FUNDOSCOPY, A USEFUL TOOL FOR EVALUATION OF PATIENTS WITH AUTOIMMUNE DISEASE

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Fundoscopy is primarily used to examine the vitreous, retina and blood vessels

WHEN & WHY

- Rheumatologists often work in collaboration with ophthalmologists for a more comprehensive approach to patient care

- Certain autoimmune diseases are known to have ocular manifestations (SLE, Behcet etc.)

and can be related with sight threatening complications

- Regular fundoscopic examinations may be recommended for

❑Cases of known or suspected eye involvement

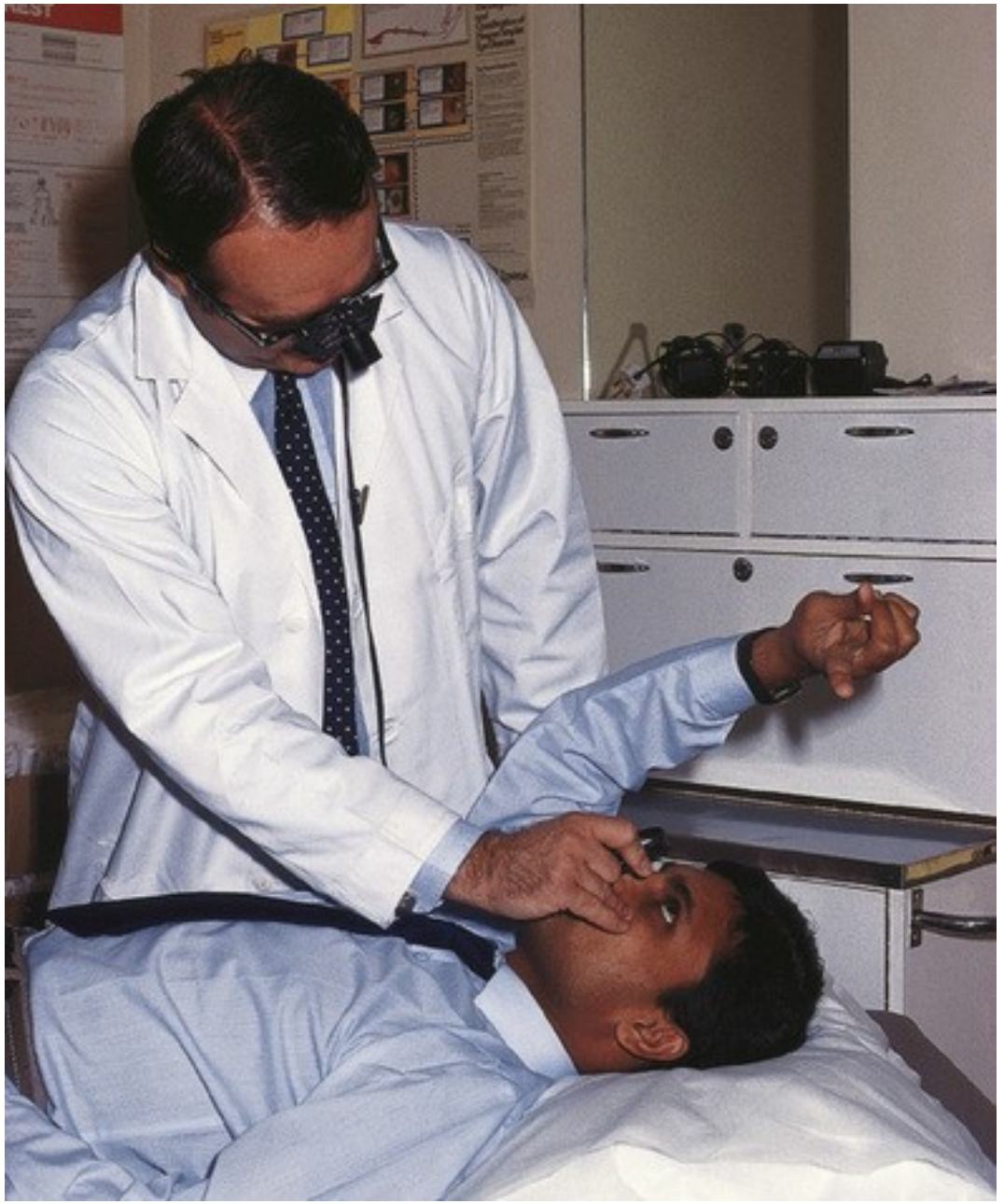
❑Assessing effectiveness of treatment (escalation if eye complications present)

❑Assessing possible toxicity of treatment (Hydroxychloroquine)

Examination of the structures of the fundus using an ophthalmoscope can reveal disease of the eye itself or may reveal an abnormality indicative of disease elsewhere in the body

-Direct (pupil dilation not necessary)

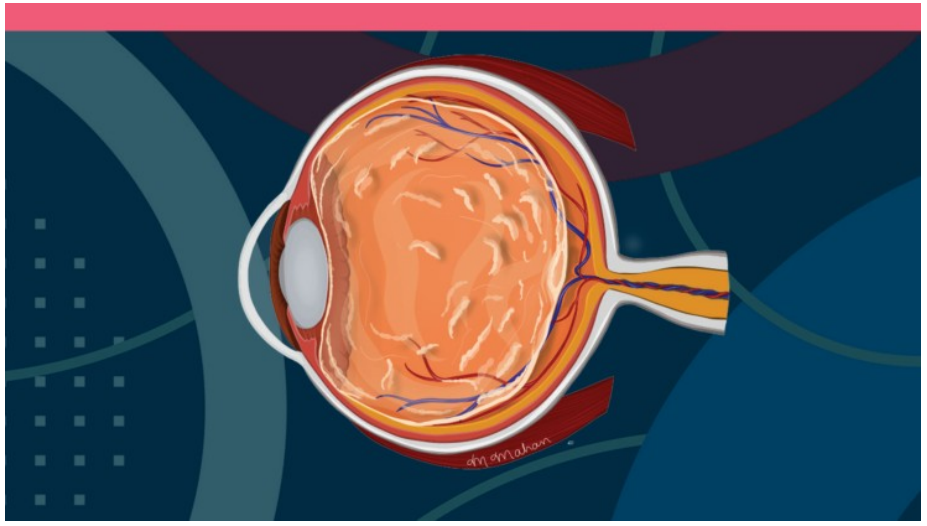
-Indirect (pupil dilation needed)

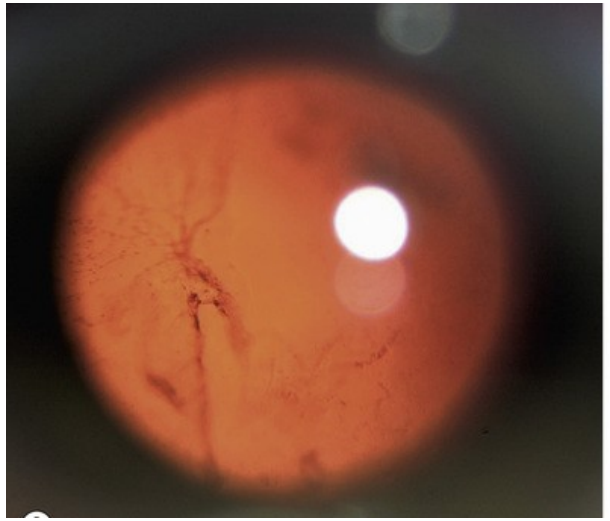


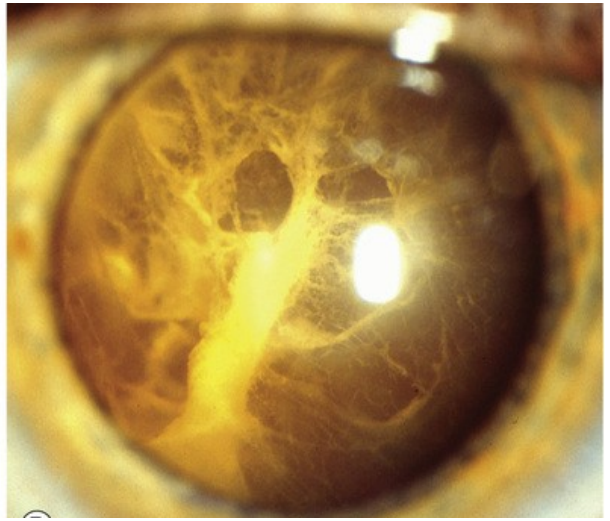
Structures examined with fundoscopy :

VITREOUS - transparent extracellular gel consisting of collagen, soluble proteins, hyaluronic acid and water. The total vitreous volume is approximately 4.0 ml

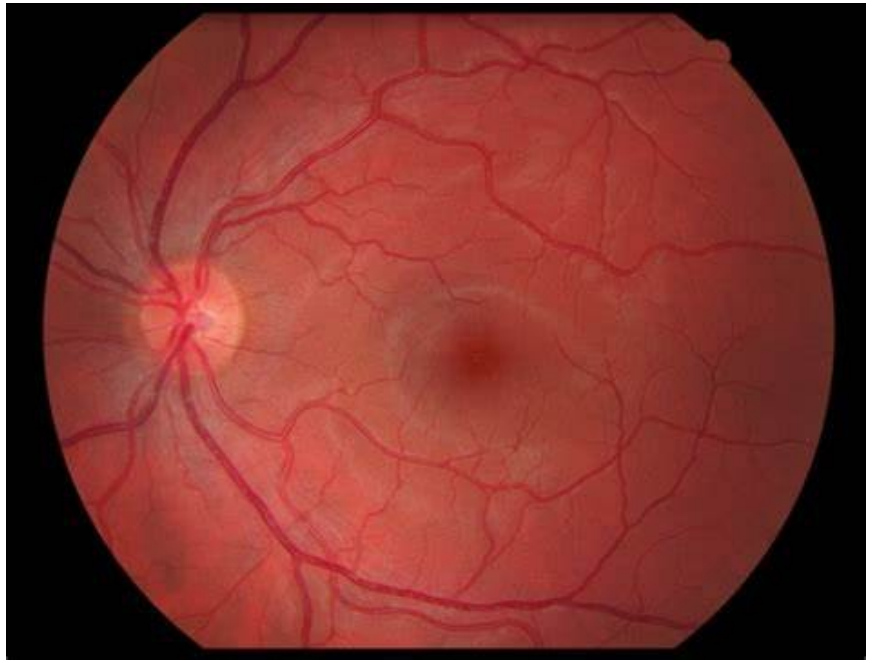
The vitreous provides structural support to the globe while allowing a clear and optically uniform path to the retina







POSTERIOR POLE



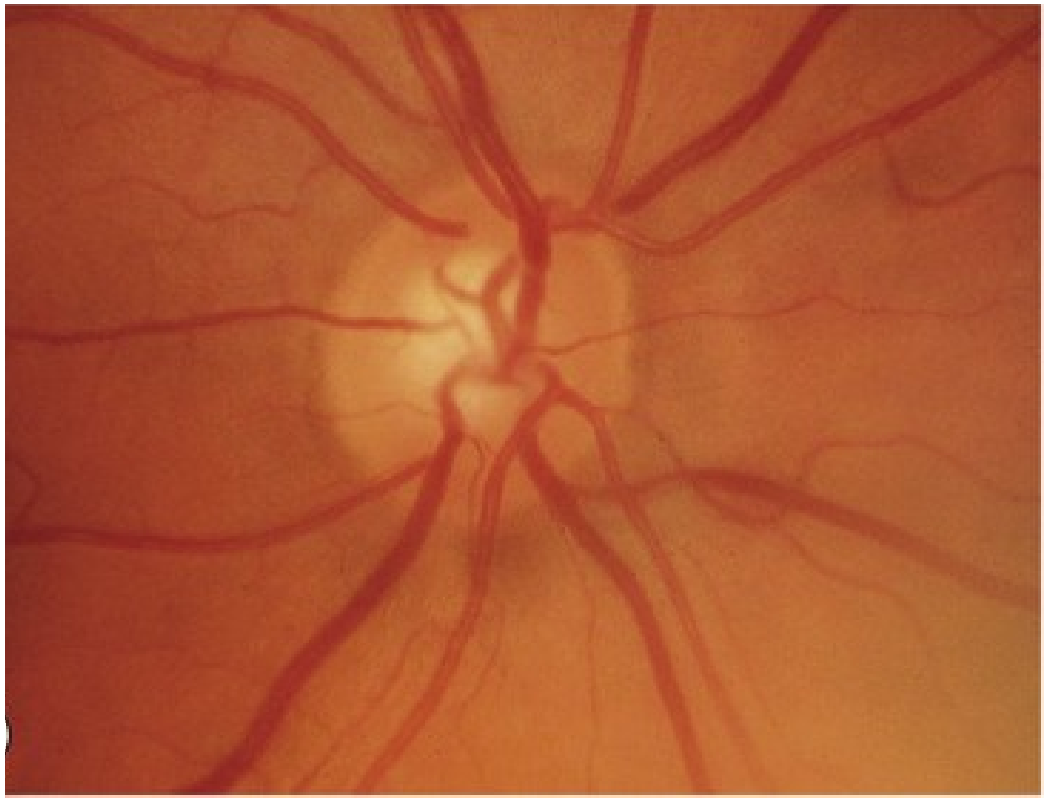
Optic disc

Major branches of the central retinal artery that emanate from the disc

Major branches of the central retinal vein collect at the disc

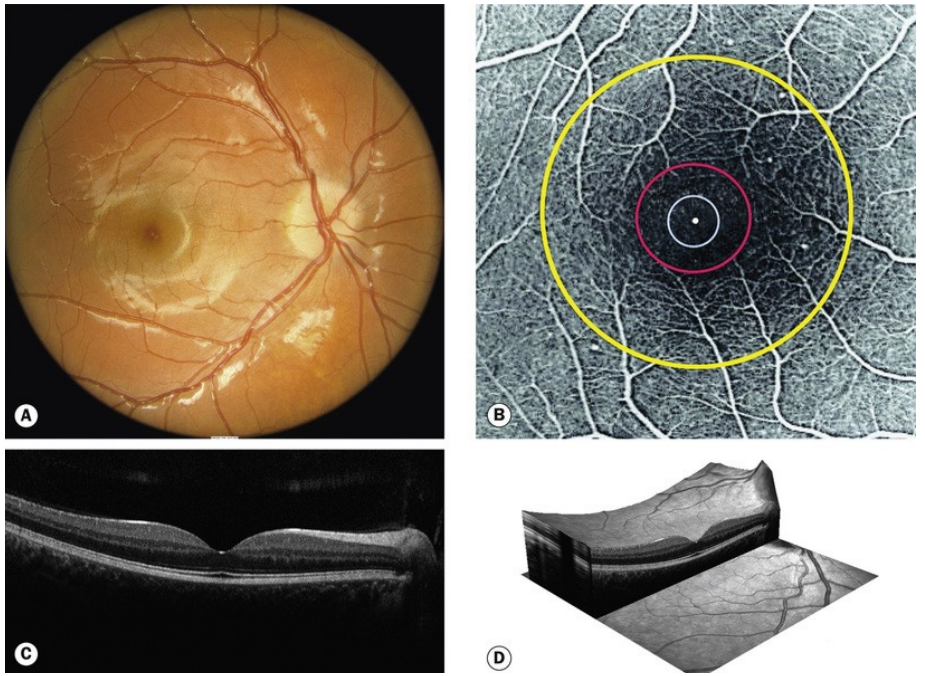
Macula-temporal to the disc-which appears darker ; no blood vessels are present in the center

OPTIC NERVE –The intraocular segment (optic nerve head) is the shortest, being 1 mm deep and approximately 1.5 mm in vertical diameter. The ophthalmoscopically visible portion is called the **optic disc**



MACULA - A round area at the posterior pole, lying inside the temporal vascular arcades

It measures between 5 and 6 mm in diameter and subserves the central 15–20° of the visual field



