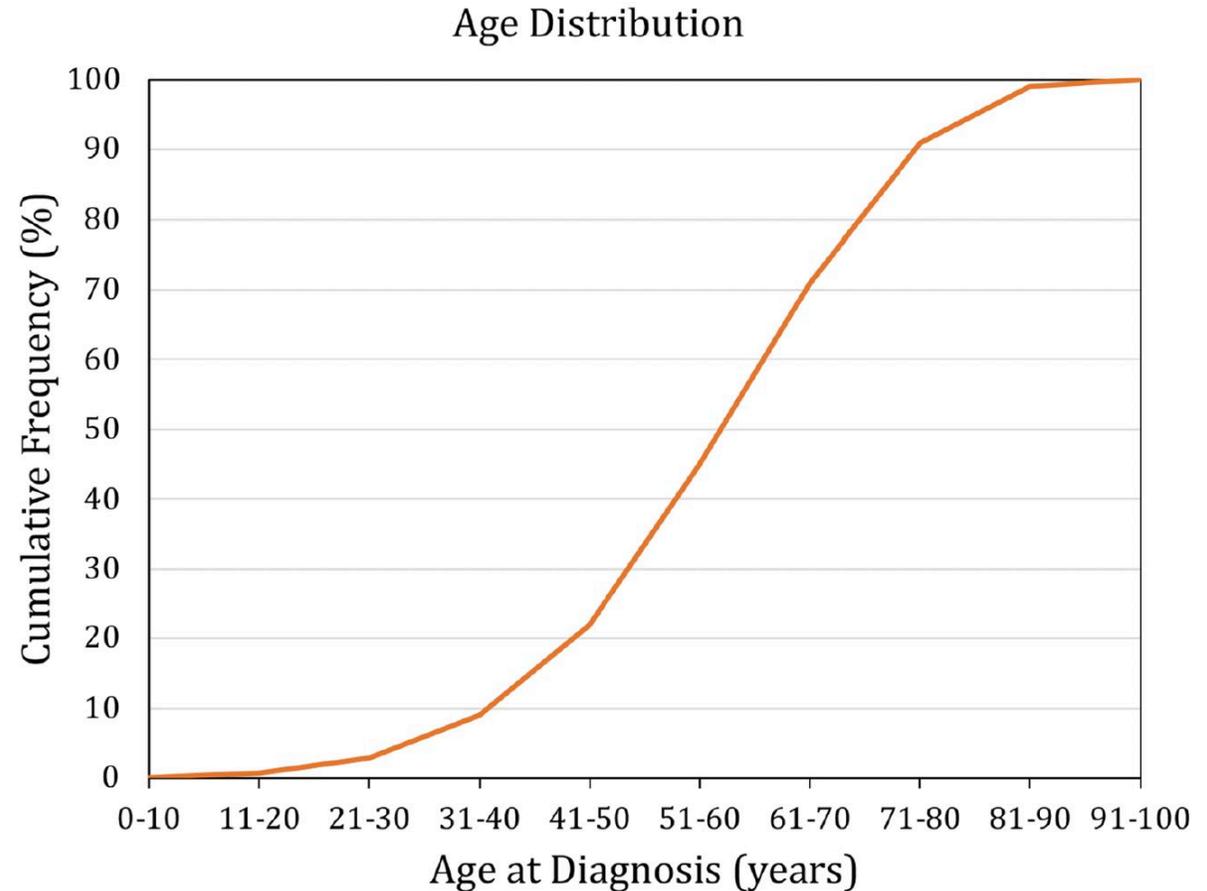
Clinical science

Predictive model for iris melanoma

Arun Singh <sup>1</sup>, Alexander Melendez-Moreno,<sup>2</sup> Jørgen Krohn <sup>3,4</sup>, Emily C Zabor<sup>5</sup>

# Uveal Melanoma

- 5,2 cases / million
- **Location** 
  - Choroid **93%**
  - Ciliary Body **7%**
  - Iris **2%**



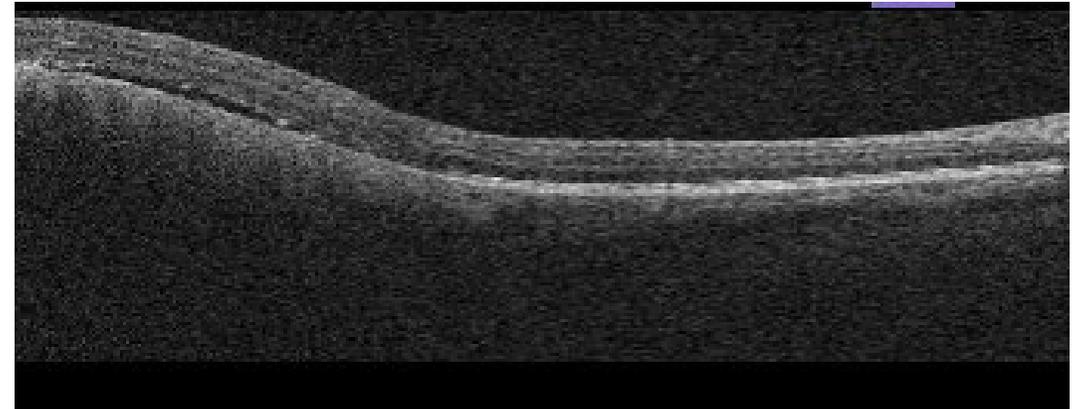
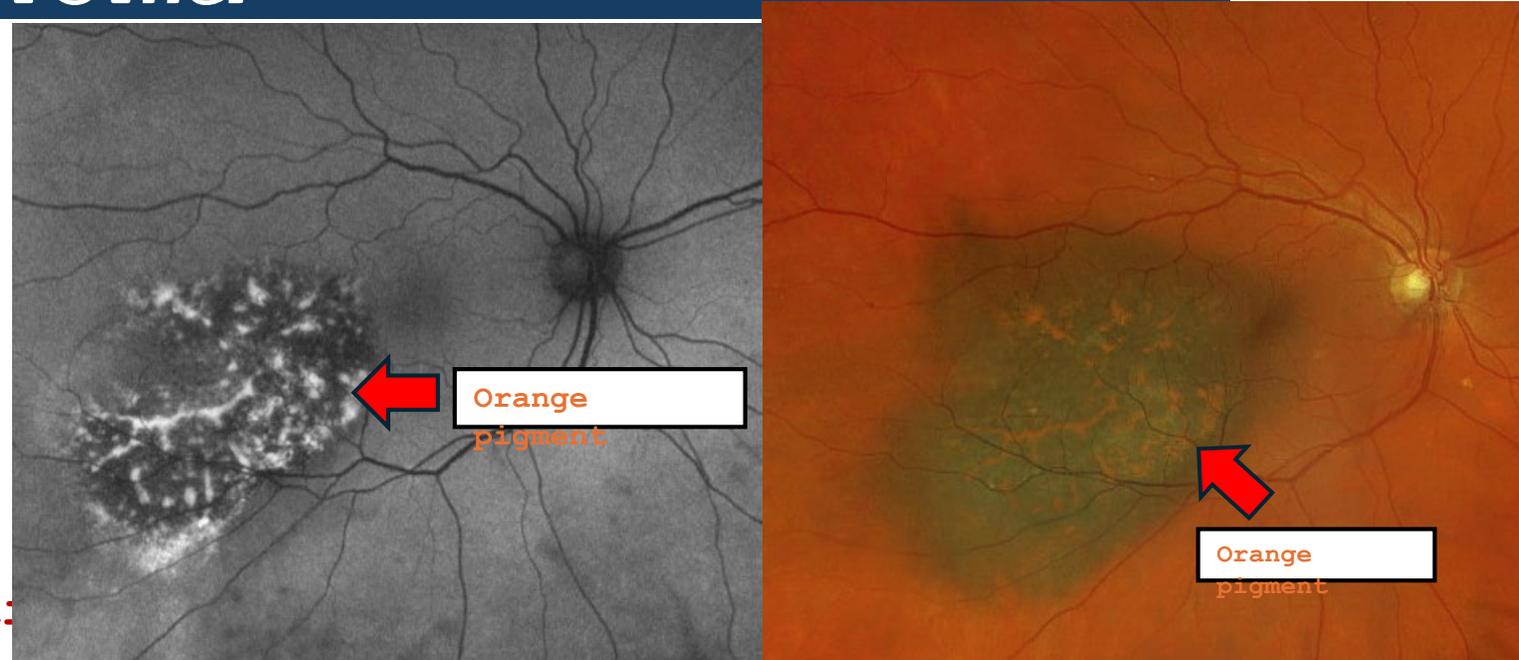
# Clinical Characteristics | Choroidal melanoma

- **Symptoms :**

- non-specific
  - Decrease VA
  - Photopsias
  - Scotomas
  - Floaters
  - Metamorphopsia
  - Microspsia
- **10 % cases are asymptomatic**

- **Pigmentation :**

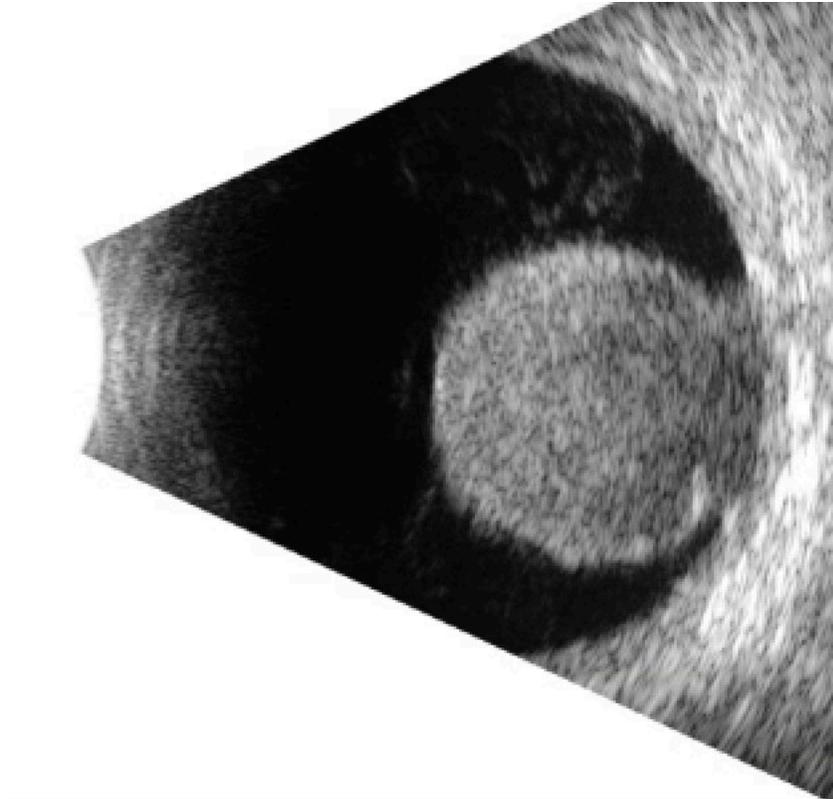
- Amelanotic → Dark brown
- Serous Retinal Detachment
- **Orange pigment**
- Faint SRF



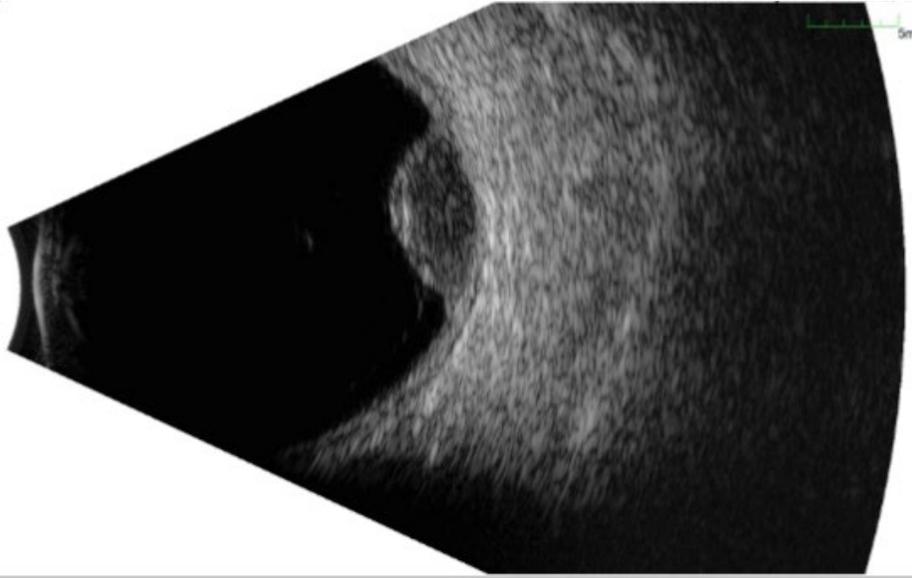
# Clinical Characteristics |

## Choroidal melanoma

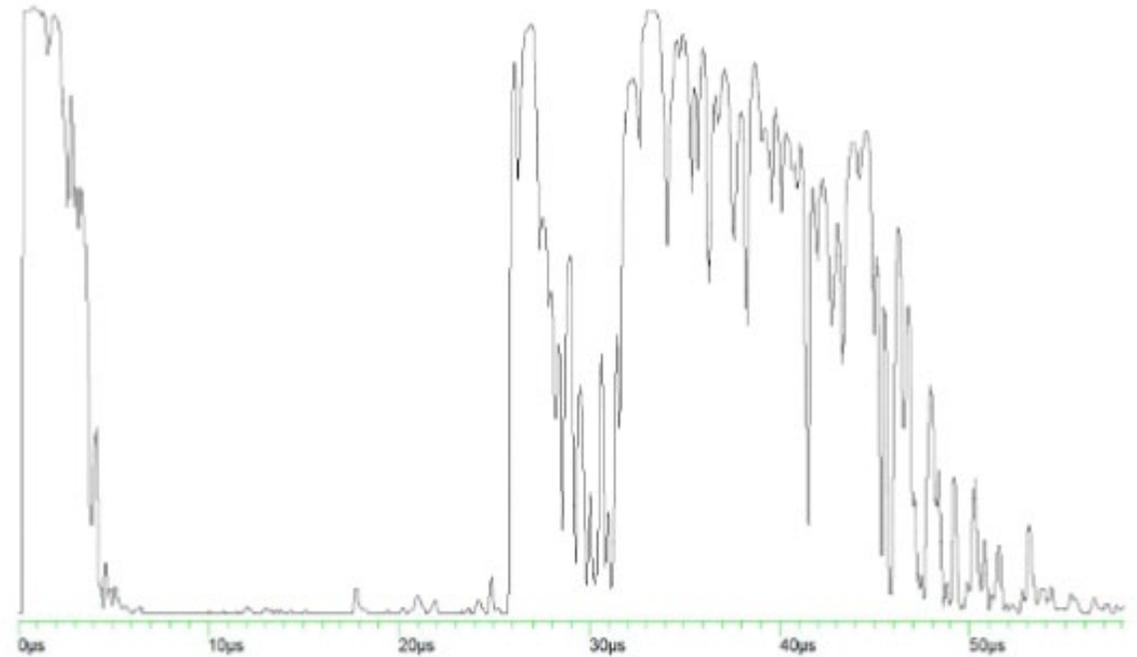
- **Shape**
  - 20 % have mushroom shape \*\*
  - Intrinsic vascularity \*\*



# B and A scan Characteristics



Acoustic Hallow +



Low Internal reflectivity  
High Angle Kappa

# What test do we need?

- Fundus pictures and autofluorescence
- B-scan or UBM
- OCT- Macula and Over the tumor

# Size do matter...

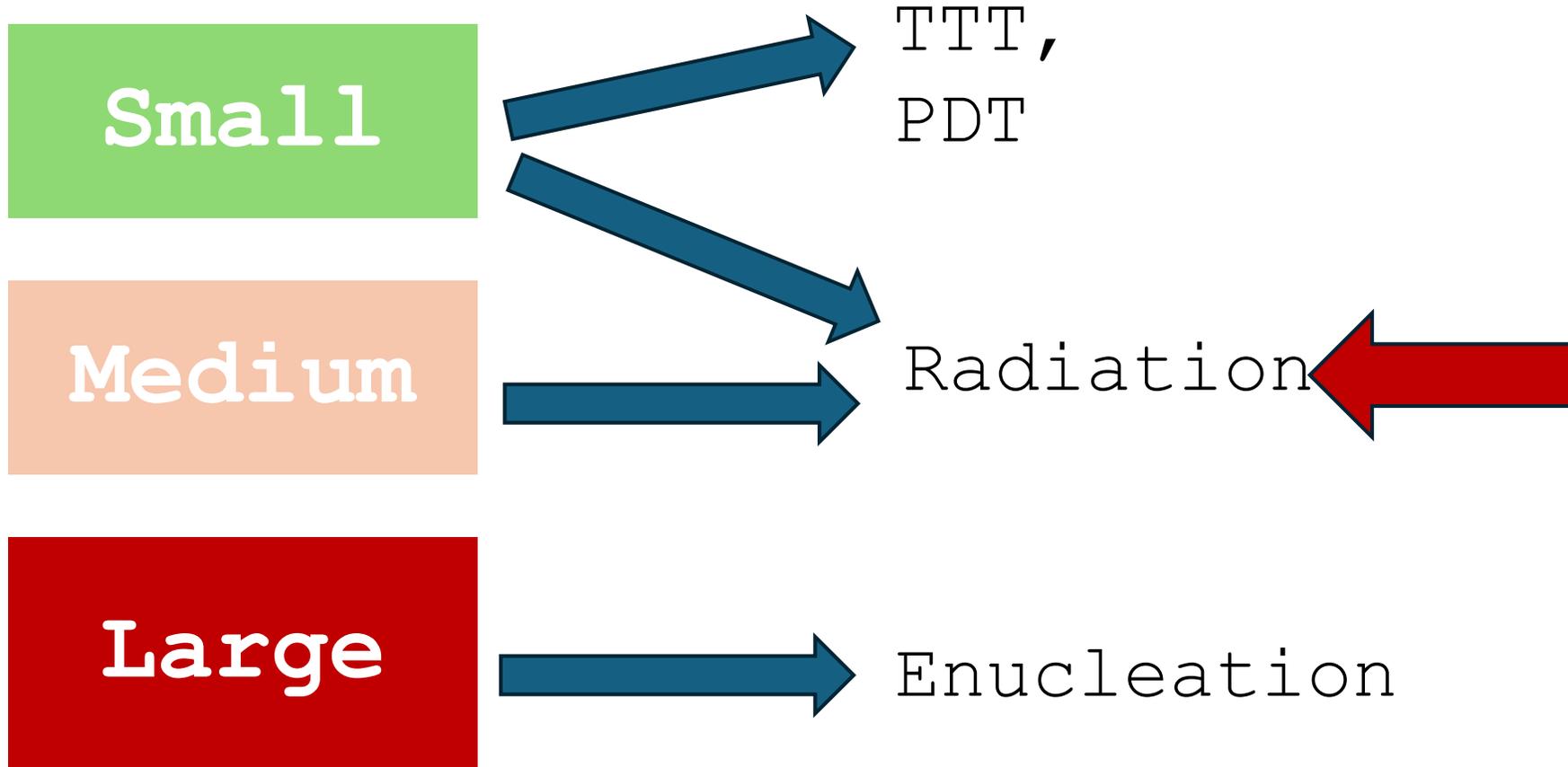
COMS Classification	Tumor Size	Mortality Rate at 5 years
<b>Small</b>	1.5-2.4 mm apical height 5-16 mm basal diameter	16%
<b>Medium</b>	2.5-10 mm apical height ≤16 mm basal diameter	32%
<b>Large</b>	>10 mm apical height >16 mm basal diameter	53%

\* Source: Collaborative Ocular Melanoma Study

**AJCC classification**

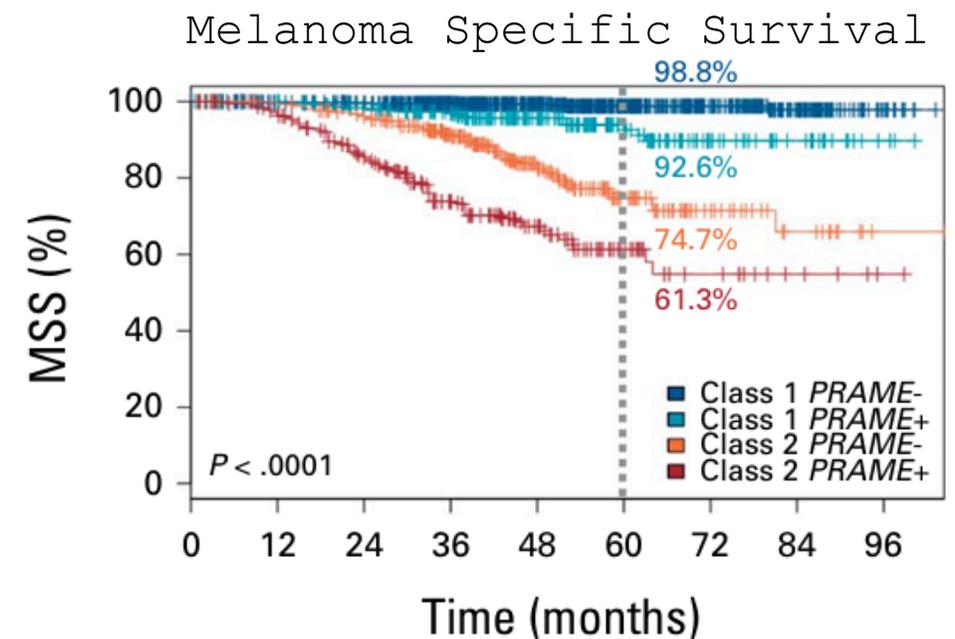
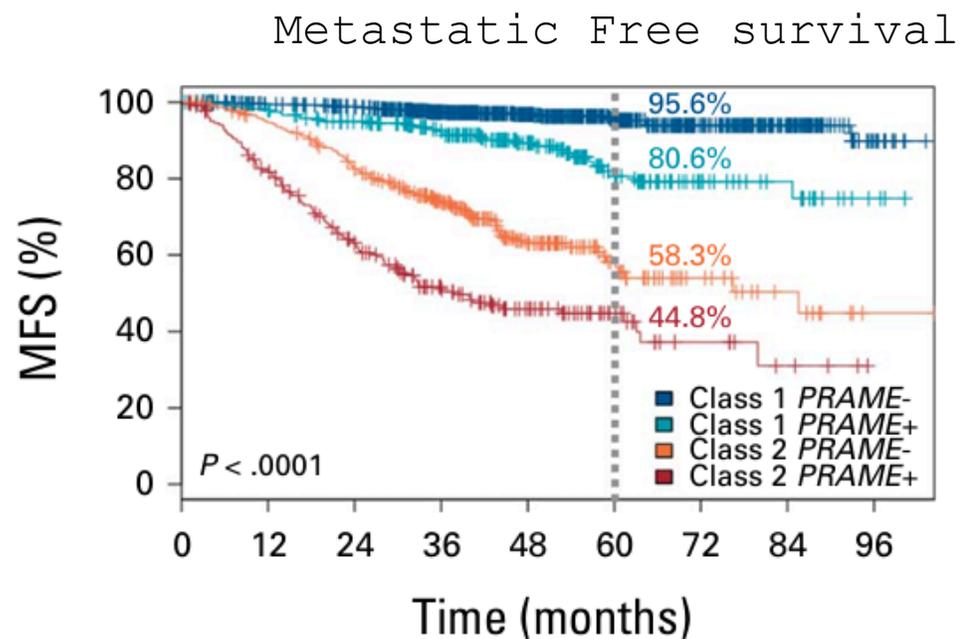
Tumor thickness (mm)							
> 15	4	4	4	4	4	4	4
12.1 - 15.0	3	3	3	3	3	4	4
9.1 - 12.0	3	3	3	3	3	3	4
6.1 - 9.0	2	2	2	2	3	3	4
3.1 - 6.0	1	1	1	2	2	3	4
≤ 3.0	1	1	1	1	2	2	4
	≤ 3.0	3.1 - 6.0	6.1 - 9.0	9.1 - 12.0	12.1 - 15.0	15.1 - 18.0	> 18.0
	Largest basal diameter (mm)						