RETINAL VESSELS

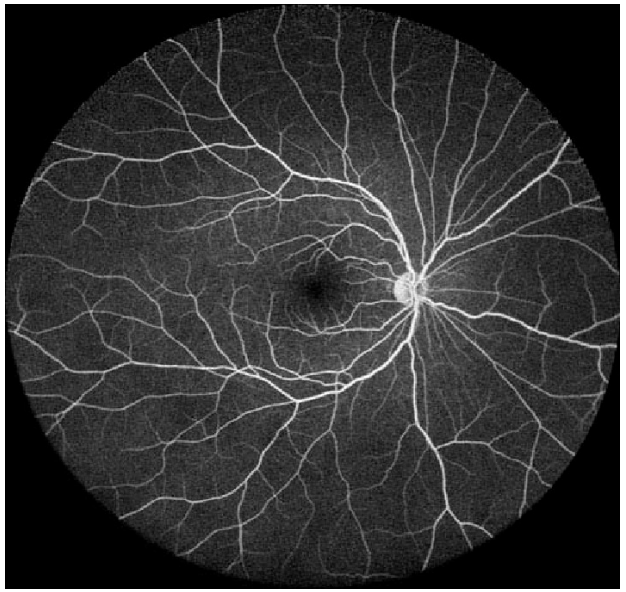
Central retinal artery, an end artery , enters the optic nerve approximately 1 cm behind the globe

Retinal arterioles that arise from the central retinal artery

Venous system

Retinal venules and veins drain blood from the capillaries

Their diameter gradually enlarges as they pass posteriorly towards the **central retinal vein**

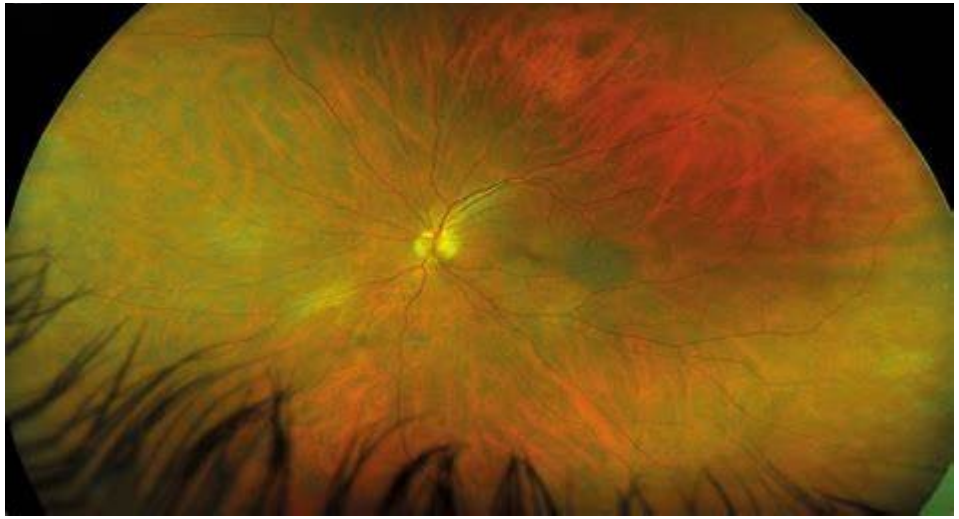


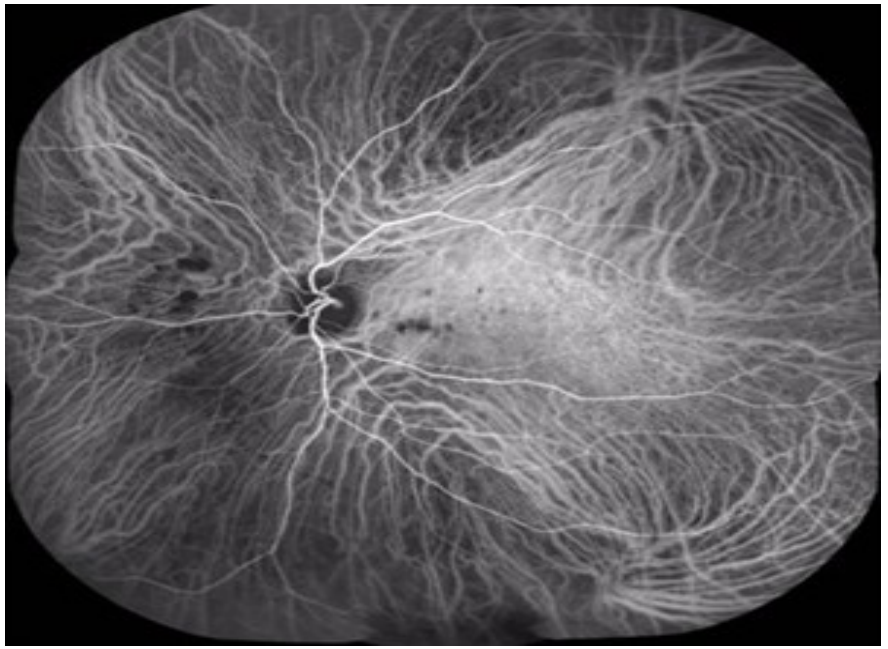
CHOROID

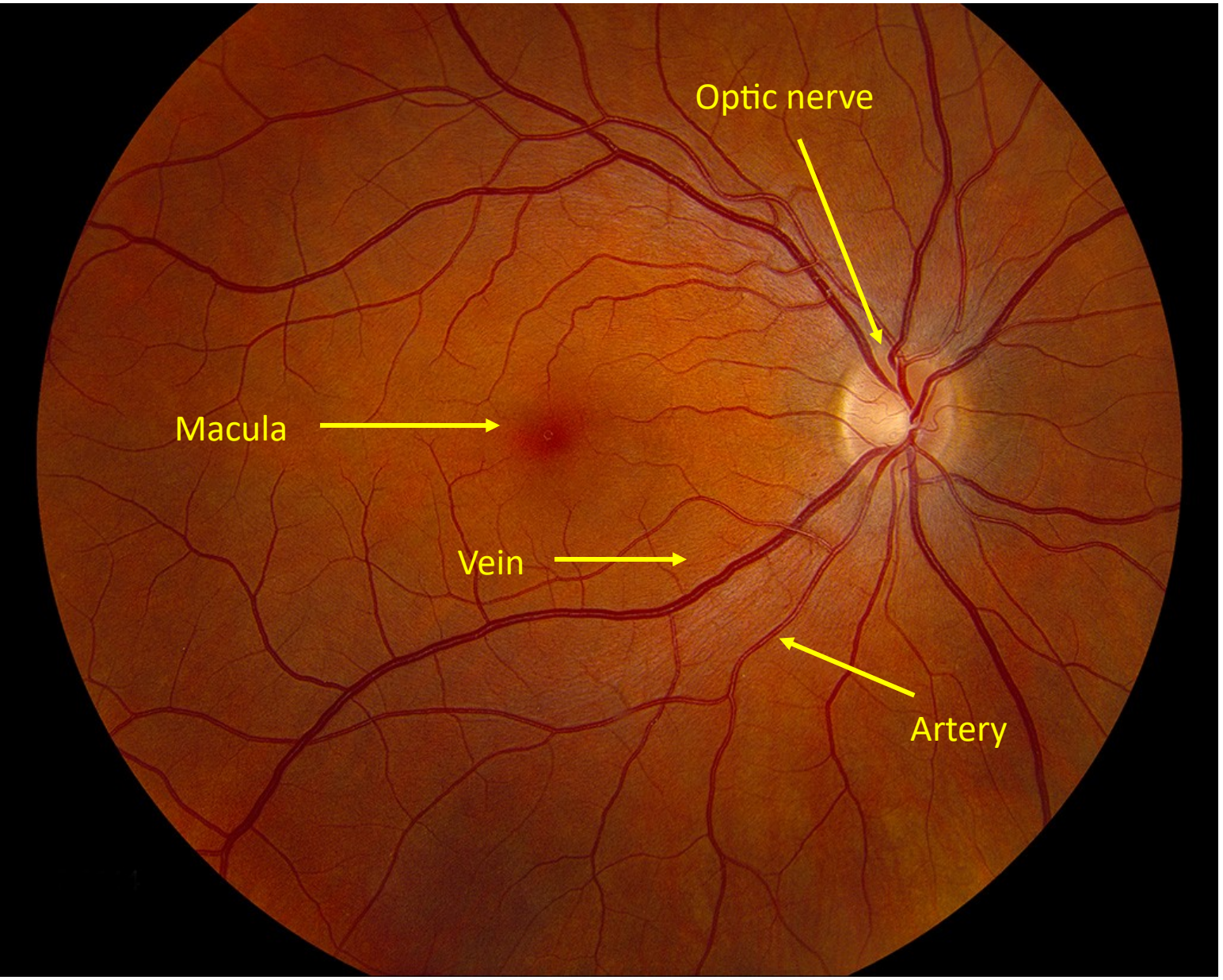
The choroid is part of the uvea, and it contains blood vessels and connective tissue

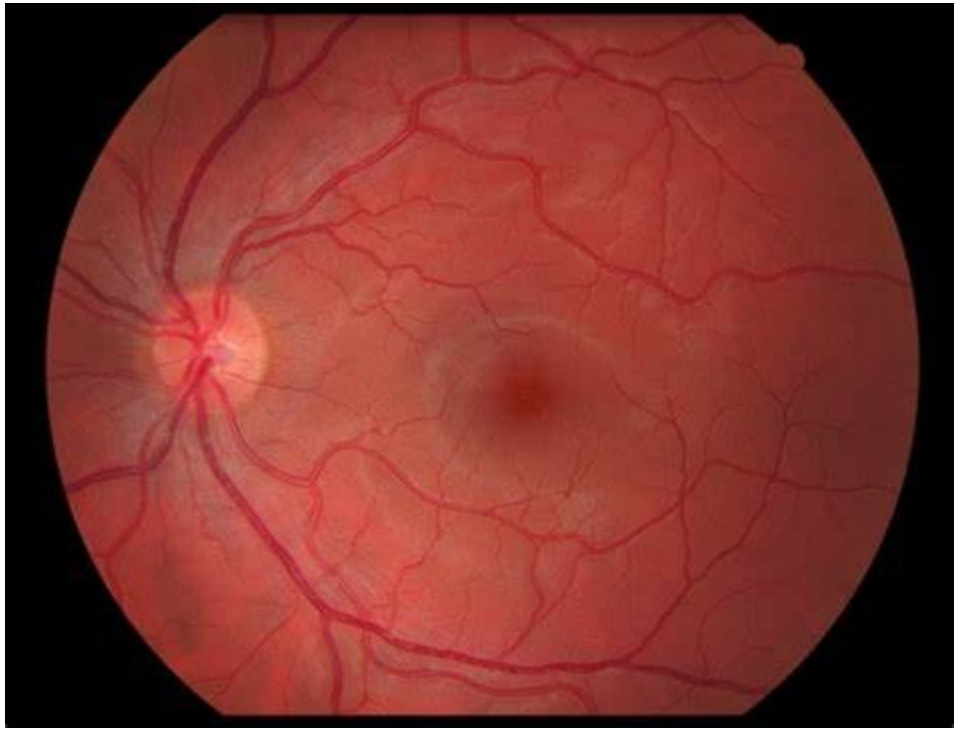
The choroid is a highly vascular tissue, per unit weight, the choroid is the tissue with the highest blood flow in the body

Due to the vascular nature of the choroid, potentially any disease that affects systemic vasculature could potentially affect choroid health









Normal retina

A patient suspected for autoimmune disorder may have :

VITRITIS which may be asymptomatic or patient may complain for

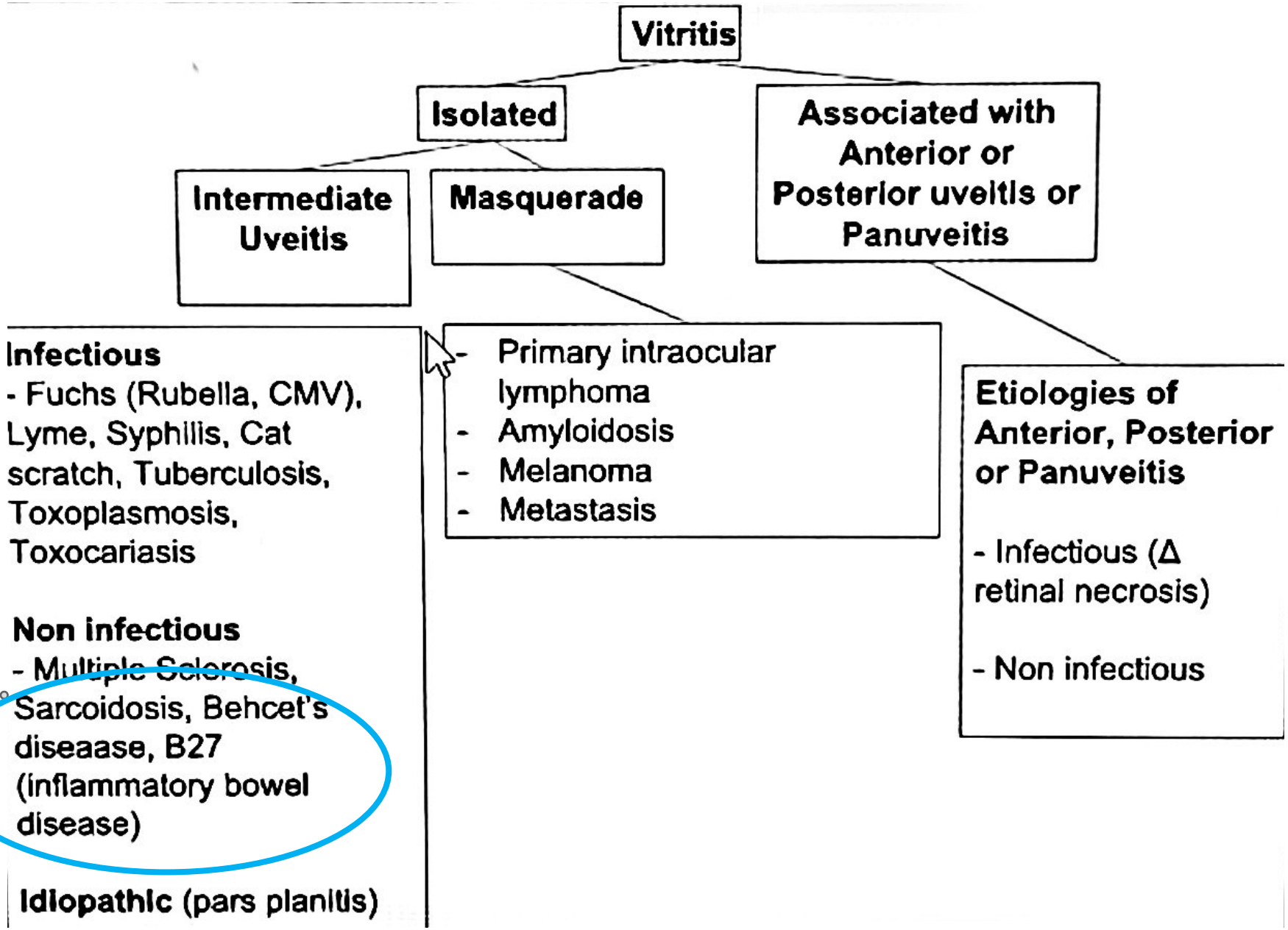
- floaters
- blurring of vision which may change with posture or eye movements
- reduced vision