# Treatments | COMS trial



# Biopsy |

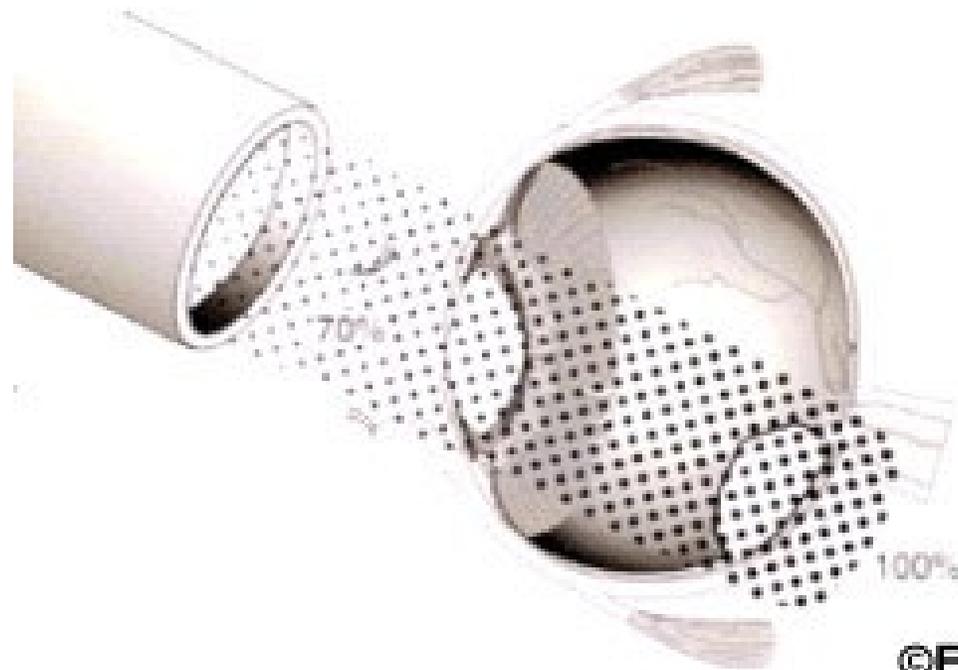
- There is 2 types of biopsy
  - Diagnostic : we don't know that is it
  - **Prognostic : What is the chance of metastasis**
    - **GEP class**



# Treatments | Radiation

## External delivery

- Proton Beam
- (EBRT/CyberKnife)

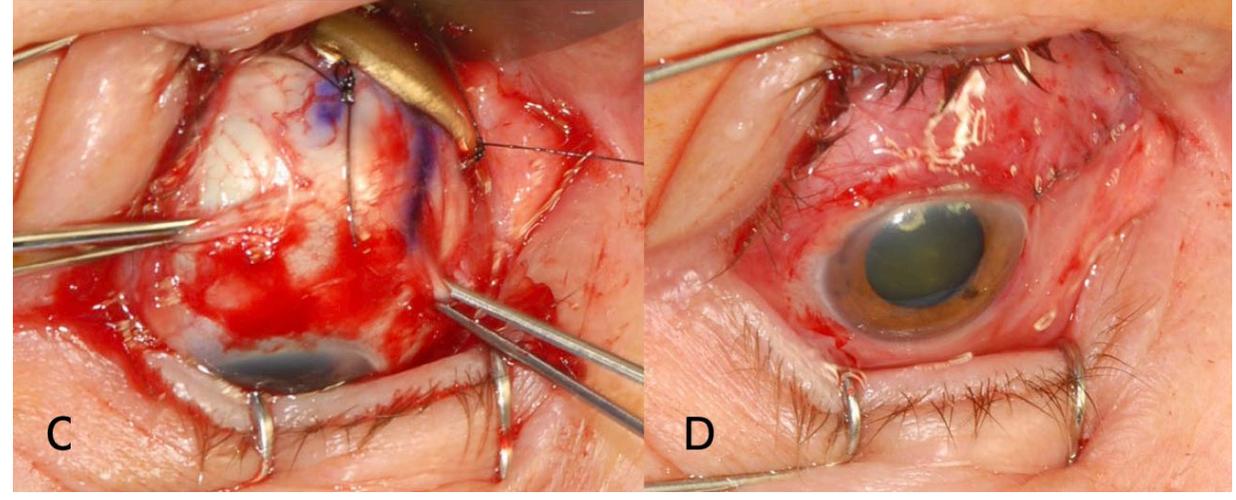
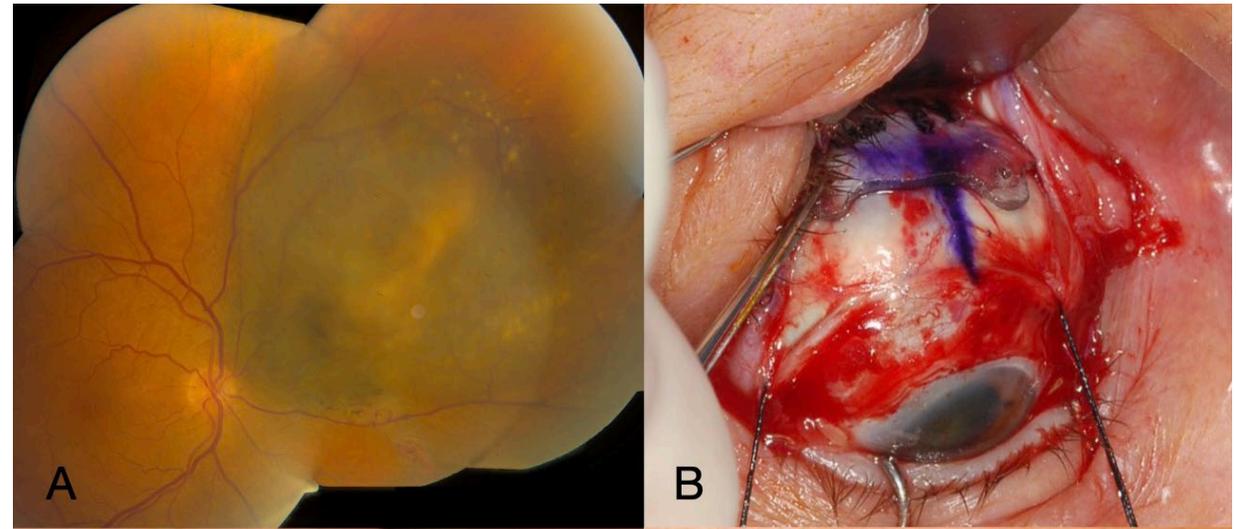
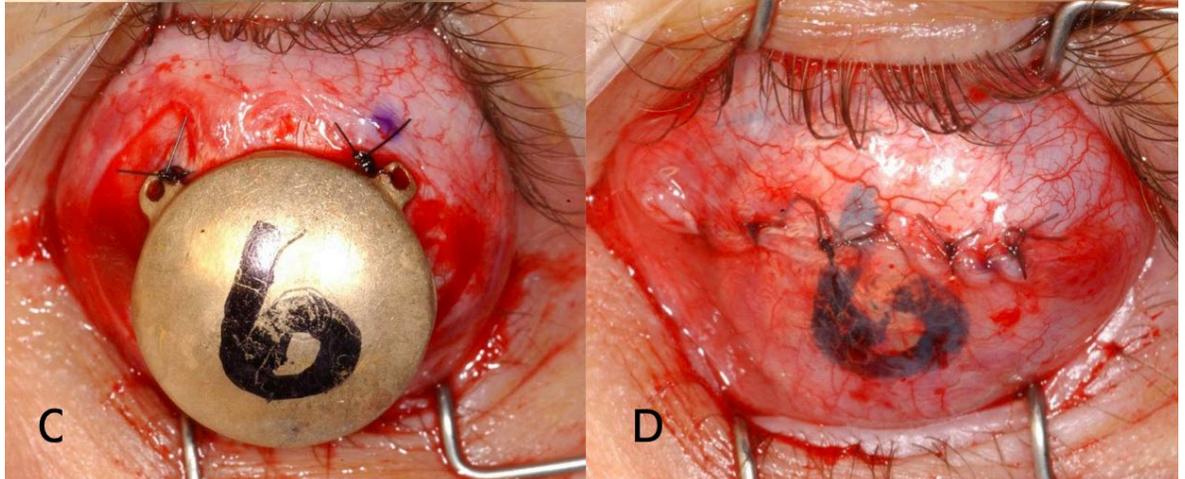
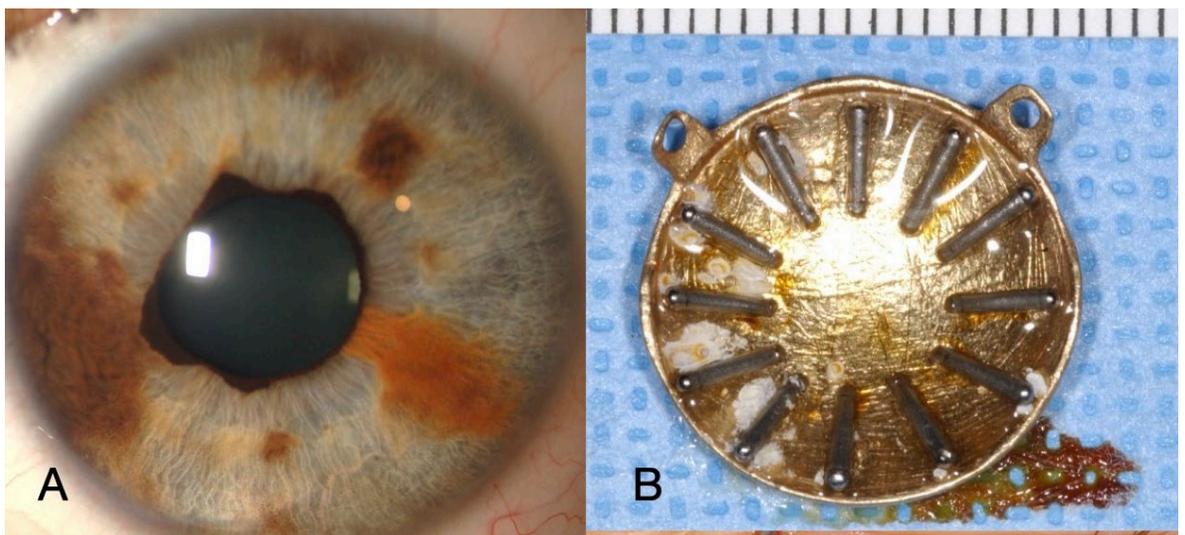