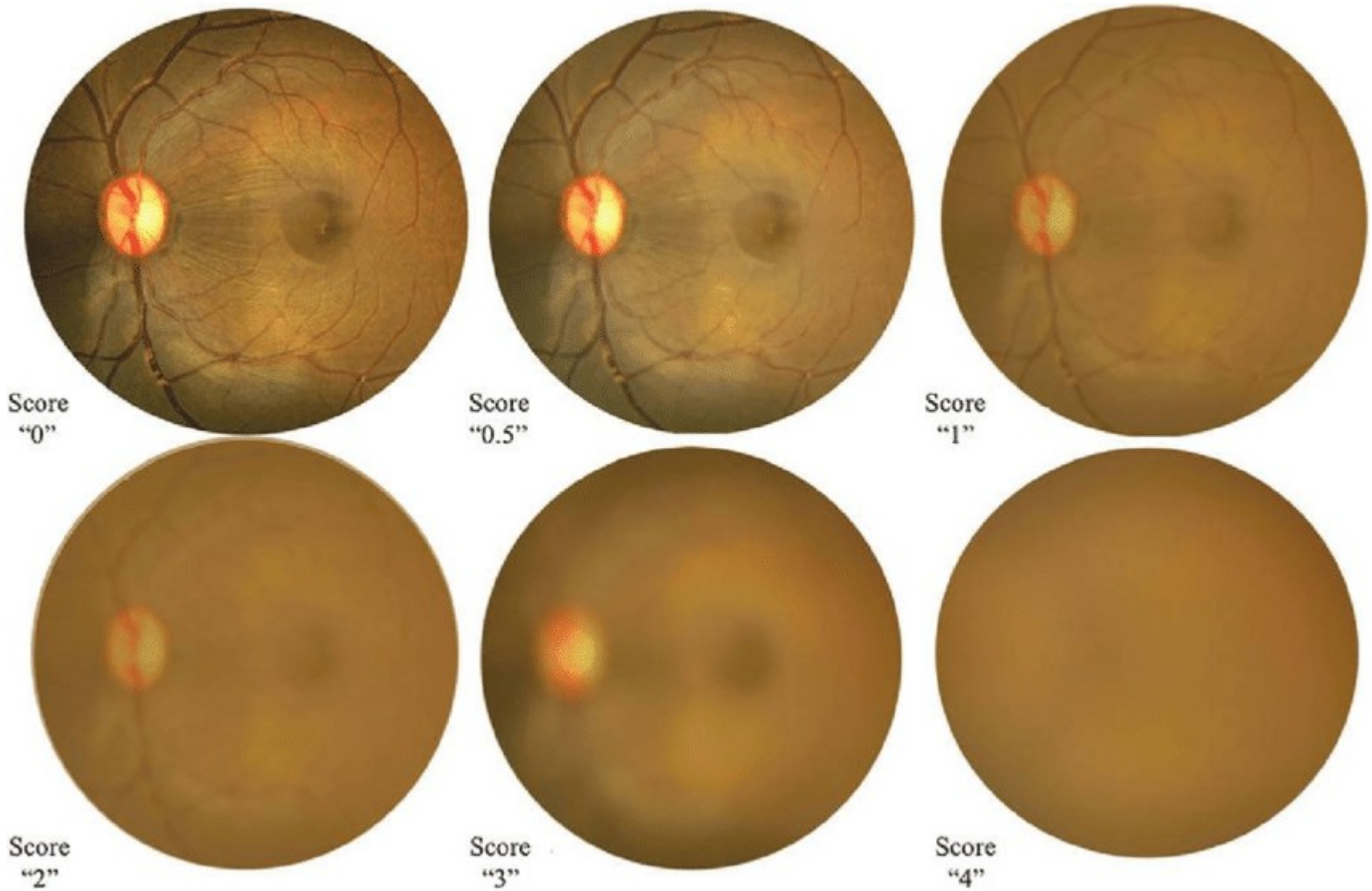
In intermediate uveitis , vitritis is the predominant site of inflammation

Cellular infiltration of the vitreous is causing haze and loss of transparency and is estimated with indirect ophthalmoscopy :

Table 5: Grading of vitreous haze (Nussenblatt 1985 / National Eye Institute).

Score	Description	Clinical findings
0	Nil	None
0.5+	Trace	
1	Minimal	Posterior pole clearly visible
2	Mild	Posterior pole details slightly hazy
3	Moderate	Posterior pole details very hazy
4	Marked	Posterior pole details barely visible
5	Severe	Fundal details not visible


Vitritis
Isolated
Associated with Anterior or Posterior uveitis or Panuveitis
Intermediate Uveitis
Masquerade
Infectious
- Fuchs (Rubella, CMV), Lyme, Syphilis, Cat scratch, Tuberculosis, Toxoplasmosis, Toxocariasis
Non infectious
- Multiple Sclerosis, Sarcoidosis, Behcet's diseaase, B27 (inflammatory bowel disease)
Idiopathic (pars planitis)
- Primary intraocular lymphoma
- Amyloidosis
- Melanoma
- Metastasis
Etiologies of Anterior, Posterior or Panuveitis
- Infectious (Δ retinal necrosis)
- Non infectious


Score
"0"
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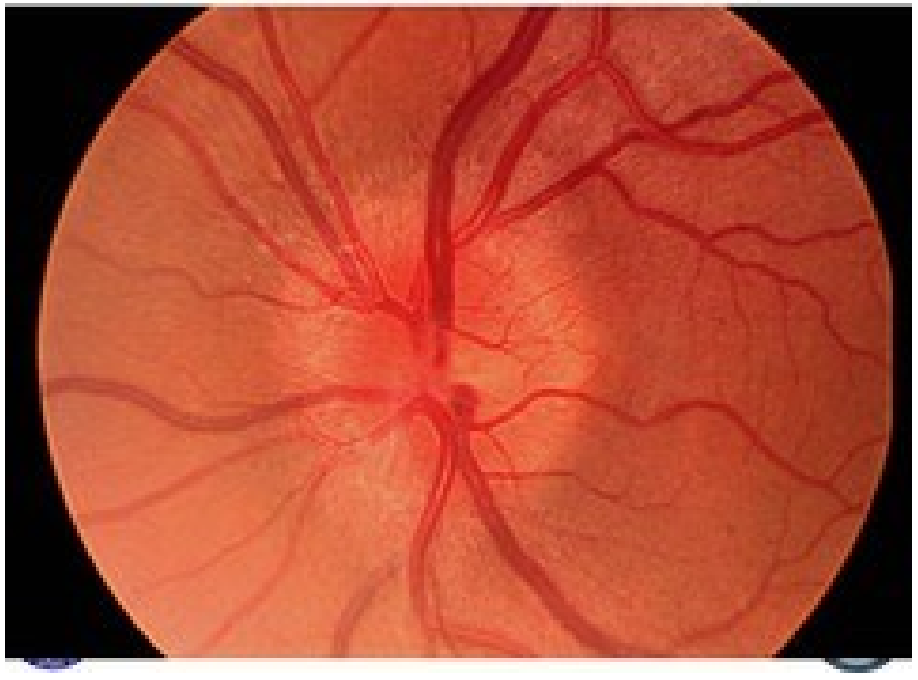
OPTIC NERVE PATHOLOGICAL FINDINGS



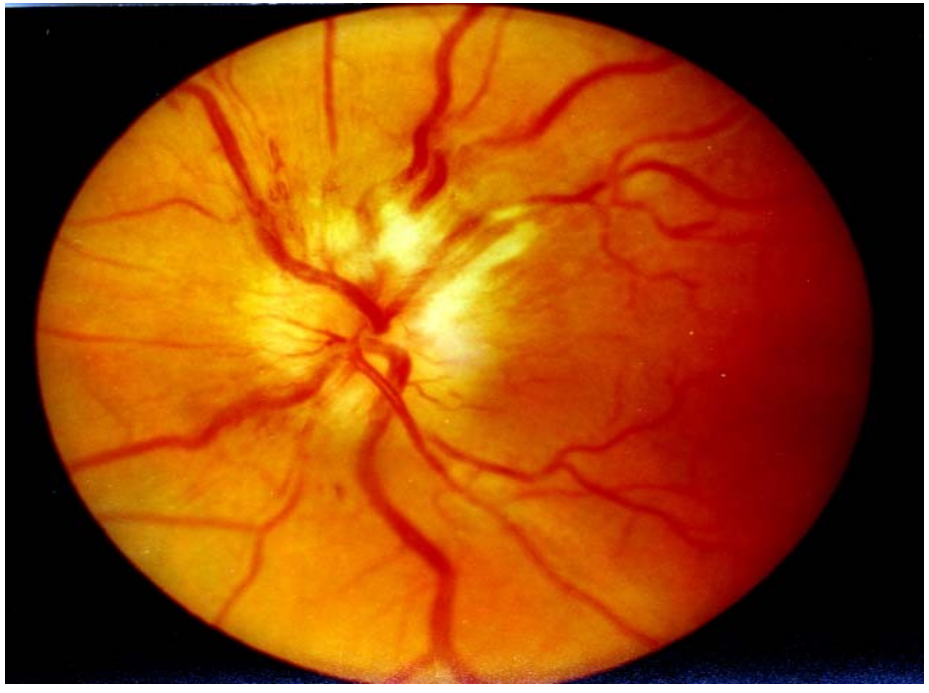
- **Disk hyperemia**

Disk hyperemia may persist even in an eye with little clinically active inflammation elsewhere.

- **Papillitis**

-Demyelinating (most common)

-Parainfectious (post viral infection or immunization)



-Infectious (sinus-related or associated with cat-scratch disease, syphilis, Lyme disease, cryptococcal meningitis and herpes zoster)

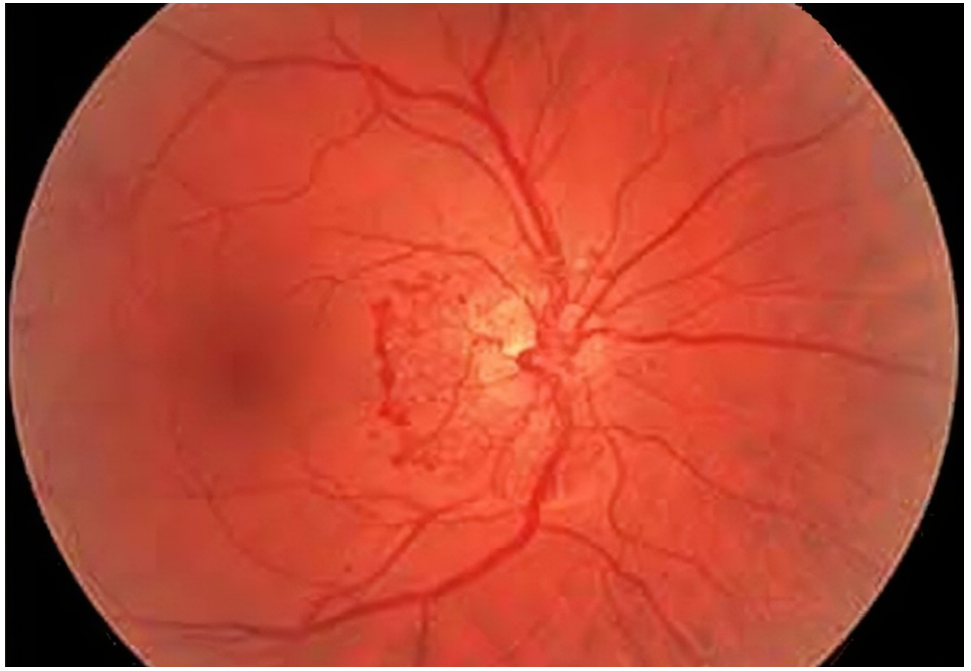
-Non-infectious (sarcoidosis, systemic lupus erythematosus, polyarteritis nodosa and other vasculitides or optic neuropathies – arteritic ishaemic optic neuropathy)

- **<u>Papilledema</u>**

 - bilateral swelling of the optic nerve head secondary to raised intracranial pressure (ICP)

- **<u>Neovascularization</u>** of the optic disc

 (a common finding in uveitis with retinal vasculitis and can regress with anti-inflammatory therapy)

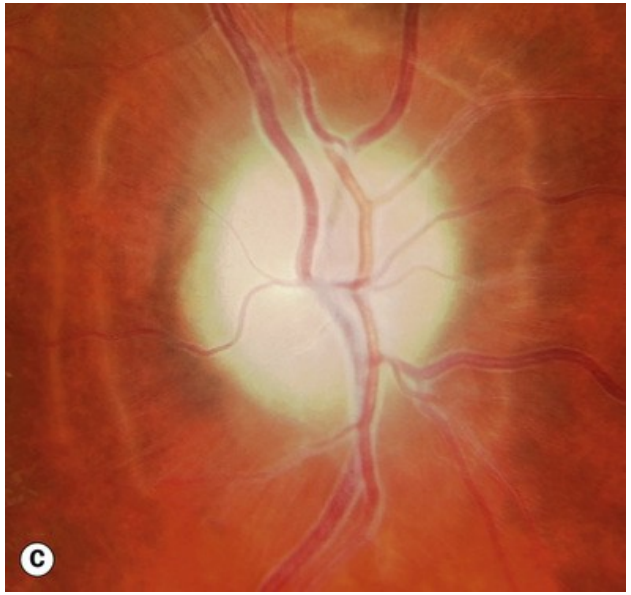


- **<u>Optic atrophy</u>**

- may develop in the presence of ocular inflammation or after diffuse loss of retinal tissue

-flat white disc with clearly delineated margins

-reduction in the number of small blood vessels on the disc surface



- **Optic nerve granuloma**

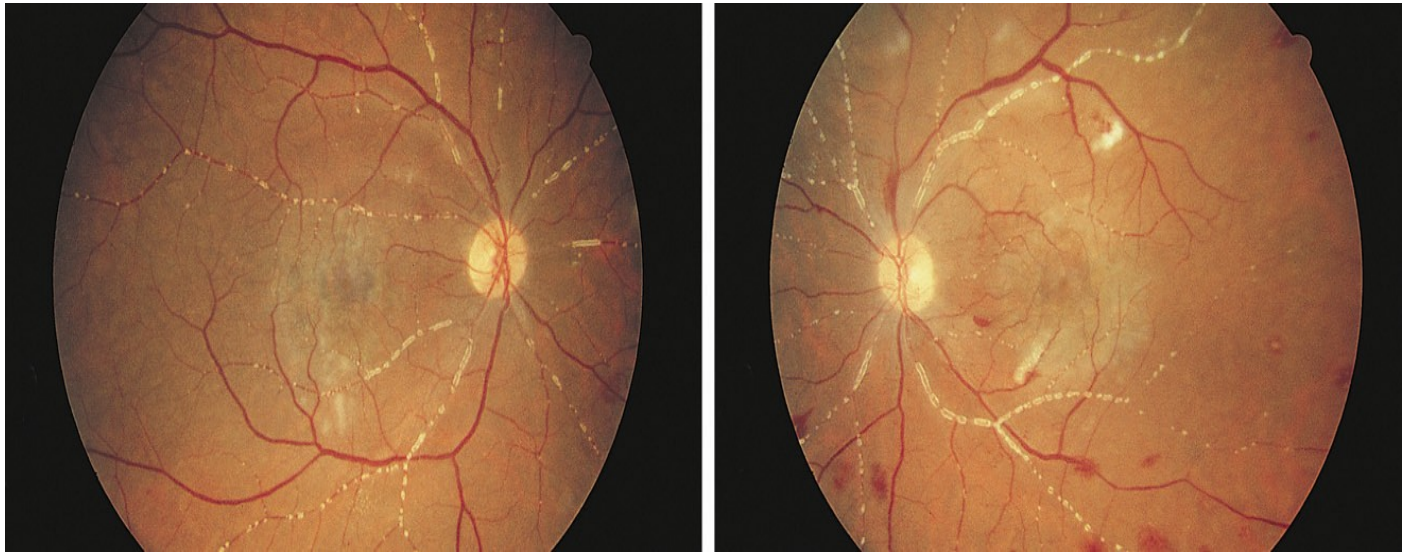
- Granulomas may impinge on the optic nerve and optic disc in diseases, such as sarcoidosis

RETINA & CHOROID

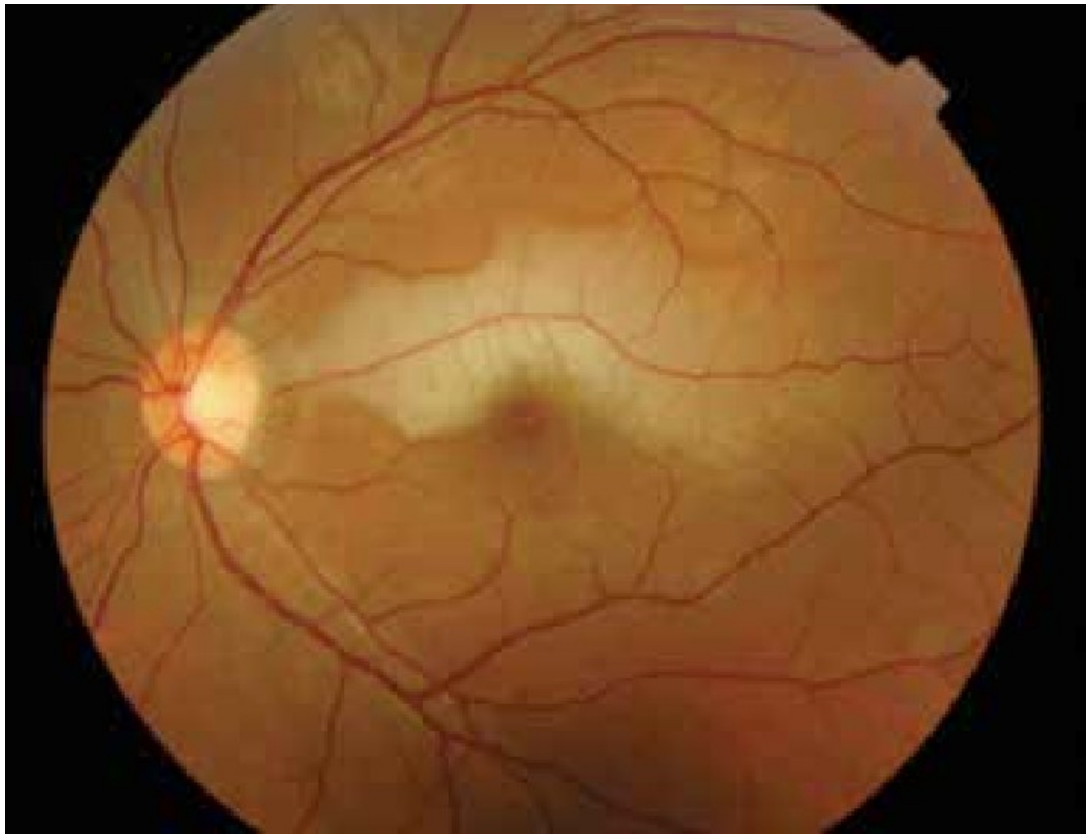
- **<u>Retinal vasculitis</u>**

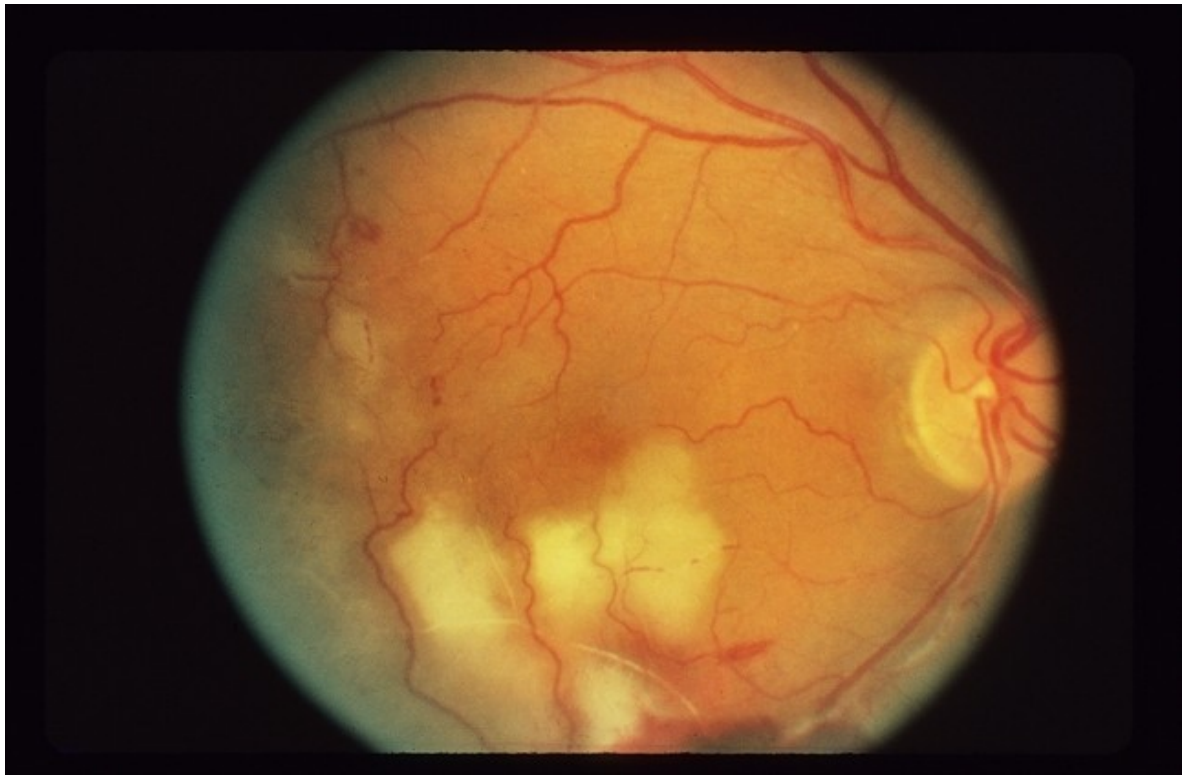
- retinal vascular alterations are common in intermediate and posterior uveitis

- <u>vascular sheathing</u> of the arteries or veins (caused by infiltration of inflammatory cells around the vessels)

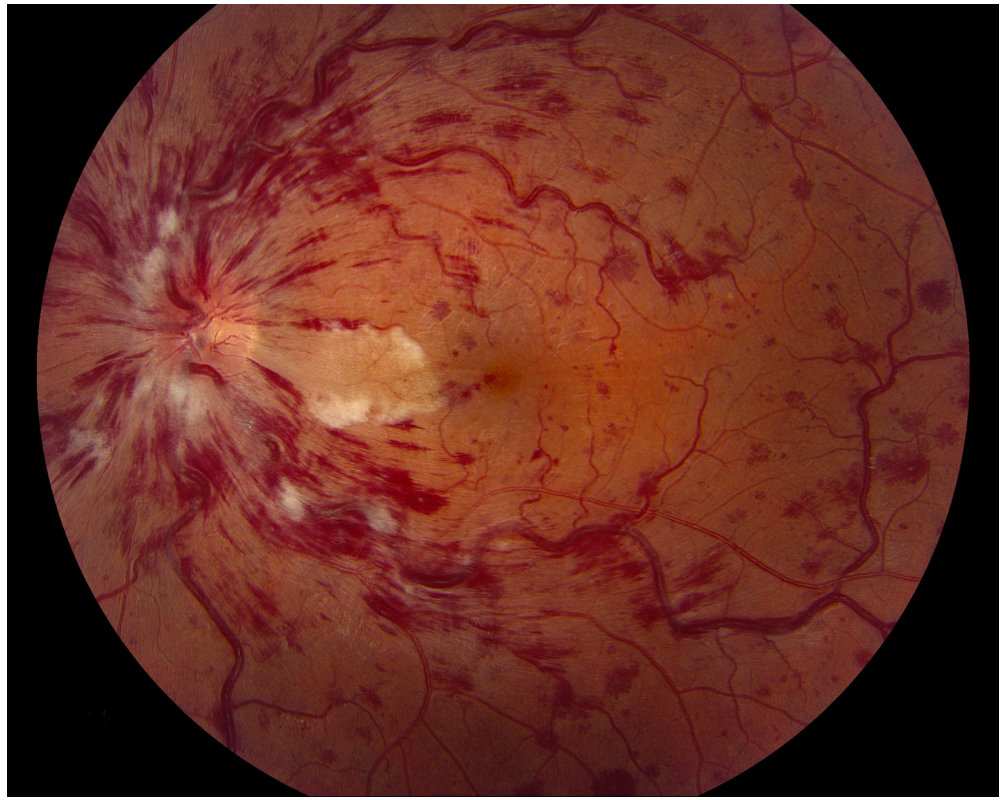


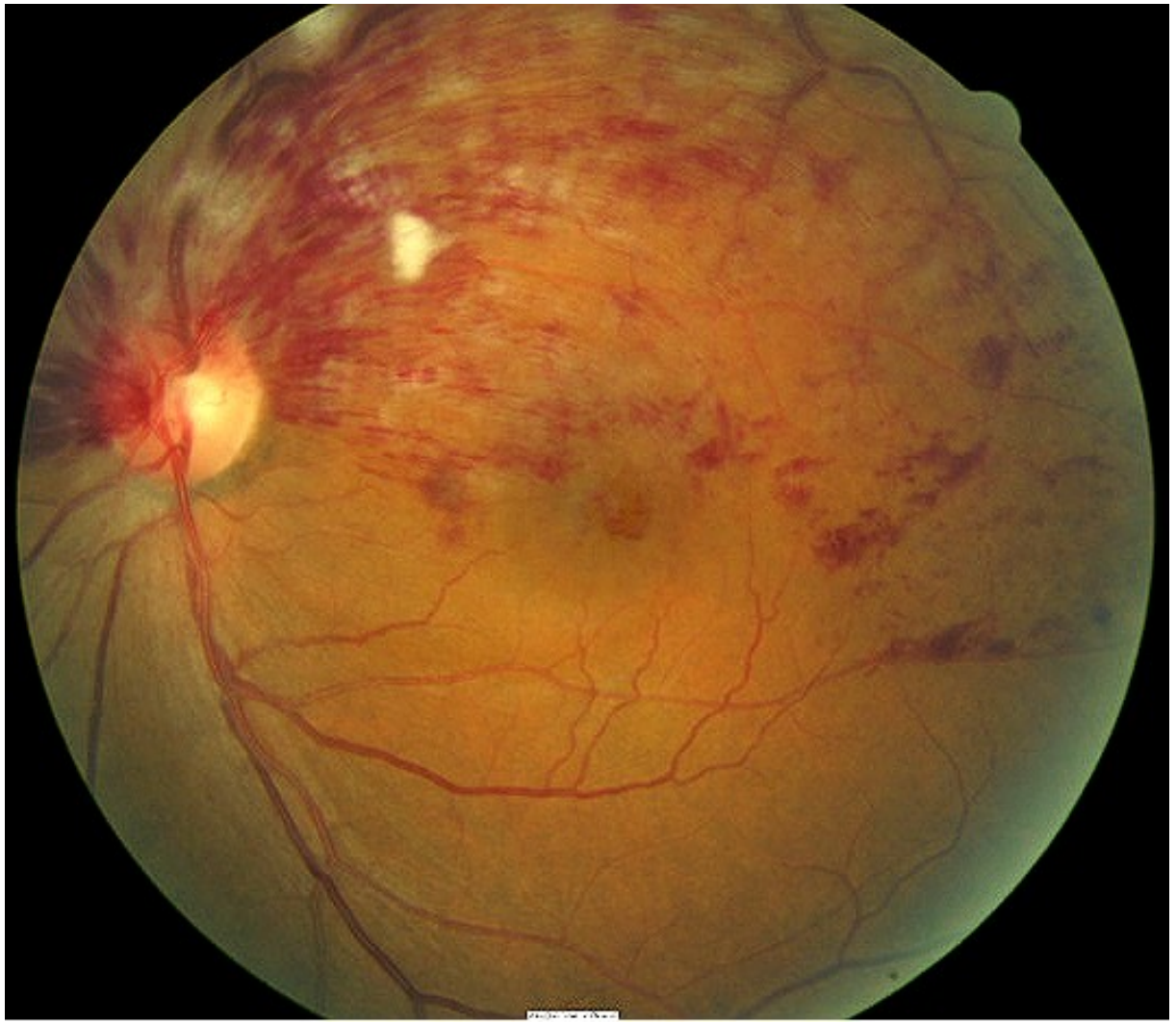
- retinal edema (whitish appearance of the retina usually in acute vascular occlusion)