©ECN

# Treatments | Radiation

## Brachytherapy : plaque

<https://retinahistory.asrs.org/milestones-developments/pl>



# Brachytherapy surgical steps

Exposure



Tumor localization



Scleral sutures  
w/ dummy plaque



Placement of the plaque

+/- Biopsy



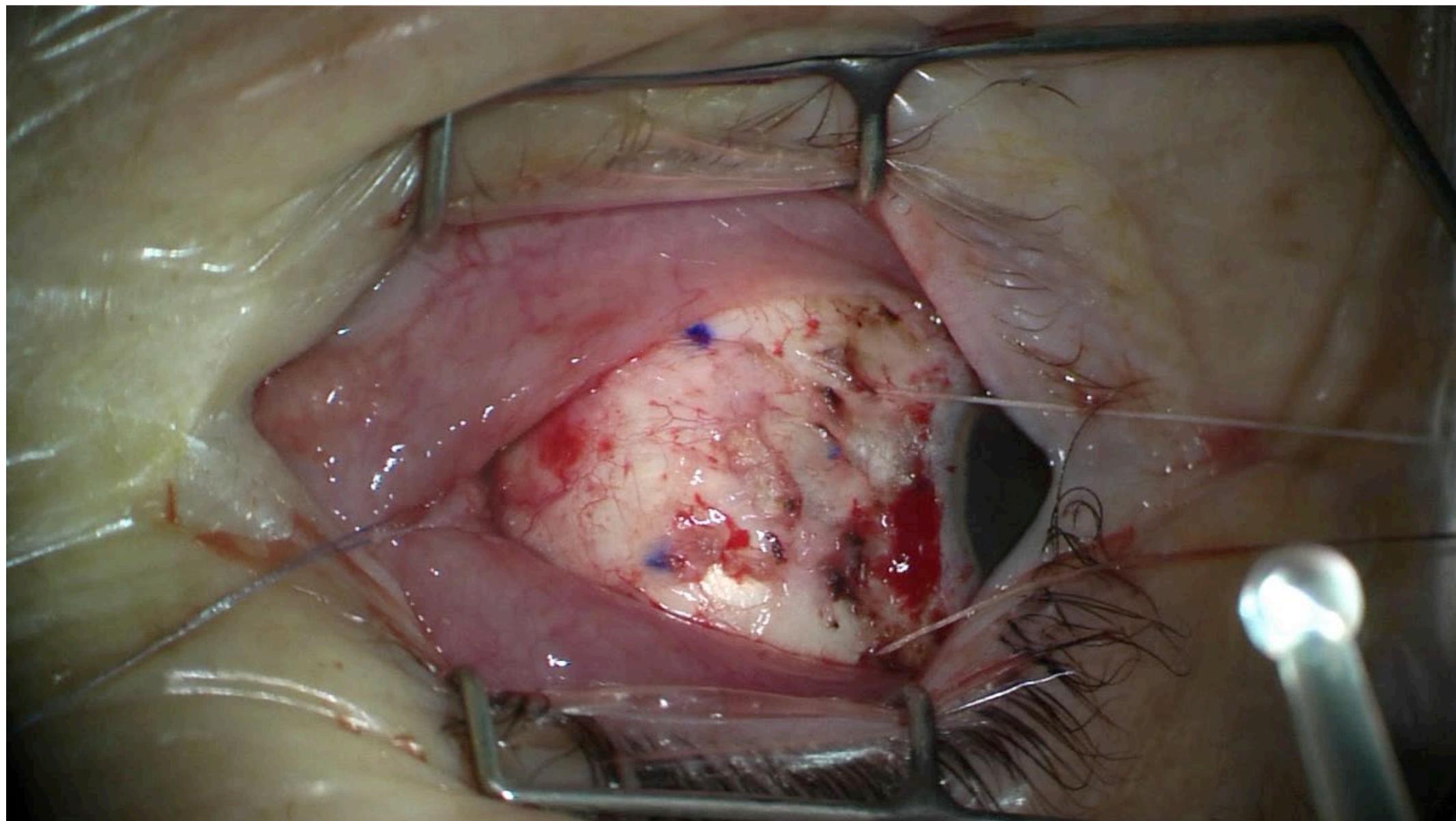
Confirmation  
plaque

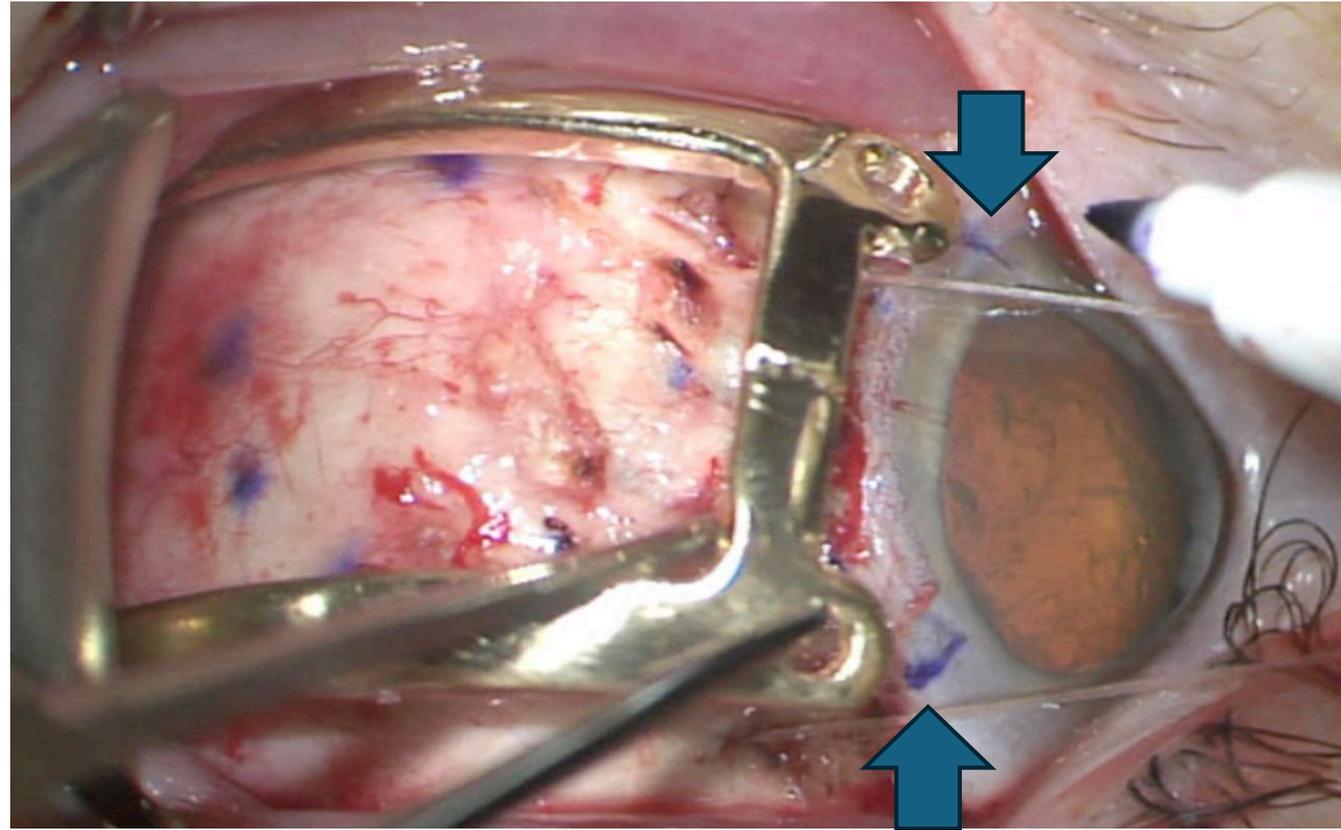
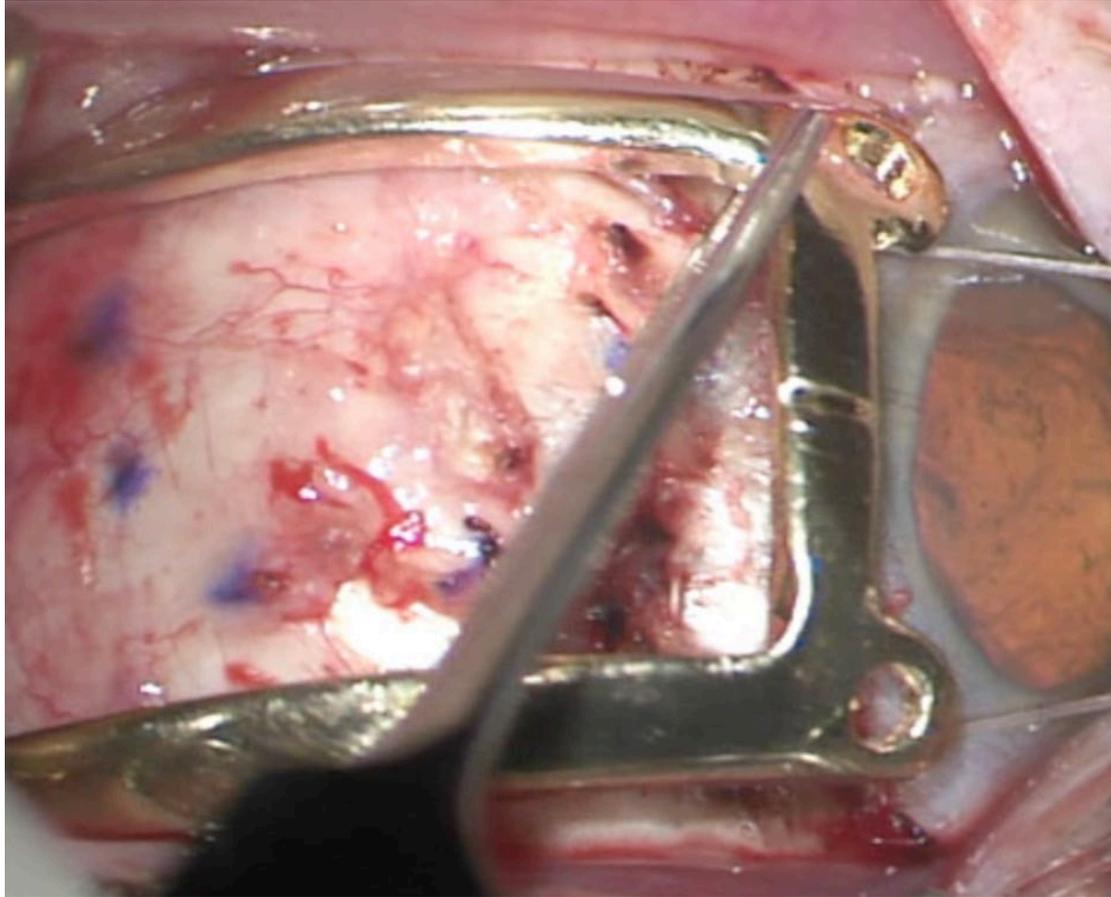
Placement

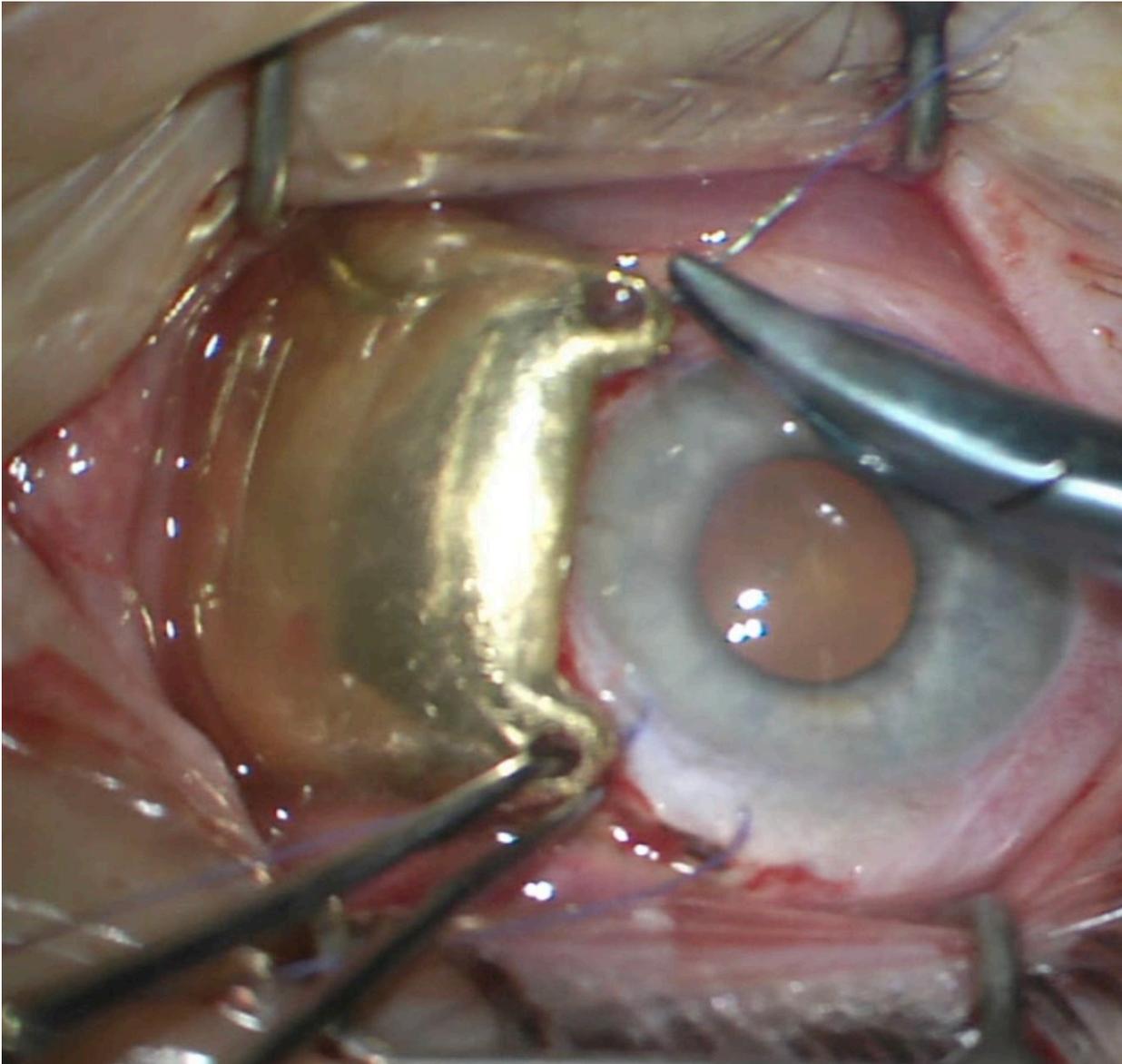


Closure

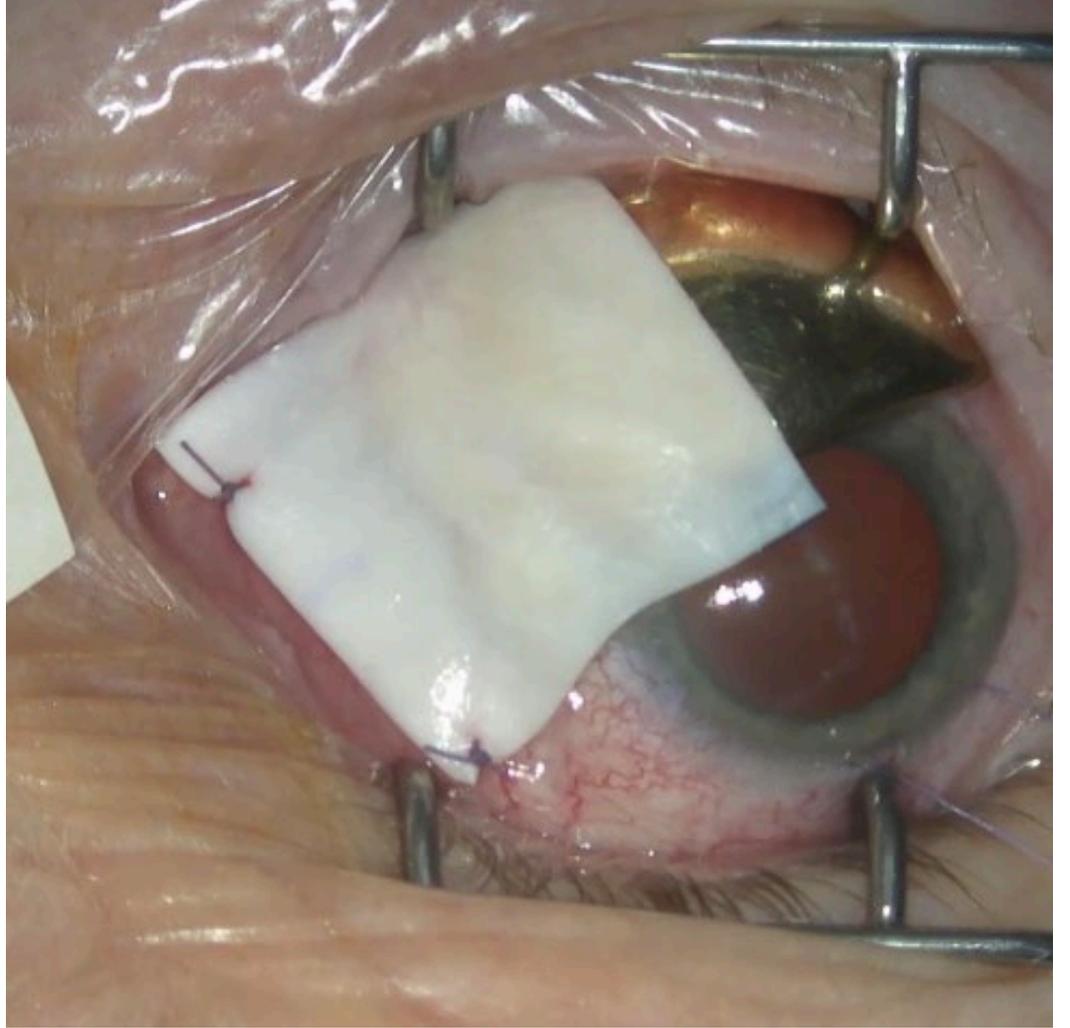
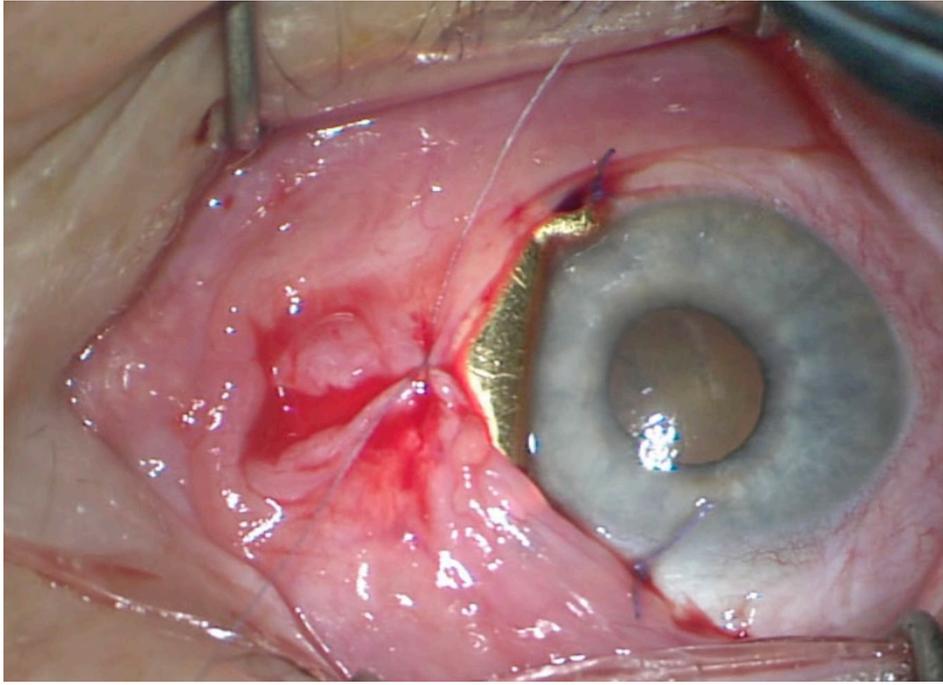
Courtesy Dr Arun Singh