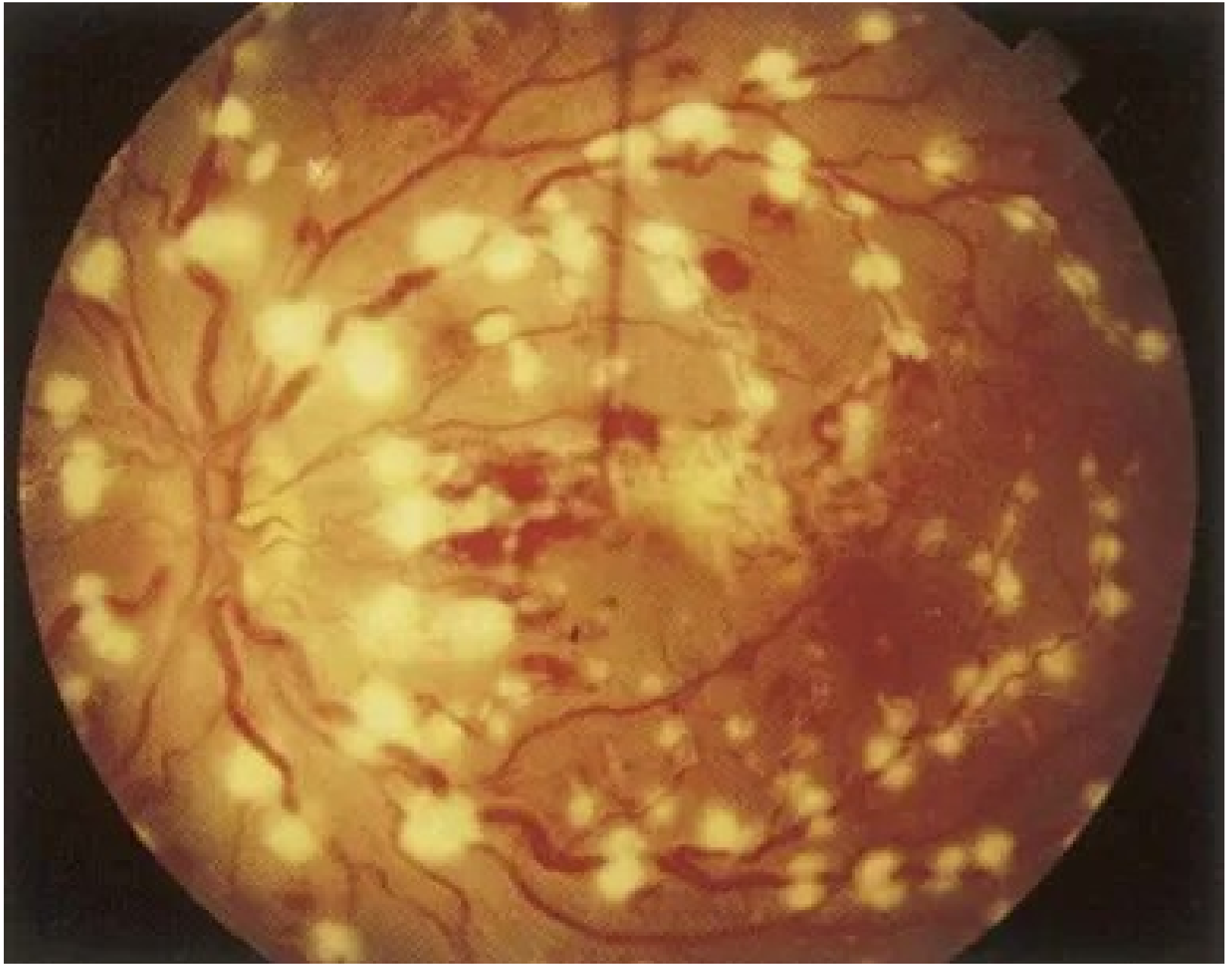


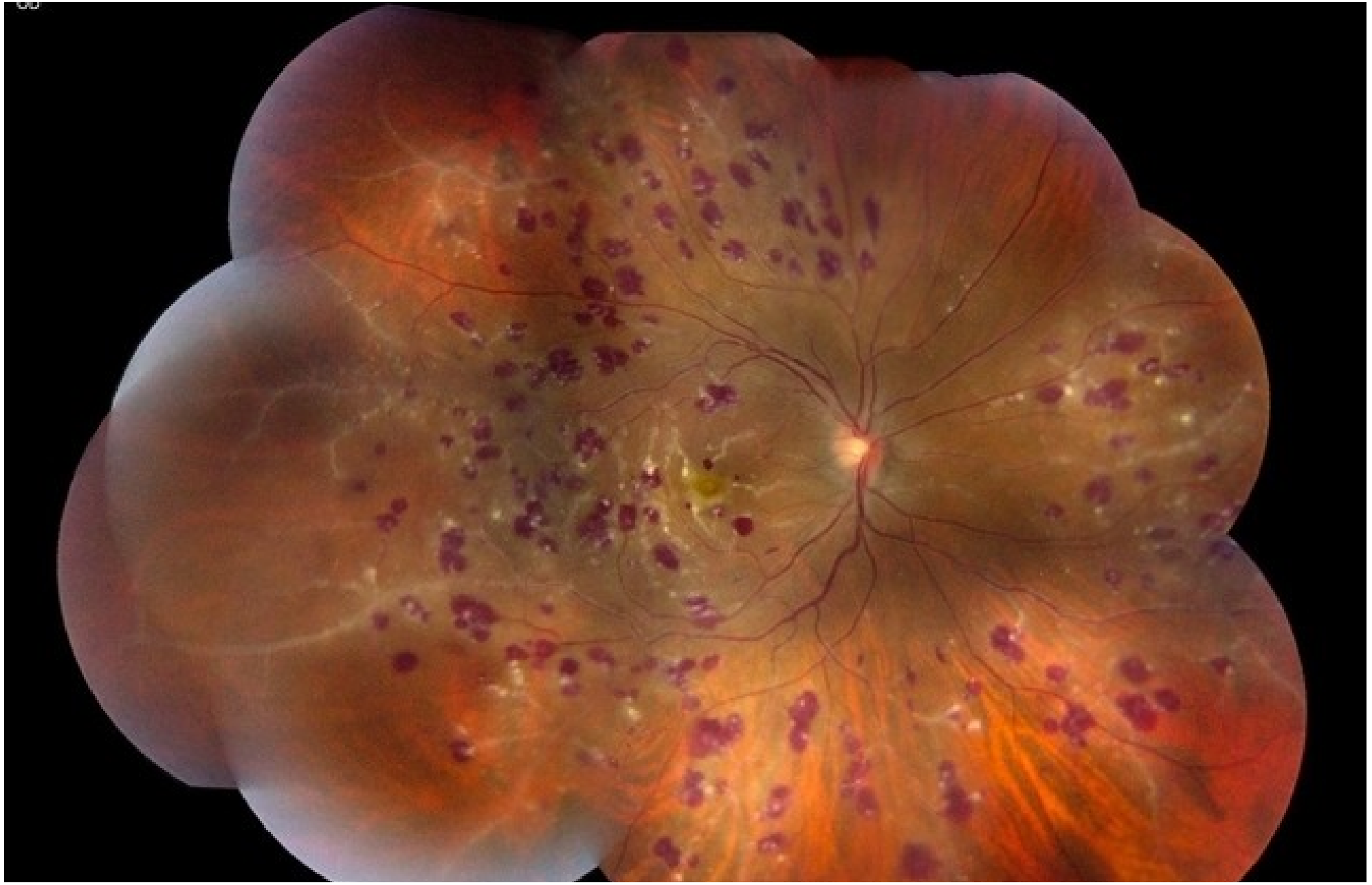


- retinal hemorrhages and cotton-wool spots (frequently accompany retinal vasculitis, presumably related to the retinal ischemia produced by the inflammation)

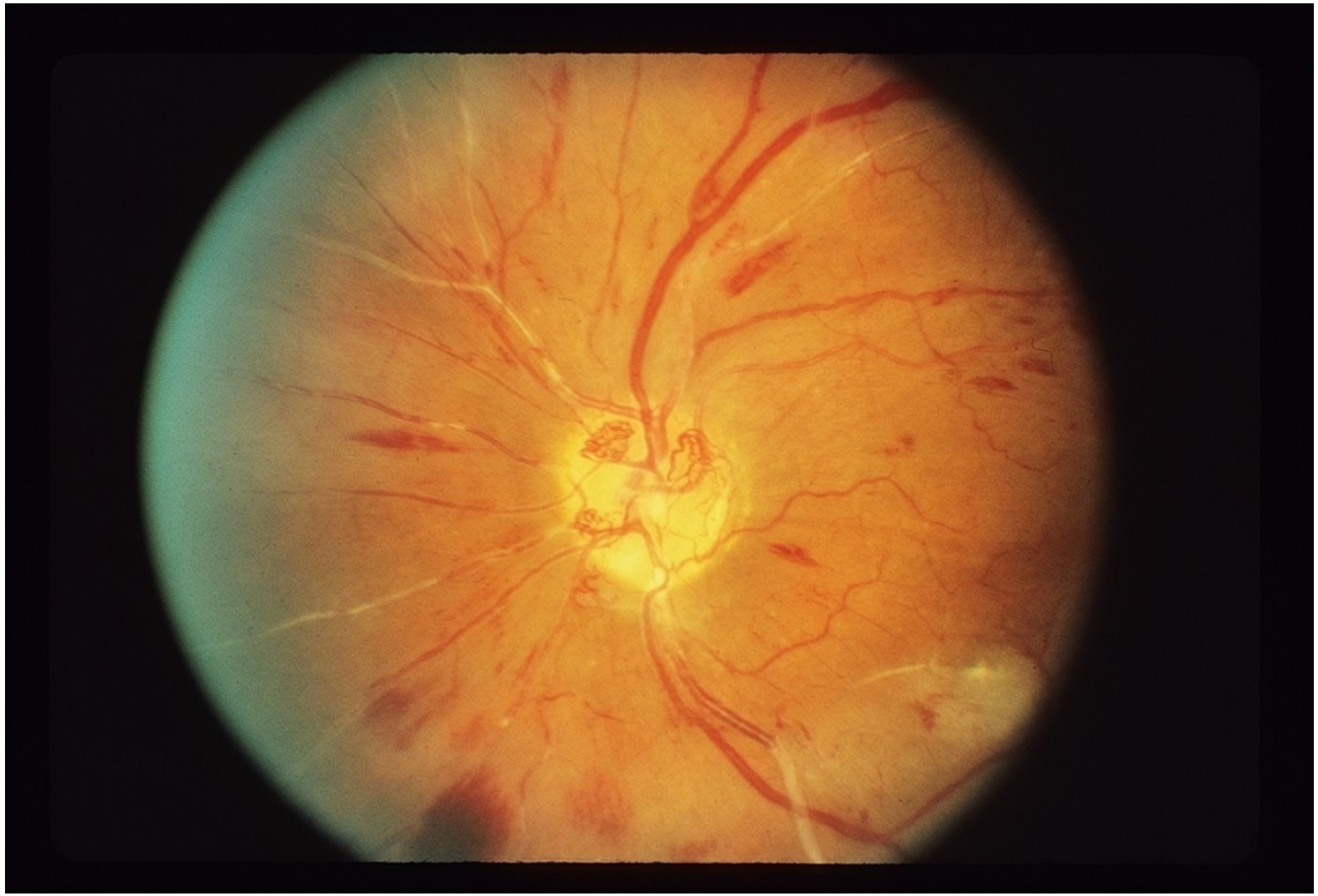


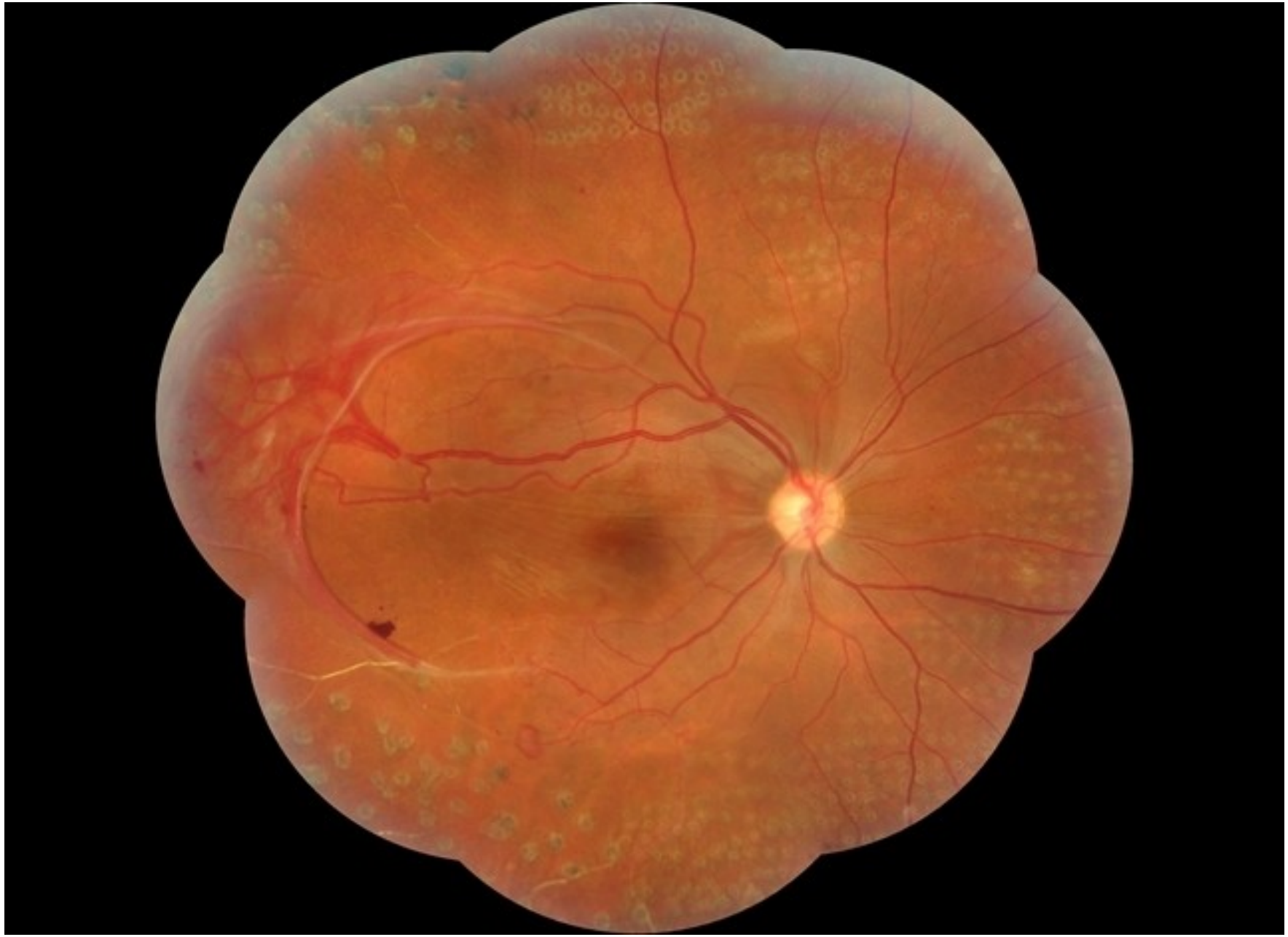




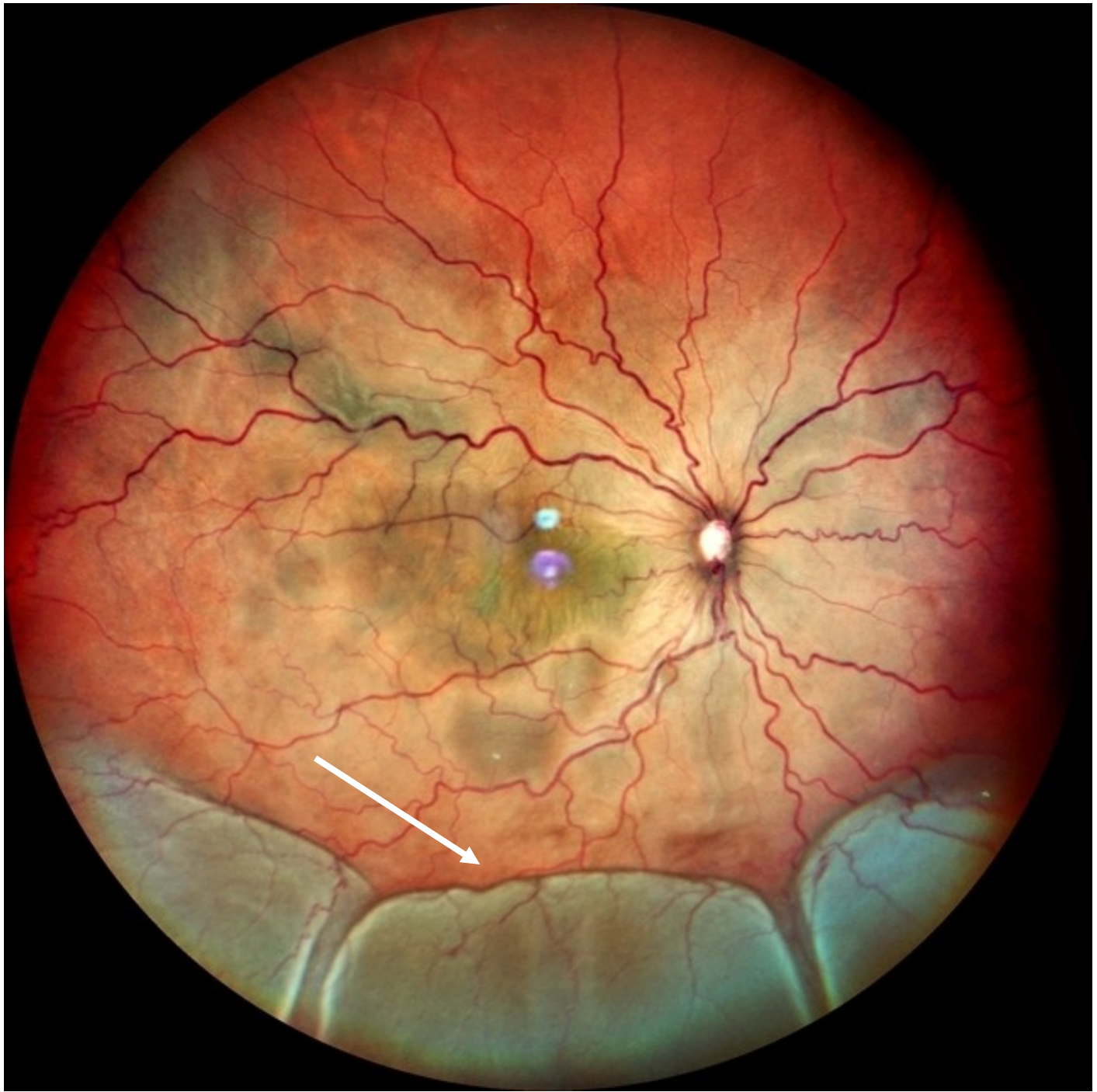


- <u>retinal neovascularization</u>
(in occlusive retinal vascular disease or result of inflammatory stimuli in some diseases ;
VKH,Behcet etc)



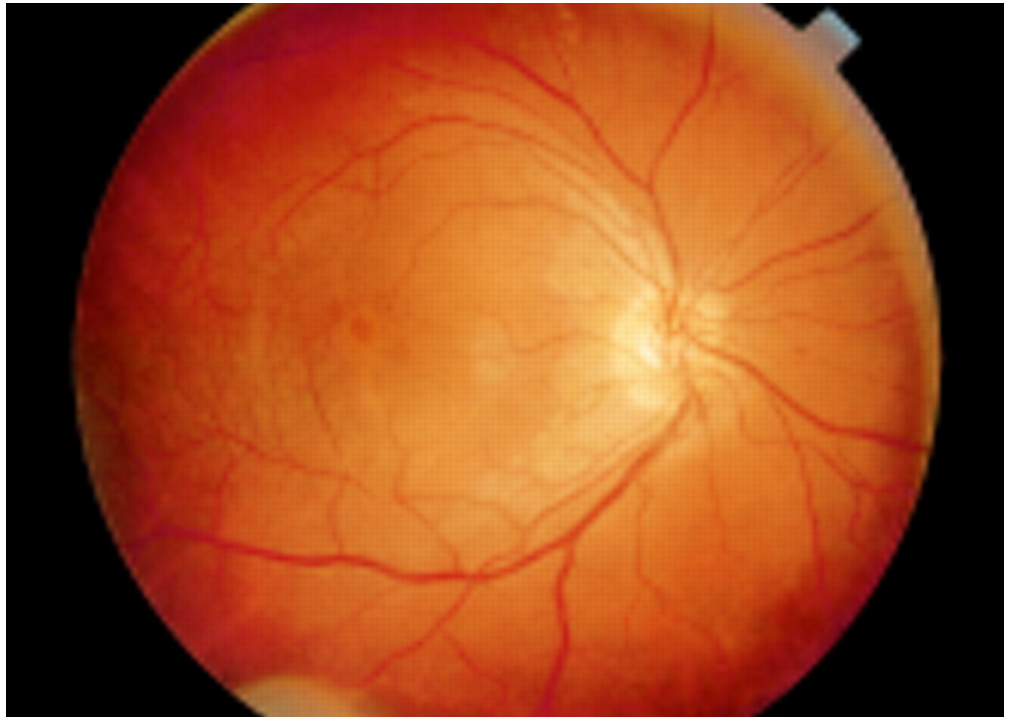


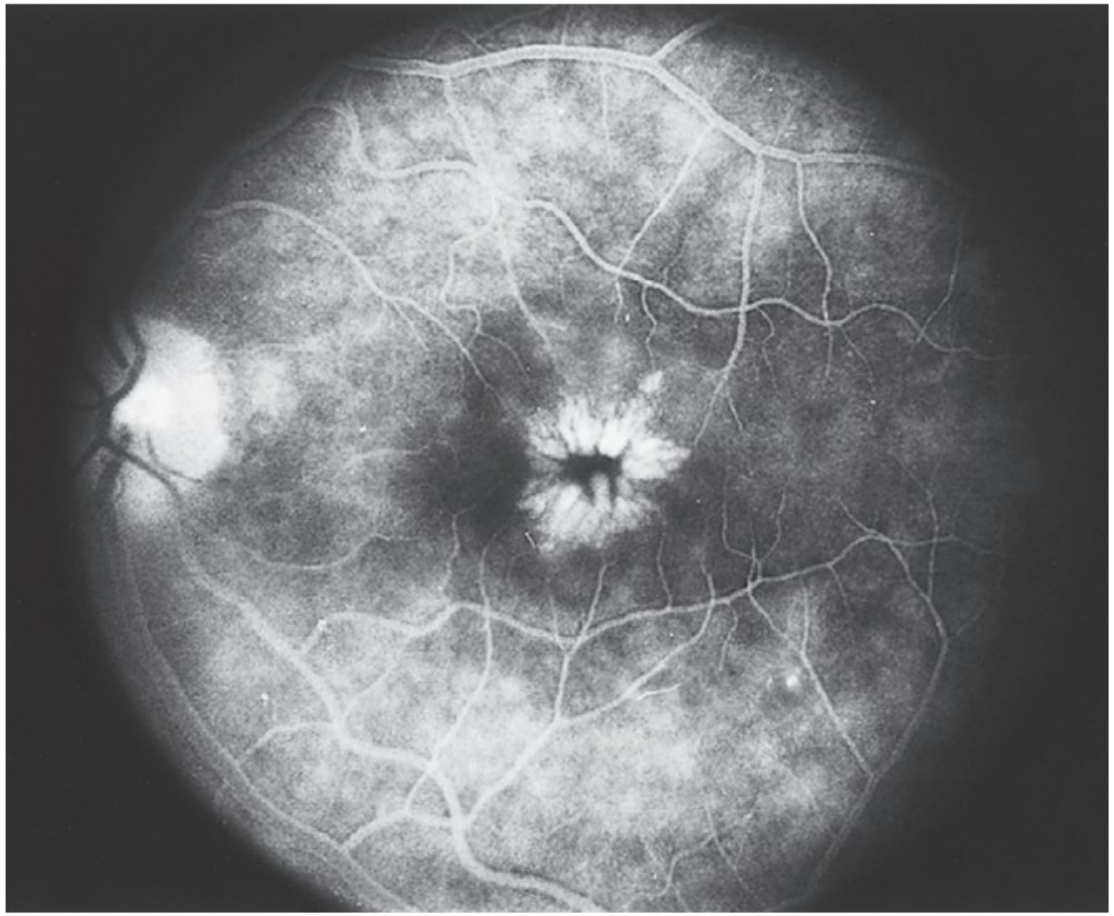
retinal detachment (exudative – VKH disease)

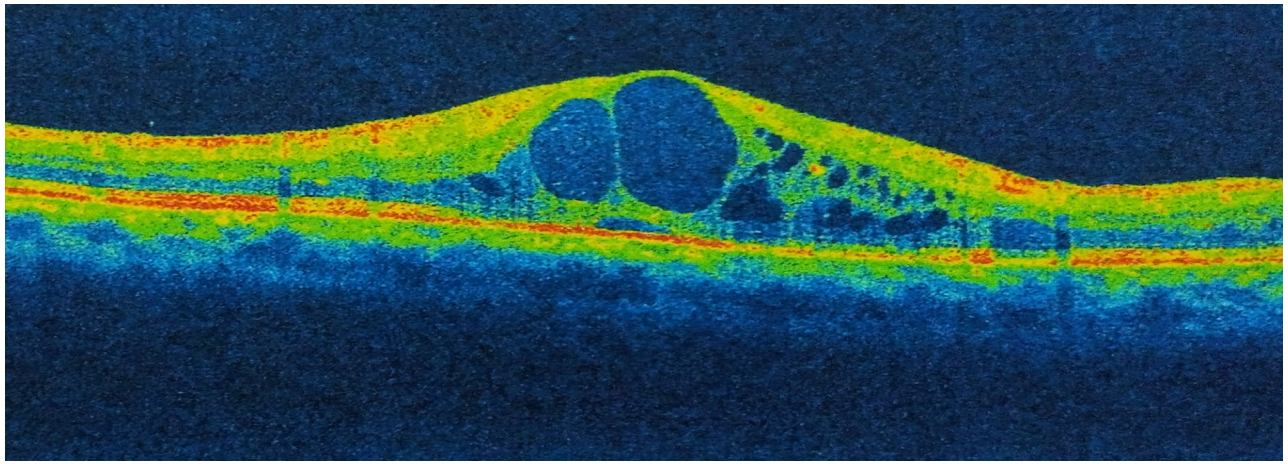


- <u>macular oedema</u>

cystoid macular edema is a common retinal finding in patients with uveitis



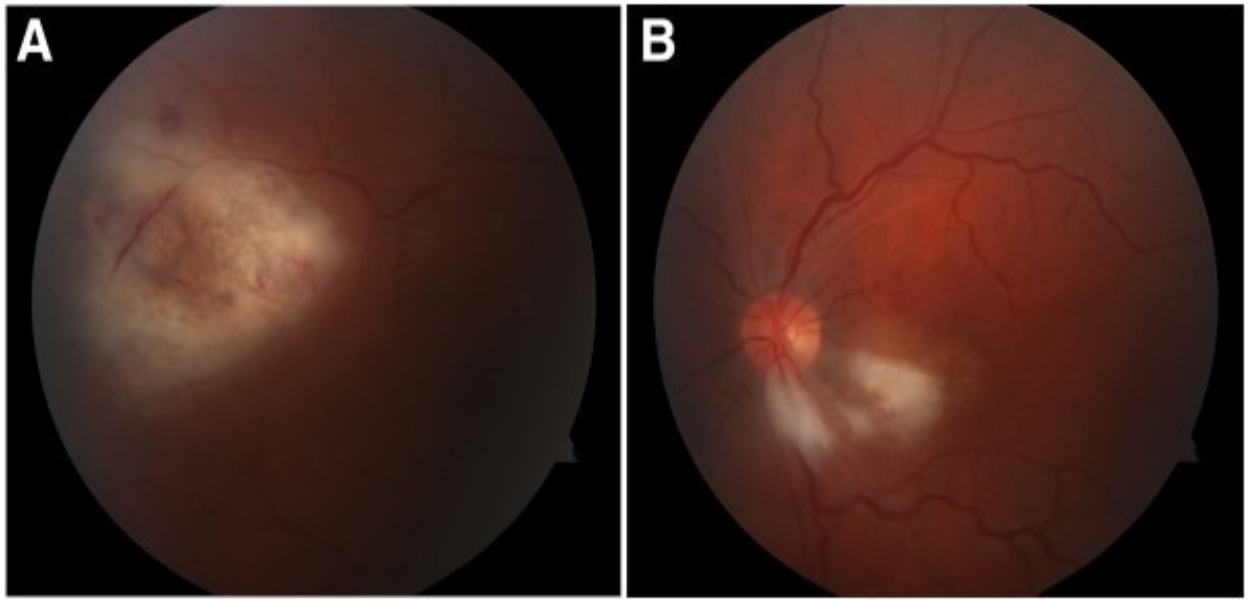




Fluorescein angiography can document the presence of macular edema more objectively and optical coherence tomography (OCT) is more frequently used to document the extent of macular edema

- <u>retinitis</u>

- cellular retinal infiltrates can be observed as **white areas** frequently have fuzzy edges, overlying vitreal cells, and surrounding retinal oedema



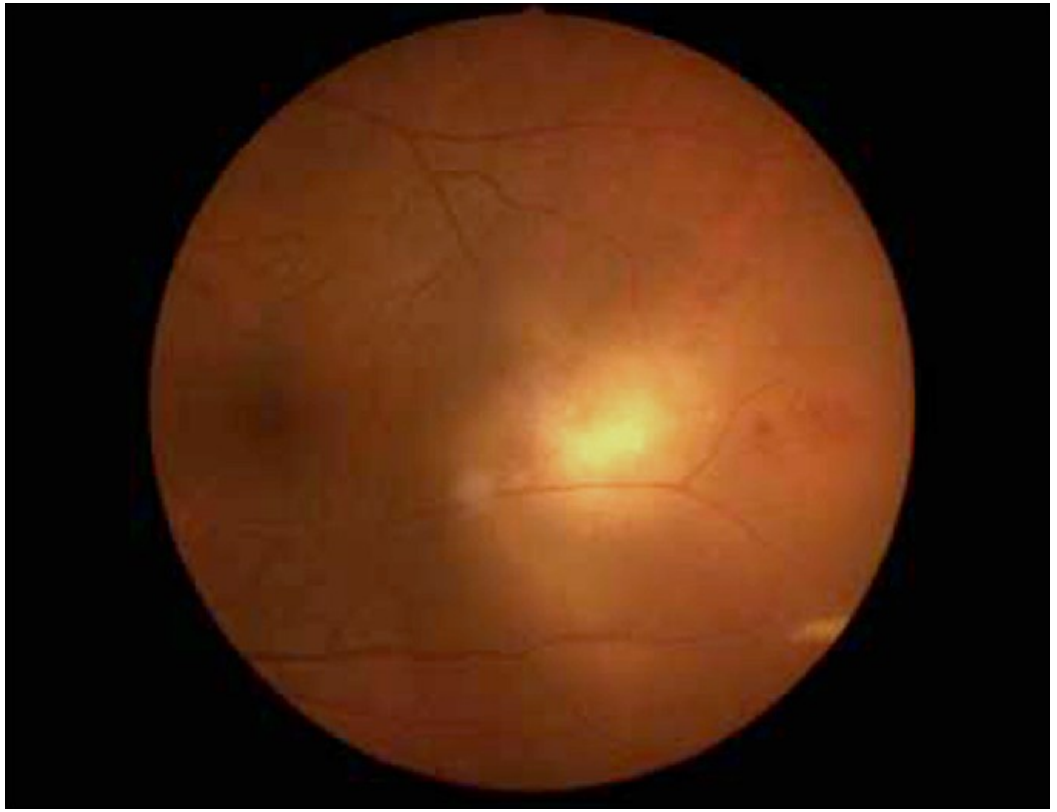
Noninfective Causes of Retinitis

- Behcet disease (occlusive vasculitis)
- Sarcoidosis
- Other :

-Systemic lupus erythematosus (SLE)

-Churg–Strauss syndrome

-Granulomatosis with polyangiitis



Chorioretinal infiltrates

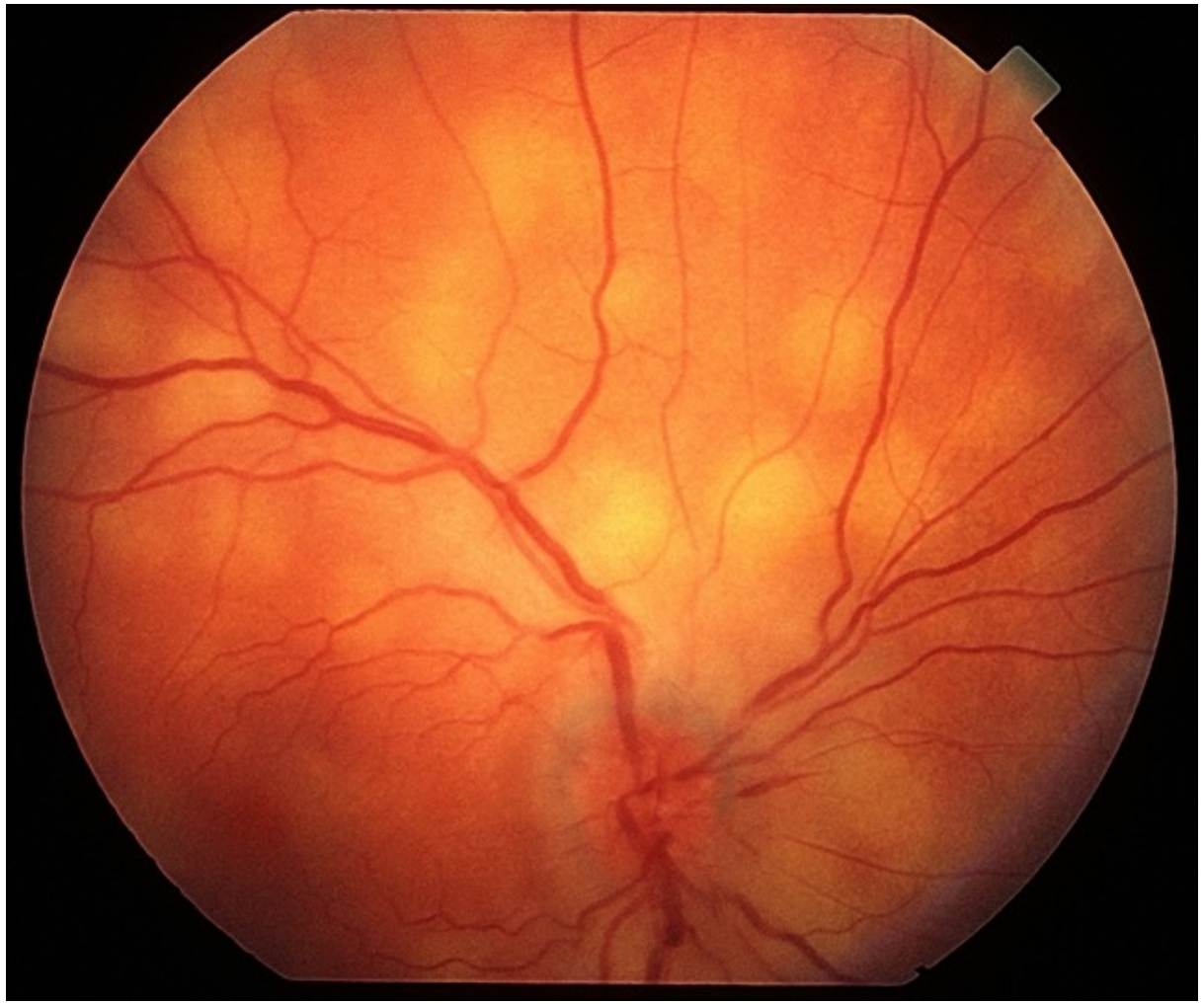
Cellular infiltrates within the choroid/outer retina