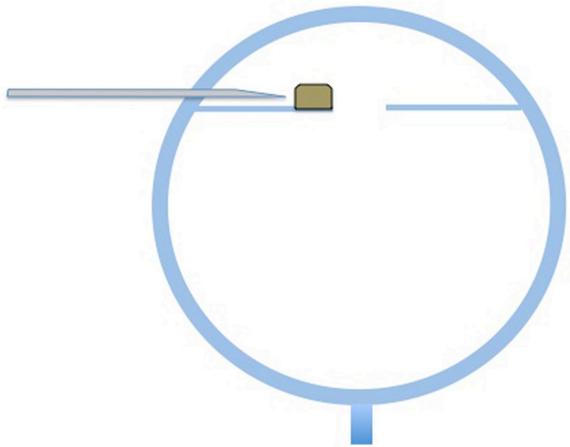




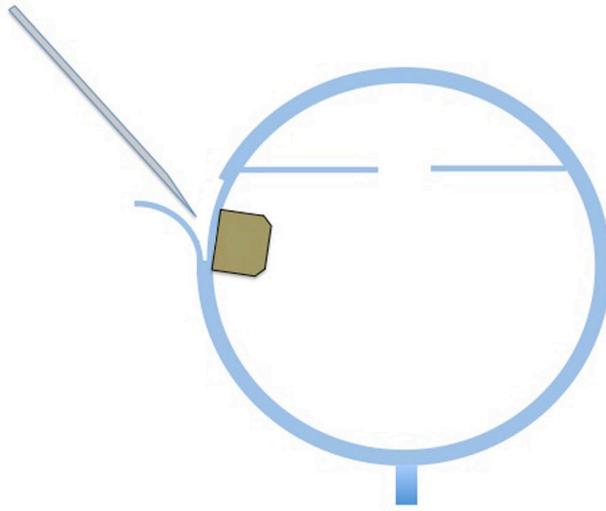
Courtesy Dr Arun Singh



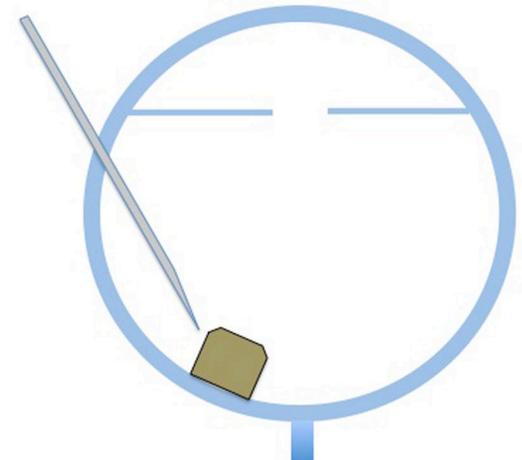
# Biopsy



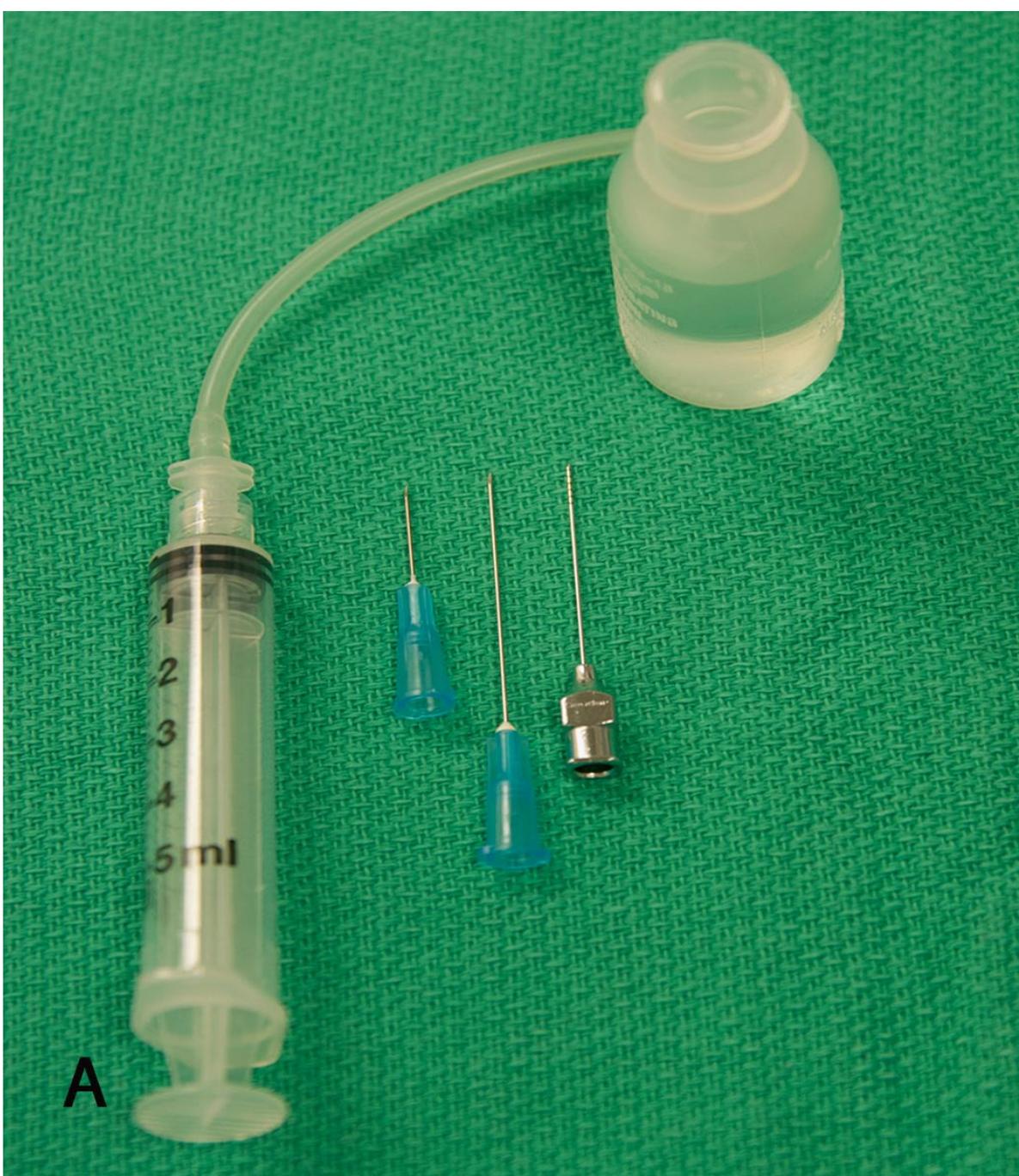
Trans-  
Corneal



Trans-  
Scleral



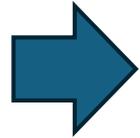
Trans-  
Vitreous



- 25-27 G short of long ne
- 5 mL syringe
- Short tubing

# Patient Journey | Uveal Melanoma

Diagnosis



Systemic Staging  
CAT scans

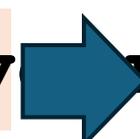


Surgery

F/U q3m x 1 year



F/U q6m ad 5 y



F/U q1 y ad 15

# Follow-up of UM | Approach

#1 Local control

Fundus pictures and B-scan/ UBM

#2 Systemic surveillance

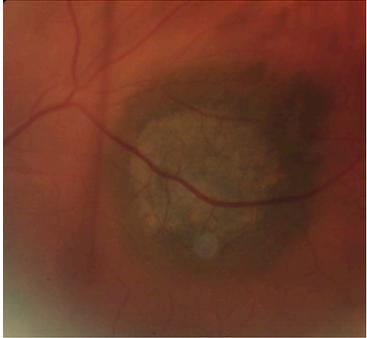
Liver Ultrasound for **total 15 ye**

#3 Radiation complications

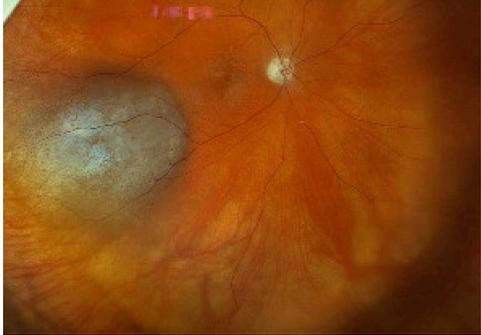
VA/IOP/ OCT

# Indeterminate Melanocytic Lesion | IML

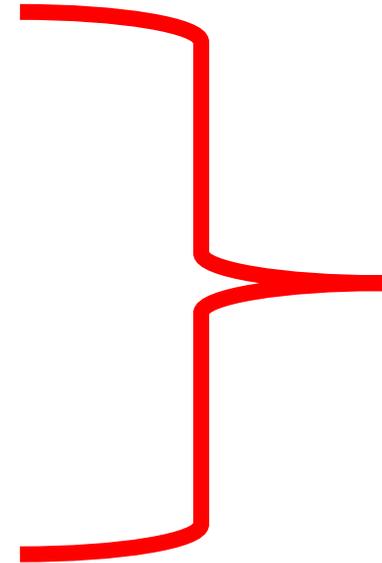
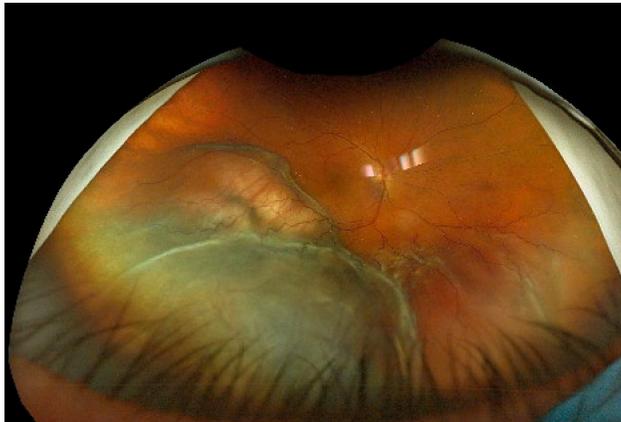
Small



Medium



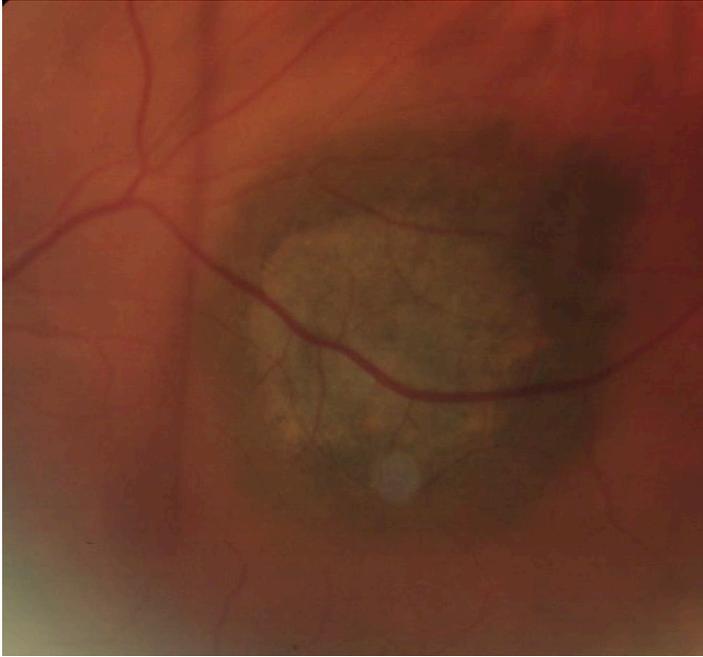
Large



Easy Dx

# Indeterminate Melanocytic Lesion | IML

Small



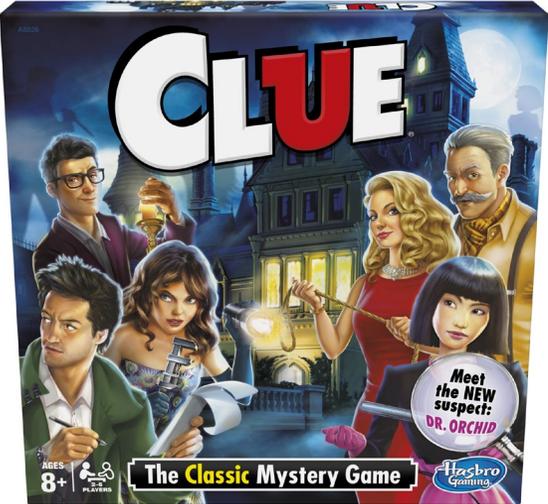
# Indeterminate Melanocytic Lesion | IML

Small



Small Choroidal Melanoma

Large/Atypical



# Indeterminate Melanocytic Lesion | IML

Small

```
graph TD; A[Small] --> B[Small Choroidal Melanocytic Lesion]; A --> C[Large/Atypical]
```

Small Choroidal Melanocytic Lesion

Large/Atypical

- SRF (<15 % nevi have it)
- Orange Pigment
  - < 10% of nevi have it
- New symptoms
- Shape
- Intrinsic vessels
- Documented growth

# Indeterminate Melanocytic Lesion | IML

Small

```
graph TD; A[Small] --> B[Small Choroidal Melanoma]; A --> C[Large/Atypical]
```

Small Choroidal Melanoma

- SRF
- Orange Pigment
- New symptoms
- Shape
- Documented growth

Large/Atypical

- Drusen
- Pigment changes
- Asymptomatic

# Indeterminate Melanocytic Lesion | IML

Indeterminate Melanocytic Lesion Favoring

**Document growth**

**Treat**

Indeterminate Melanocytic Lesion

**Observe closely (3 months)**

# Indeterminate Melanocytic Lesion | IML

- If indeterminate lesion, what is the chance of becoming melanoma?
  - **5-6 % vs 1 : 8000 in nevus**
- **Need to be watched more carefully**

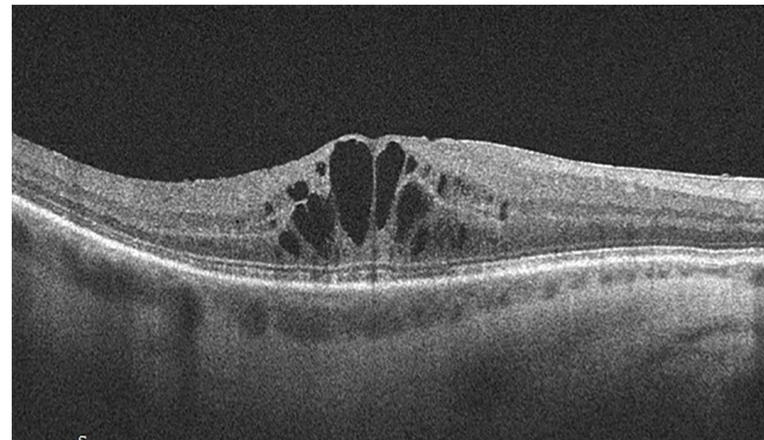
# Complications | Radiation

## Radiation Retinopathy

- Non-proliferative
- Proliferative
- CME

~Diabetic Retinopathy

**Dose**



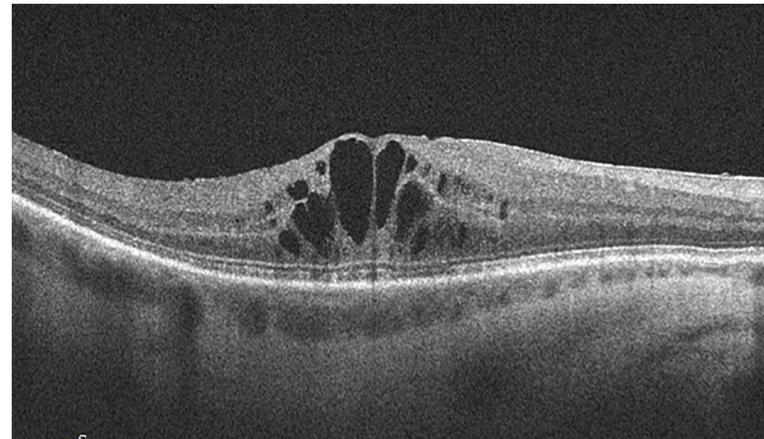
# Complications | Radiation Retinopathy

## Treatments

- Anti-VEGEGF
- Steroids
- Laser (PRP)



Can be untreatable



# Complications | Radiation Retinopathy

## Protocol AL

- DRCR
- Randomized control trial
- Goal : Evaluate if early intervention with **faricimab** or a **fluocinolone implant** prevents visual acuity loss compared to observation.