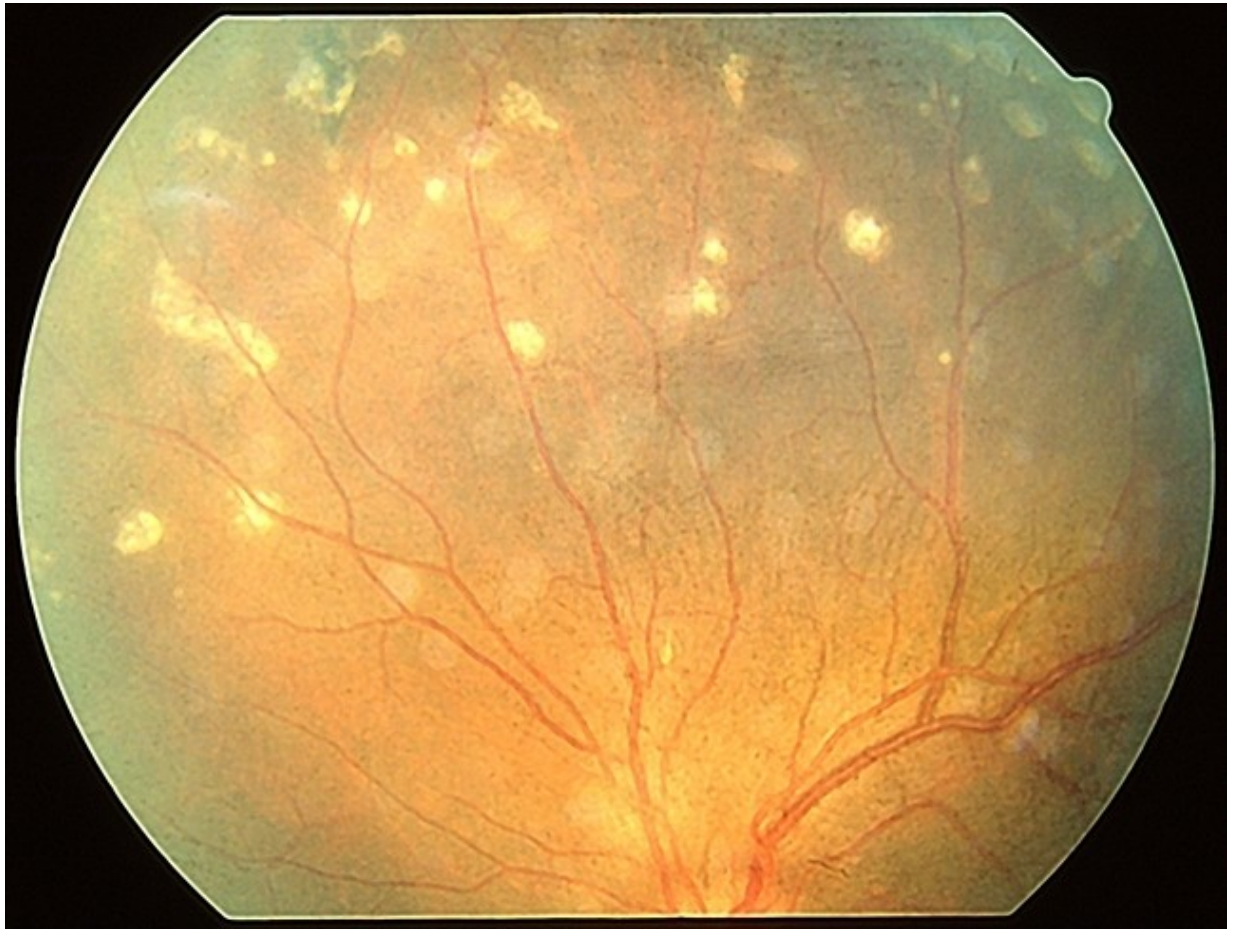
Single or multifocal

In many forms of posterior uveitis

Associated vitritis

Associated retinal oedema





Causes of Intermediate Uveitis

Sarcoidosis

Inflammatory bowel disease

Multiple sclerosis

Lyme disease

Pars planitis[a]

Causes of Posterior Uveitis

Focal Retinitis
Toxoplasmosis
Onchocerciasis
Cysticercosis
Masquerade syndromes

Multifocal Retinitis
Syphilis
Herpes simplex virus
Cytomegalovirus
Sarcoidosis
Masquerade syndromes
Candidiasis
Meningococcus

Focal Choroiditis
Toxocariasis
Tuberculosis
Nocardiosis
Masquerade syndromes

Multifocal Choroiditis
Histoplasmosis
Sympathetic ophthalmia
Vogt-Koyanagi-Harada syndrome
Sarcoidosis
Serpiginous choroidopathy
Birdshot choroidopathy
Masquerade syndromes (metastatic tumor)

Causes of Panuveitis

Syphilis
Sarcoidosis
Vogt-Koyanagi-Harada syndrome
Infectious endophthalmitis
Behçet disease

Causes and Associations of Retinal Vasculitis

Non infectious associations	Infectious agents
Behcet's disease	Mycobacterium Tuberculosis
Sarcoidosis	Treponema pallidum
Systemic lupus erythematosus	Toxoplasma gondii
Multiple sclerosis	Bartonella henselae
Seronegative arthropathies	Borrelia burgdorferi
Inflammatory bowel disease	Brucella
Sjogren's syndrome	Leptospira
Polyarteritis nodosa	Leptospira
Wegener granulomatosis	HIV
Relapsing polychondritis	HTLV1
Lymphoproliferative disorders	Herpesviridae – HSV, VZV, CMV, EBV
Drug induced	

With fundoscoy we can have a direct view of vessels….

Commoner causes of Periphlebitis and Arteritis

Venulitis (periphlebitis)	Arteritis	Arteritis and Periphlebitis
Intermediate uveitis	Susac's syndrome	Systemic vasculitides *
Sarcoidosis	Systemic vasculitides * (ANCA-positive)	Toxoplasma chorioretinitis
Multiple sclerosis	Herpetic retinopathies	Syphilis
Inflammatory bowel disease	Toxoplasma chorioretinitis	Tuberculosis-Eale's disease
	Syphilis	
Seronegative arthropathies		

* Systemic vasculitides include Churg-Strauss, Wegener's granulomatosis, polyarteritis nodosa and ANCA–positive vasculitides

CASES

Behcet's disease

Systemic vasculitis

Affects large & small vessels

Recurrent oral ulceration + at least two of :

- genital ulcers

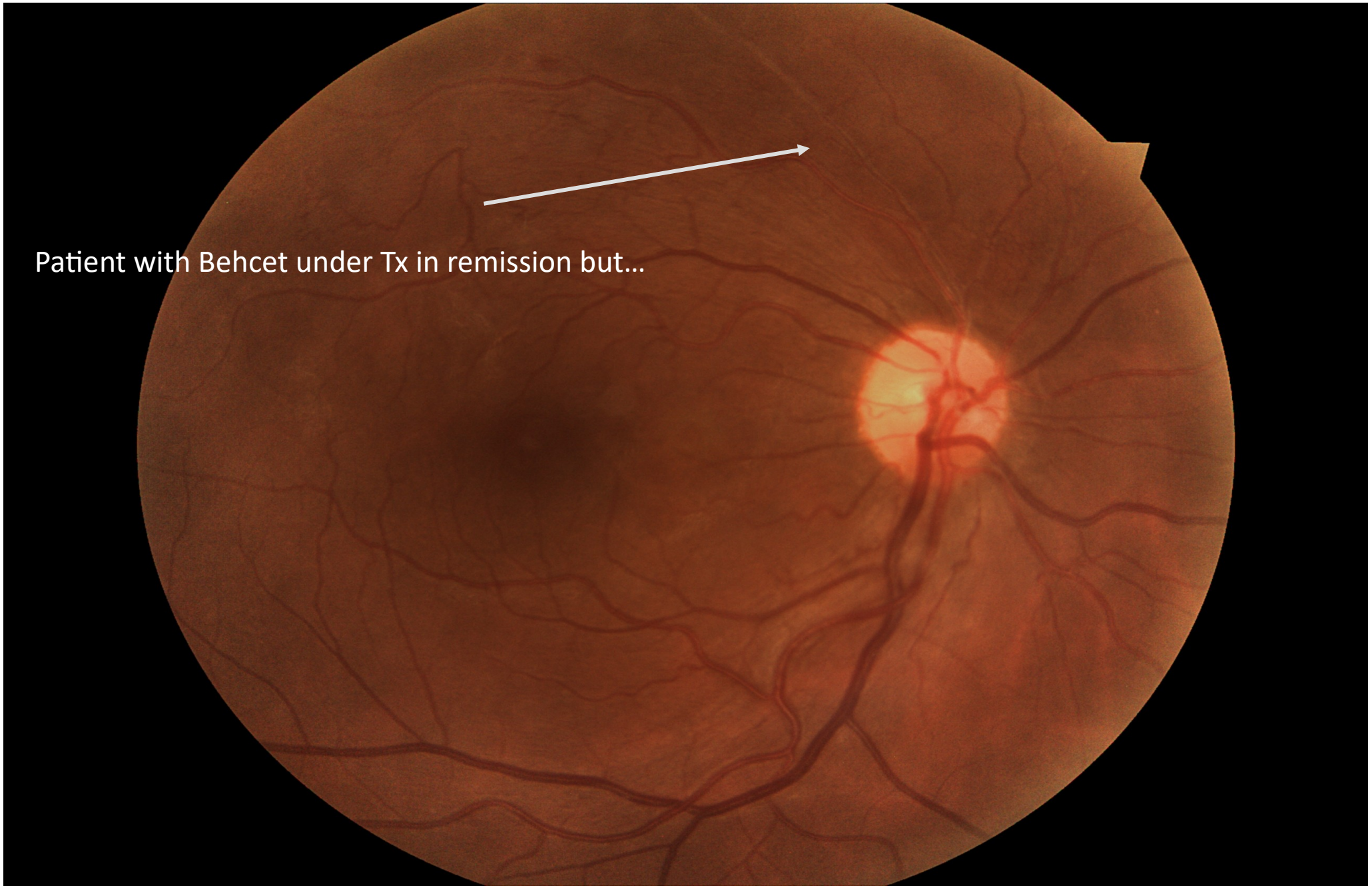
-ocular involvement

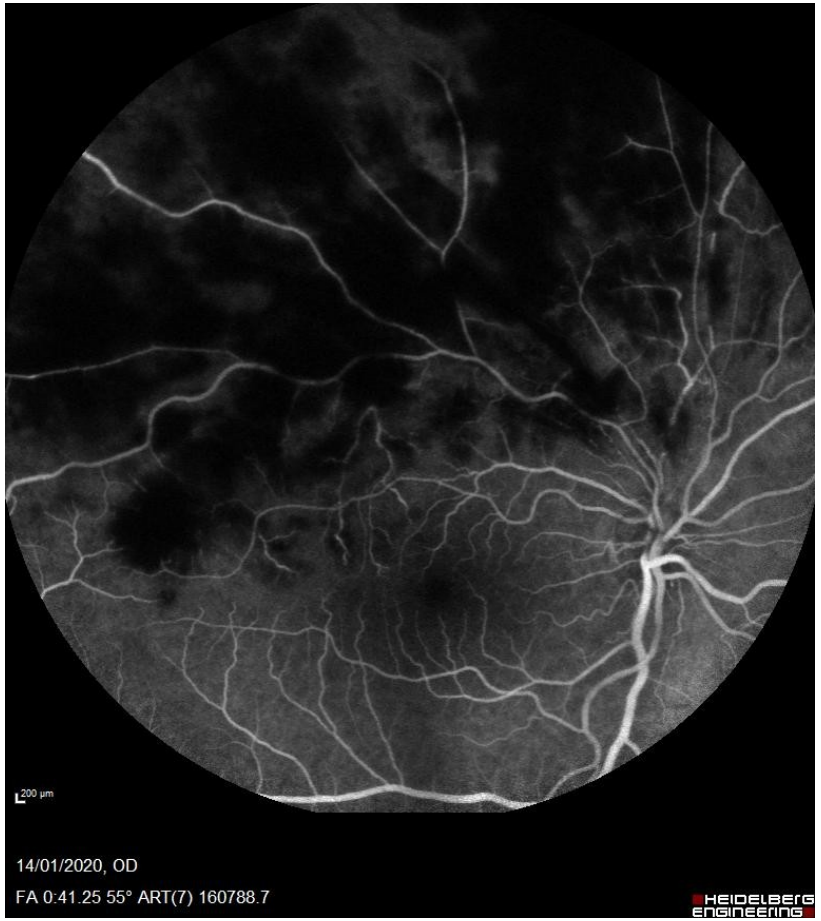
-skin lesions

-a specific pathergy test which provokes pustular inflammation resulting from skin scratching