# Complications | Radiation

**Toxic Tumor**

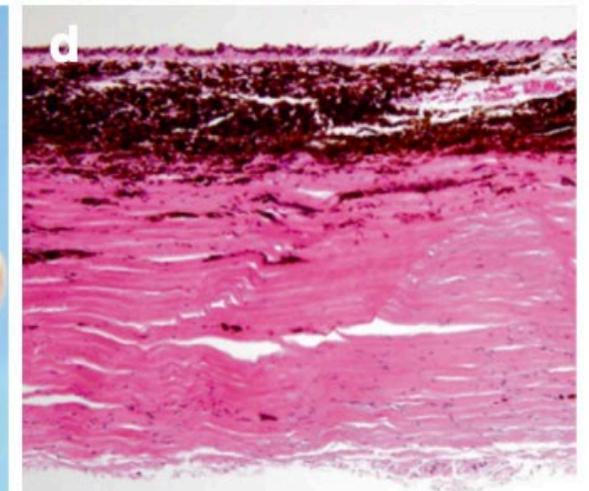


**Radiation Optic**



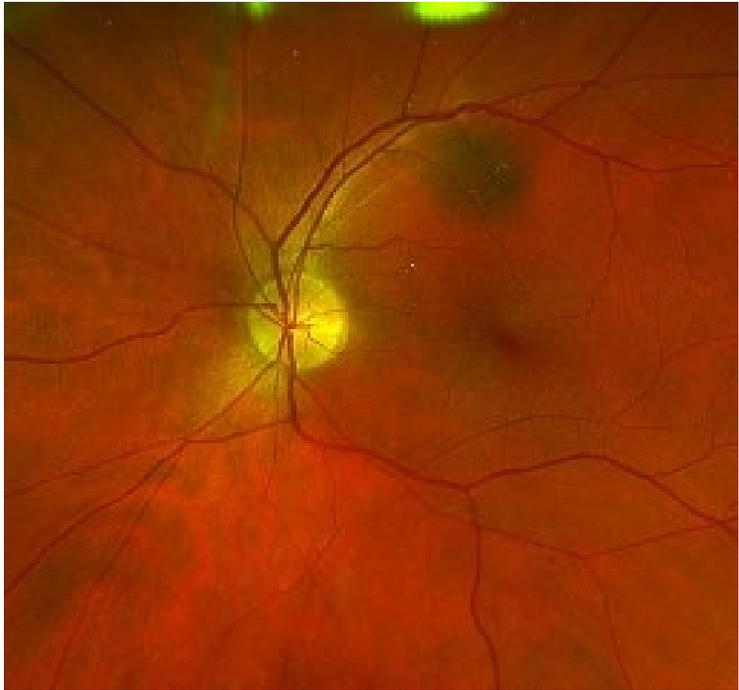
# Nevus of Ota | Ocular dermal melanocytosis

- 0.4% of the population
- **1:400 risk of UM**
- **10% risk of Glaucoma**
- Can be only the eye (- skin)
  - Ocular Melanocytosis



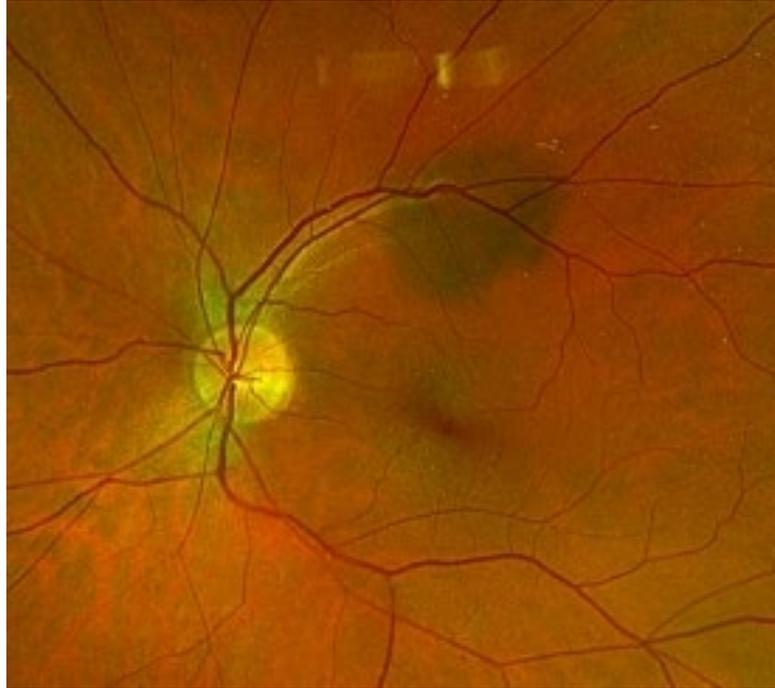
# What Can I do in clinic?

- Take a picture



# What Can I do in my clinic?

- Take a picture



# What Can I do in my clinic?

- Take a picture



# What Can I do in my clinic?

- Take a picture

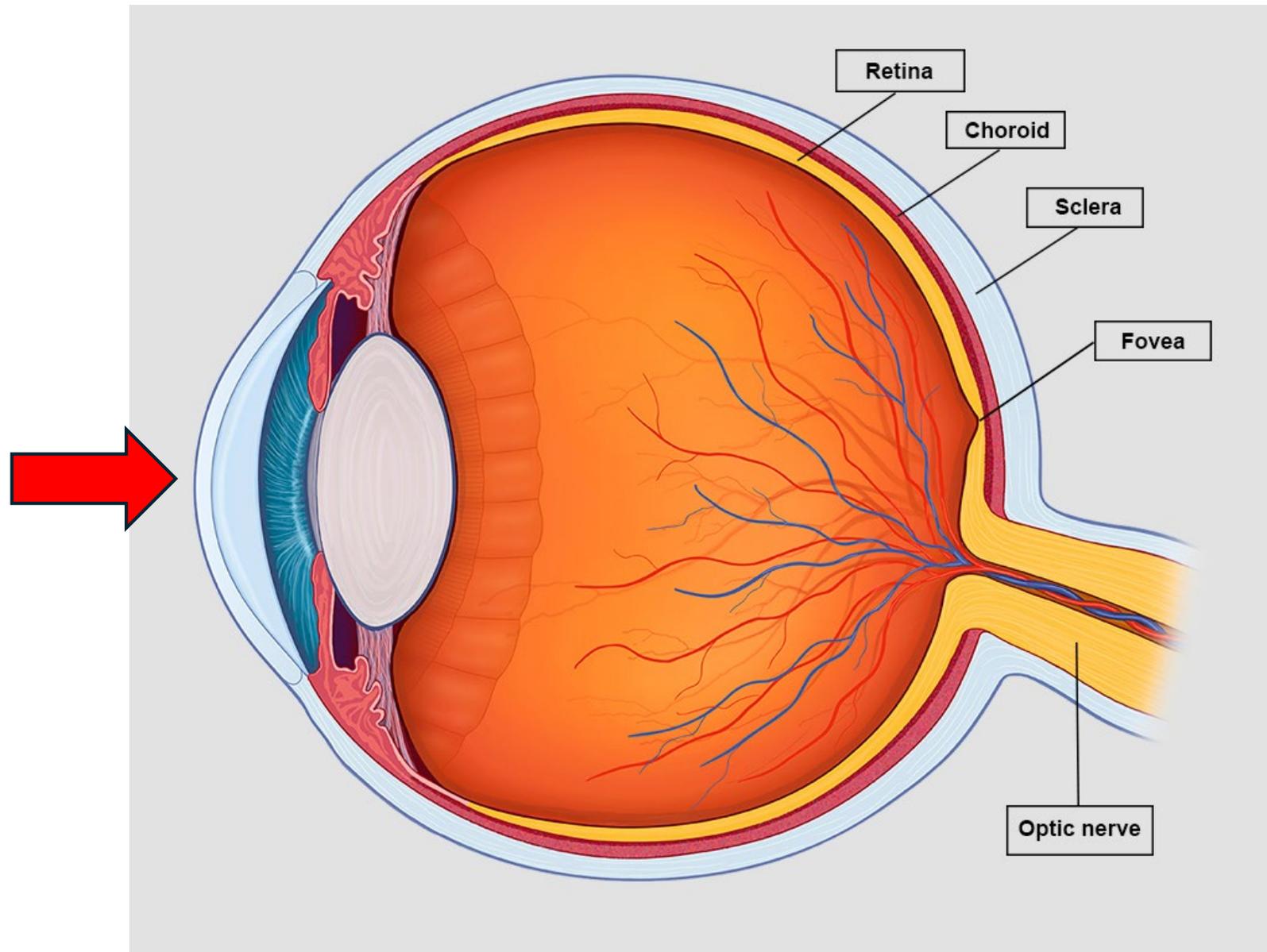


2021

2023

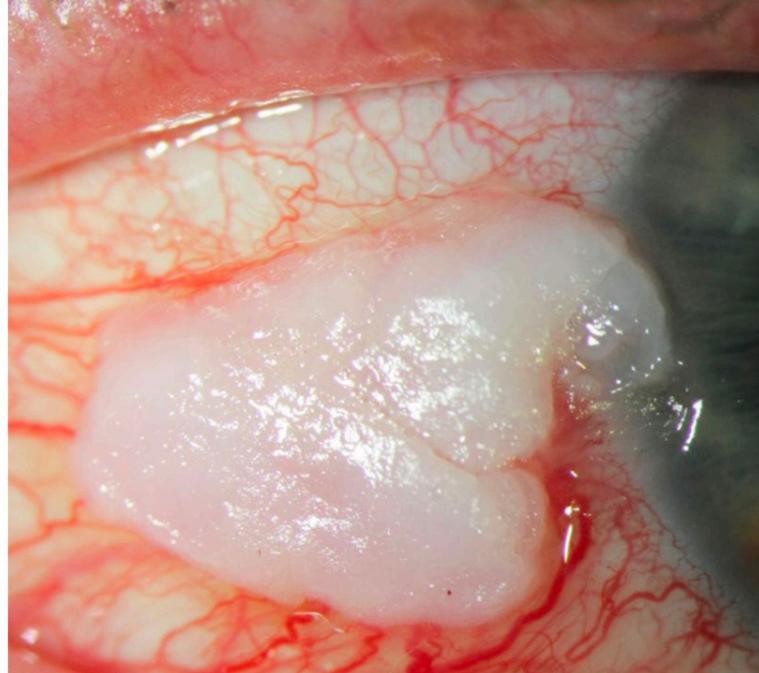
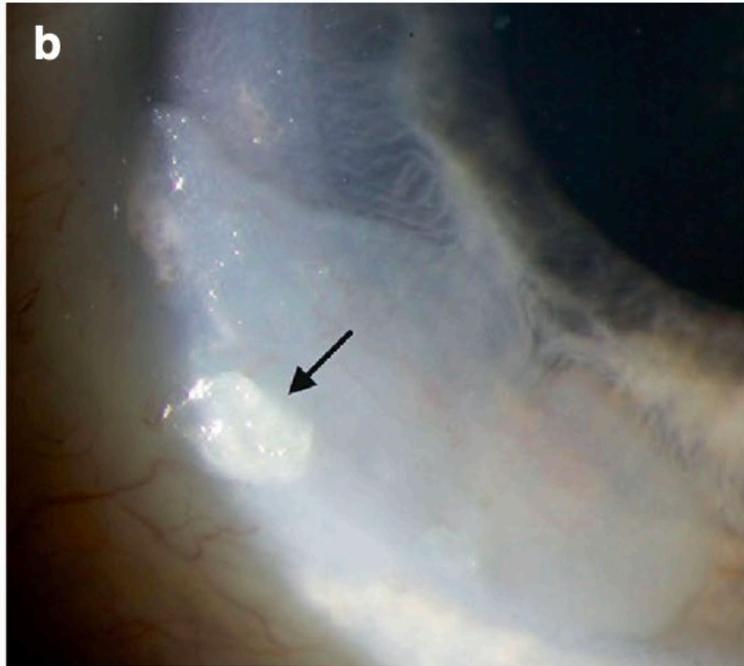
2025

# Anatomy | Cornea Conjunctiva



# Ocular Surface Squamous Neoplasia (CIN/SCC)

- **Pre-cancerous** and **cancerous** disease
- Incidence varies • 0.3 -



Pictures from : Clinical Ophthalmic Oncology, Conjunctival Tumors. Jacob Pe'er Bertil E. Damato Arun D. Singh *Editors*

## Systemic Risk Factors

## Ocular Risk Factors

Non-  
Modifiable

Male Sex  
Age  
Syndromes  
    Xeroderma  
    Pigmentosum

Modifiable

Smoking  
Vitamin A deficiency  
Immunosuppression  
    AIDS  
    Post-transplant  
    Auto-immune disease  
    treatments  
HPV infection

**Sun Exposure**

Chronic Trauma  
Chronic inflammation

# Clinical Characteristics

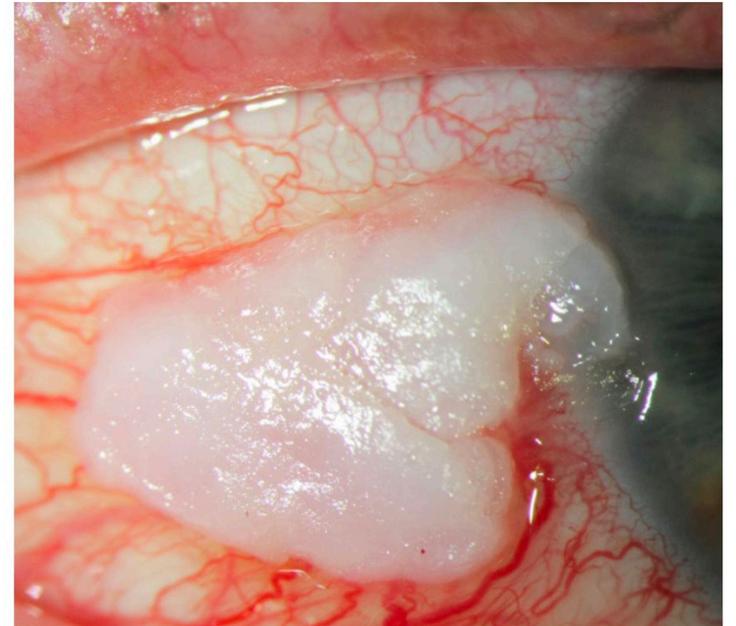
- Thick epithelium
- Leukoplakia
- Feeding vessels



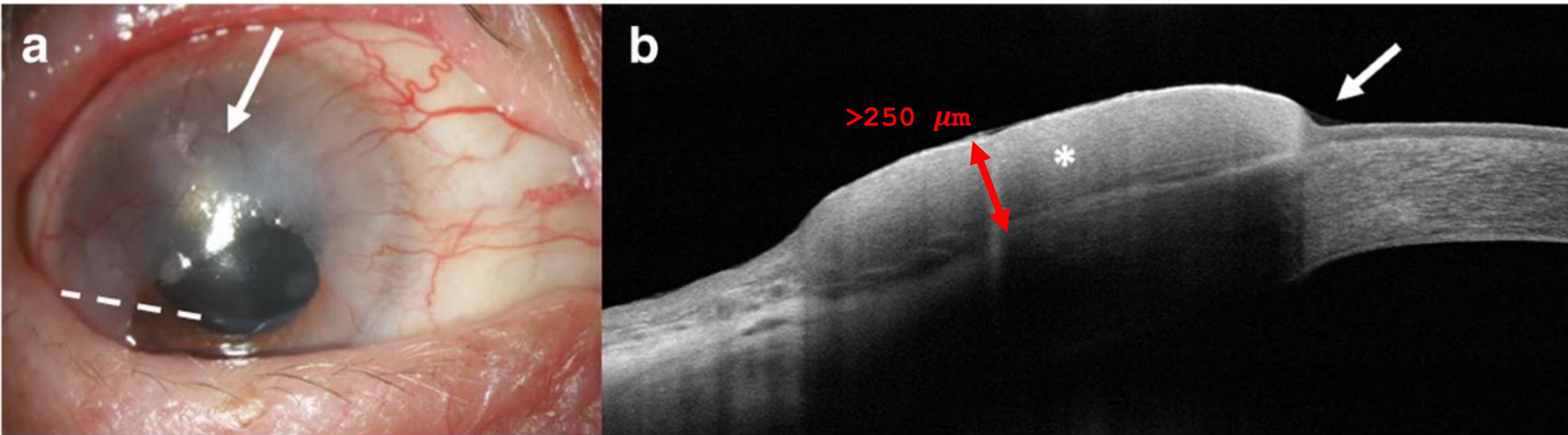
Papillomatous



Gelatinous



Leukoplakia



Venkateswaran, N., Galor, A., Wang, J. et al. Optical coherence tomography for ocular surface and corneal diseases: a review. *Eye and Vis* **5**, 13 (2018).

# Treatment

## Surgical

Excision biopsy,  
2-3 mm margin with none-touch technique  
+ cryotherapy

Cryotherapy

## Chemo Drops

MMC 0.02% QID in cycles

5-FU 1% QID in cycles

# Excision surgical steps | No Touch Technique

Delineate the tumor + 2 mm

Repair

Cornea : Absolute EtOH

Primary Closure

Secondary Closure

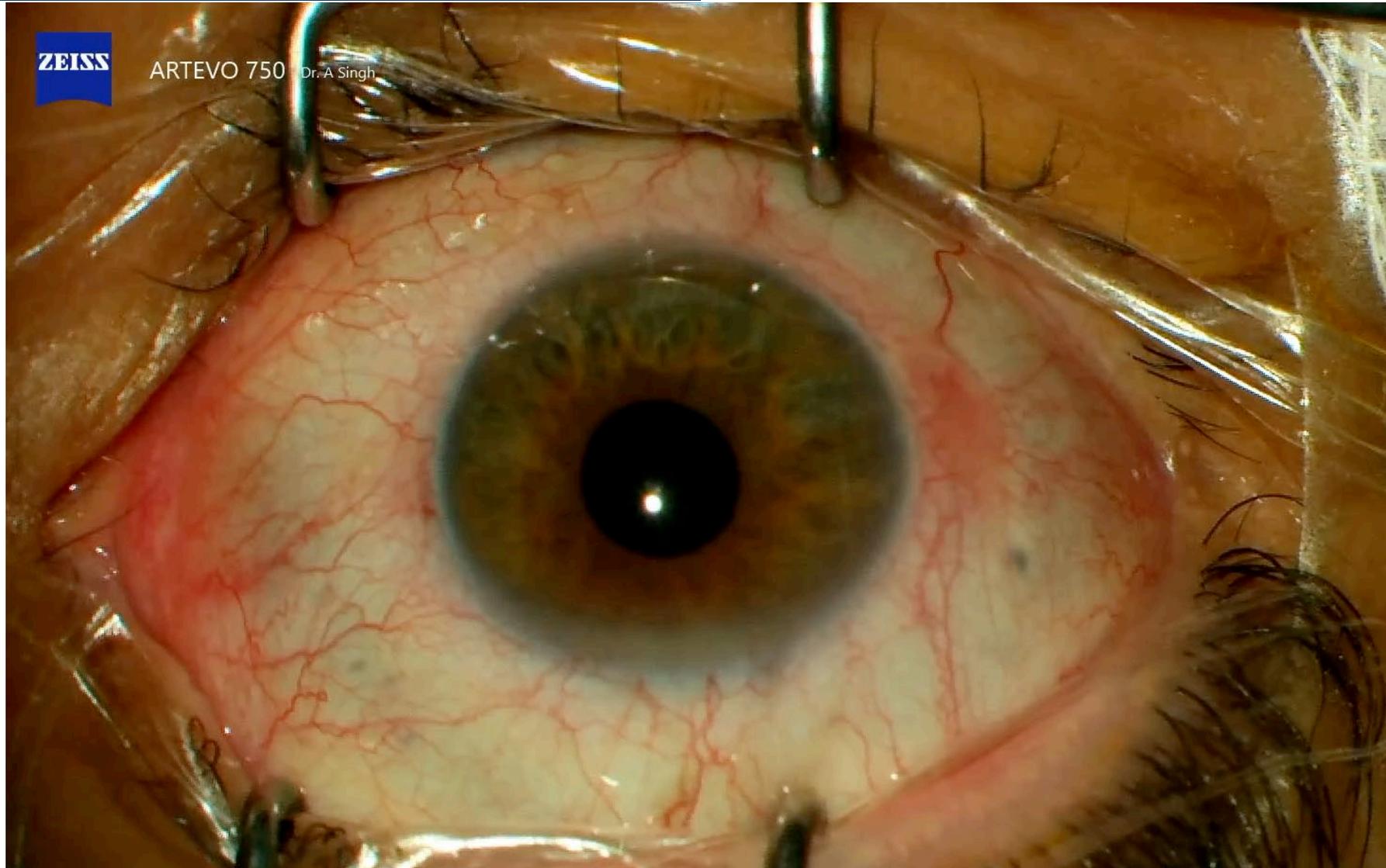
- Autograft
- AMT

Cautery

Conjunctival excision

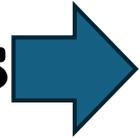
# Surgery Steps

Courtesy Dr Arun SIngh



# Patient Journey | Conjunctival Tumors

**Diagnosis**



**Treatment**



**No Tumor**

**F/U q3m x 1 year**



**F/U q6m ad 2 years**



**Discharged**

Objective 1: Identify the key clinical features, diagnostic approach and treatment modalities

- Choroidal Melanoma
- Conjunctival Cancer

Objective 2: Recognize common complications of radiation delivered to the eye



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Thank you !