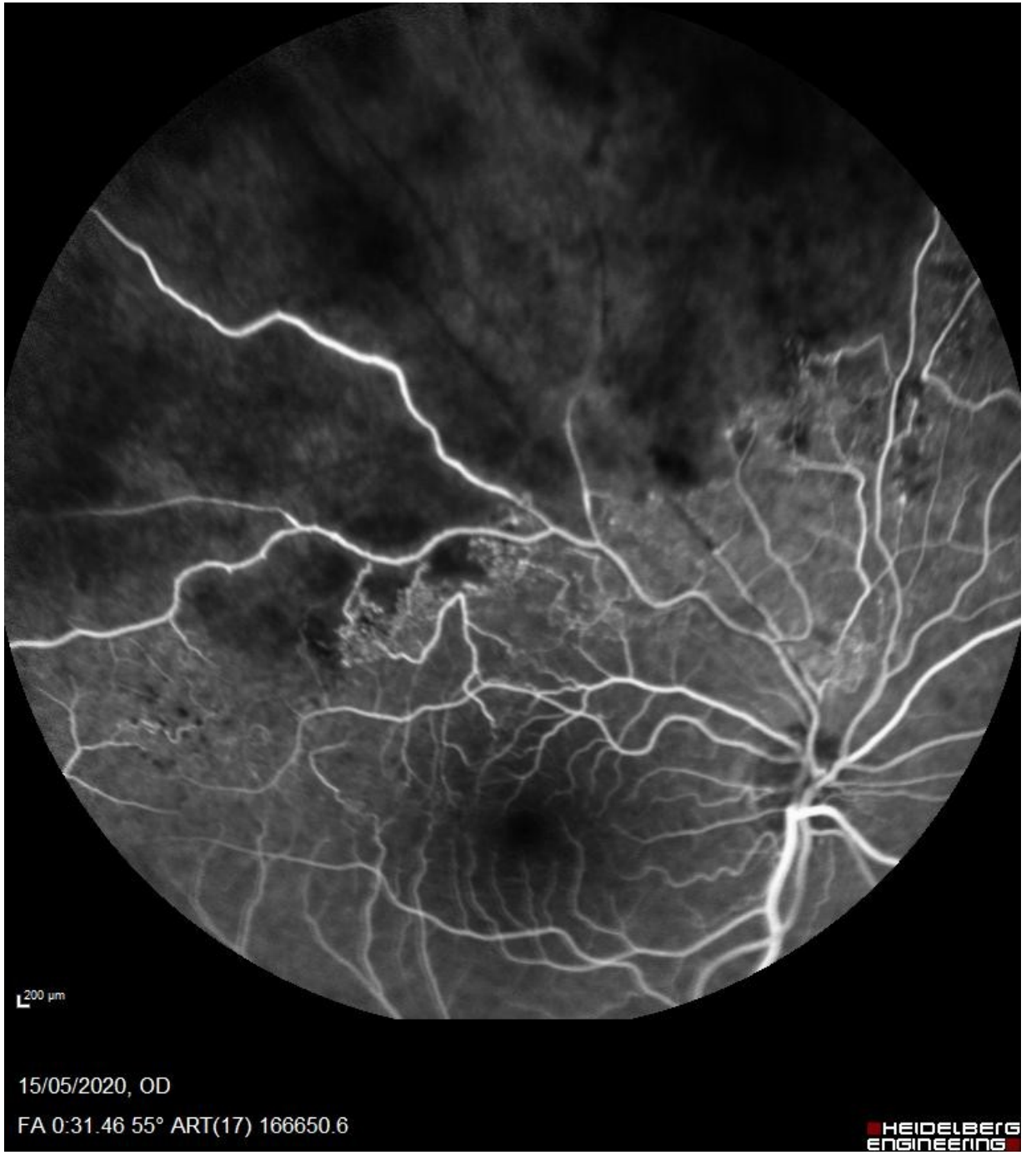
Hallmark lesions of Behçet

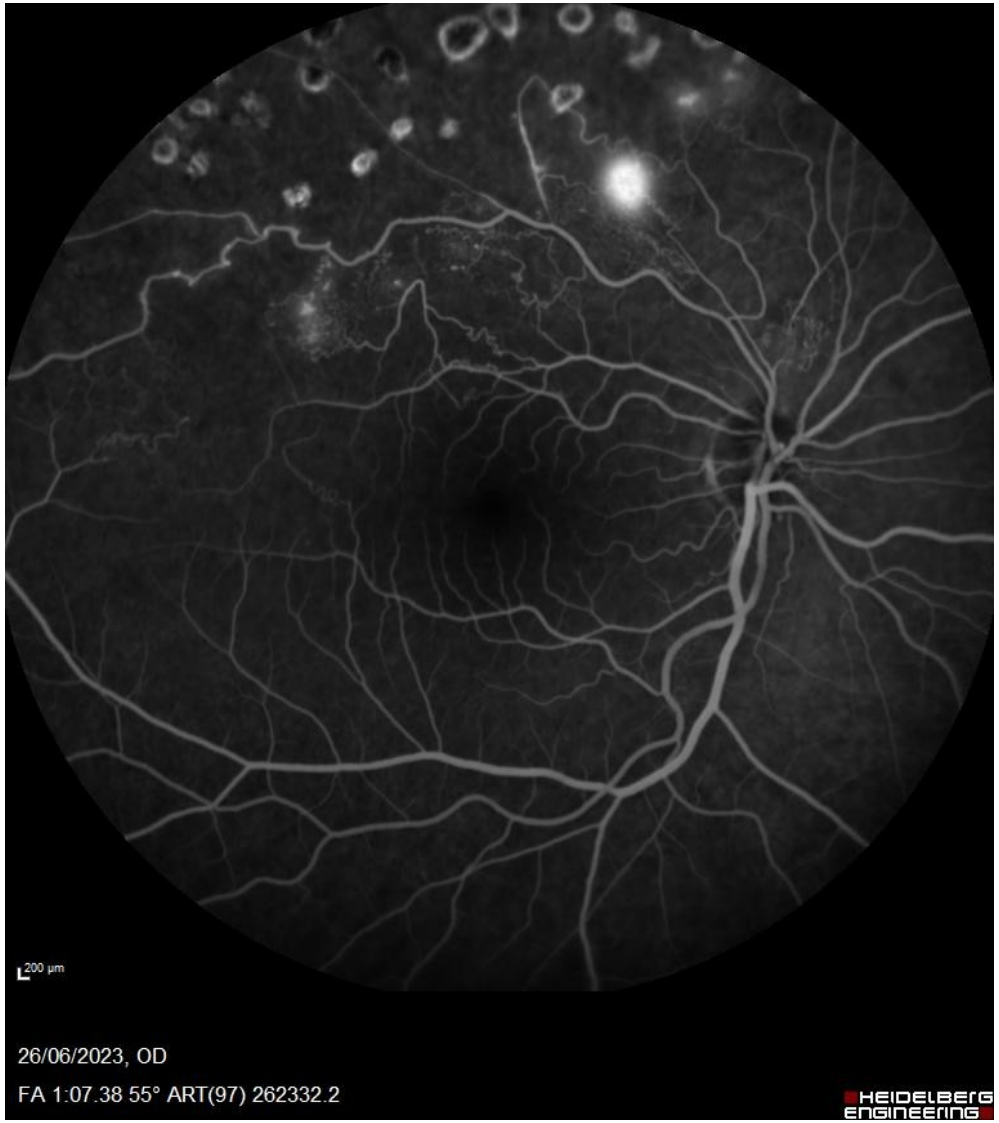
- Vitritis
- Retinal vasculitis
- Retinitis
- Papillitis
- Panuveitis


Patient with Behcet under Tx in remission but…



After escalation of Tx




200 µm
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200 µm
26/06/2023, OD
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CMV retinitis in a immunosuppressed patient for autoimmune disease

After IV Tx …


RG OptomapPlus
Oct 18, 2023 10:04 AM
Image: 1
4000
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Laterality: R
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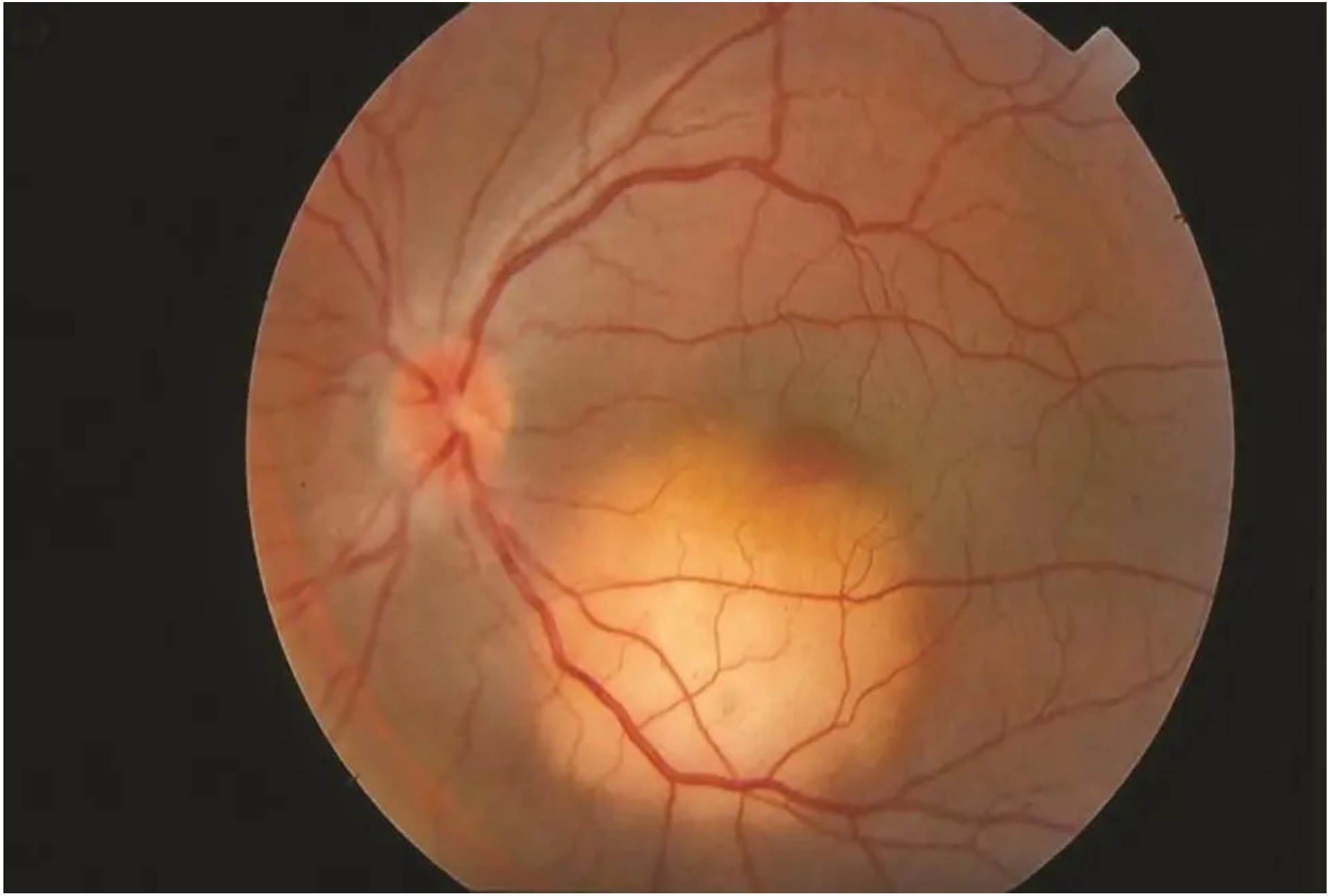
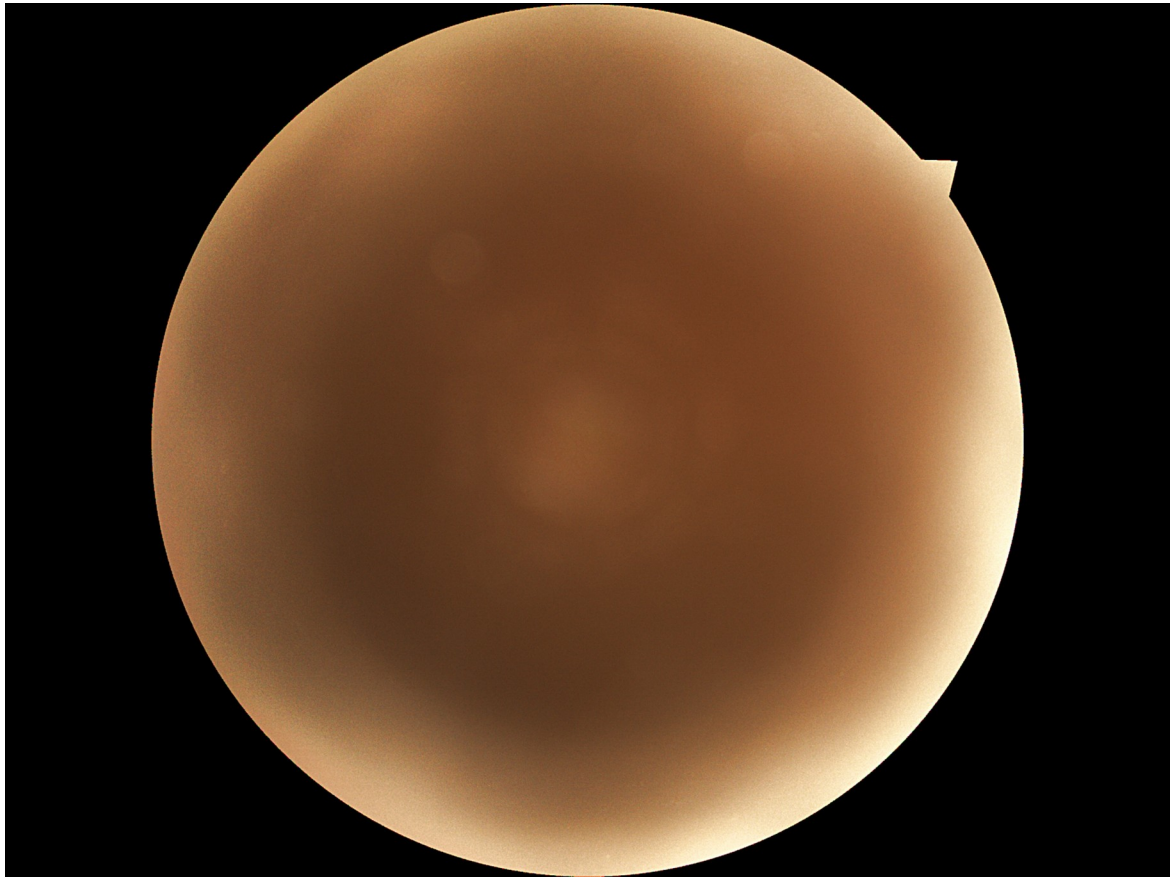
Green: 50%
Zoom: 1.50
Presentation: Multiple
1/3

Choroidal granuloma in sarcoidosis

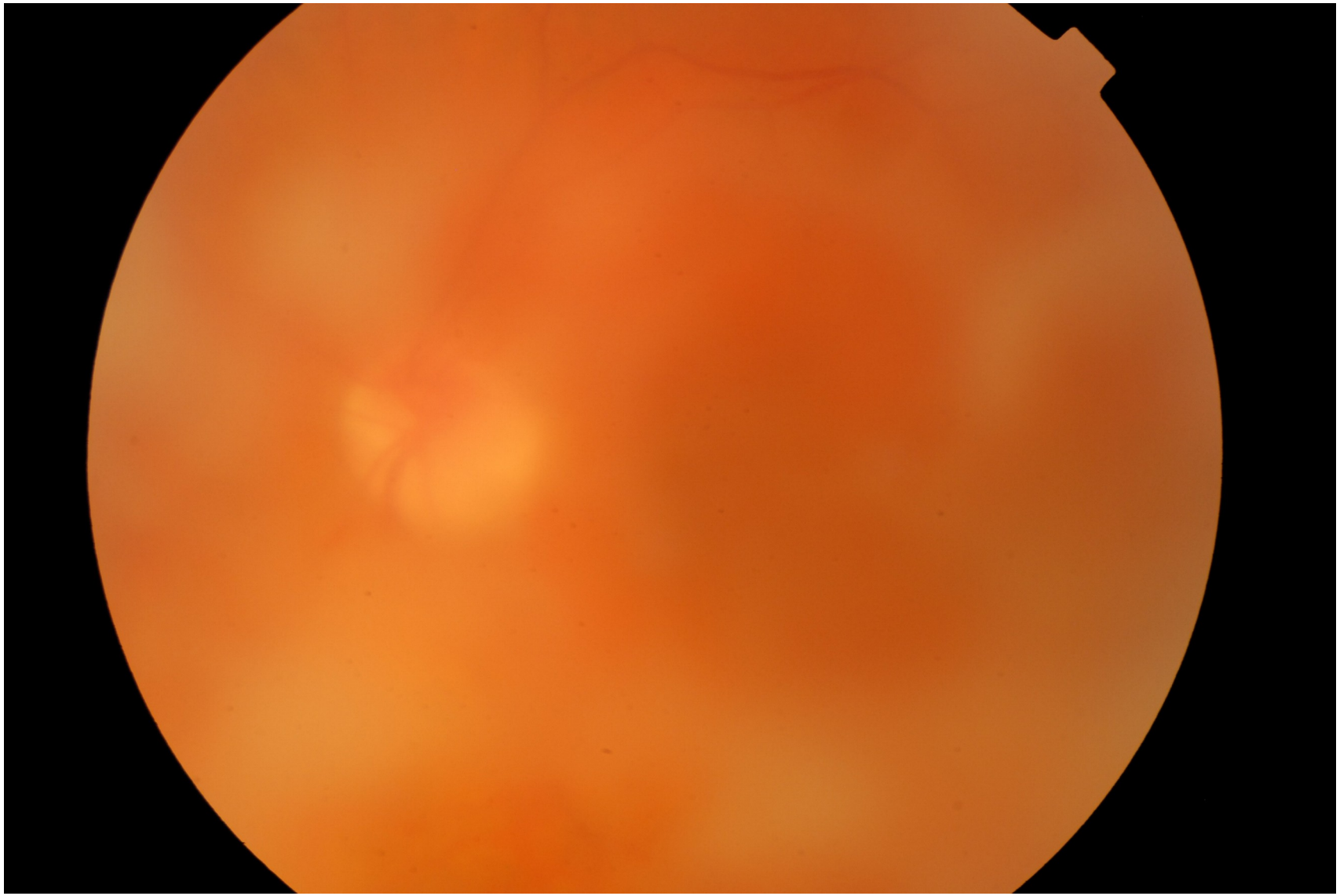




Dense vitreous haze in a patient with uveitis
Bioscore 5 – no fundal view

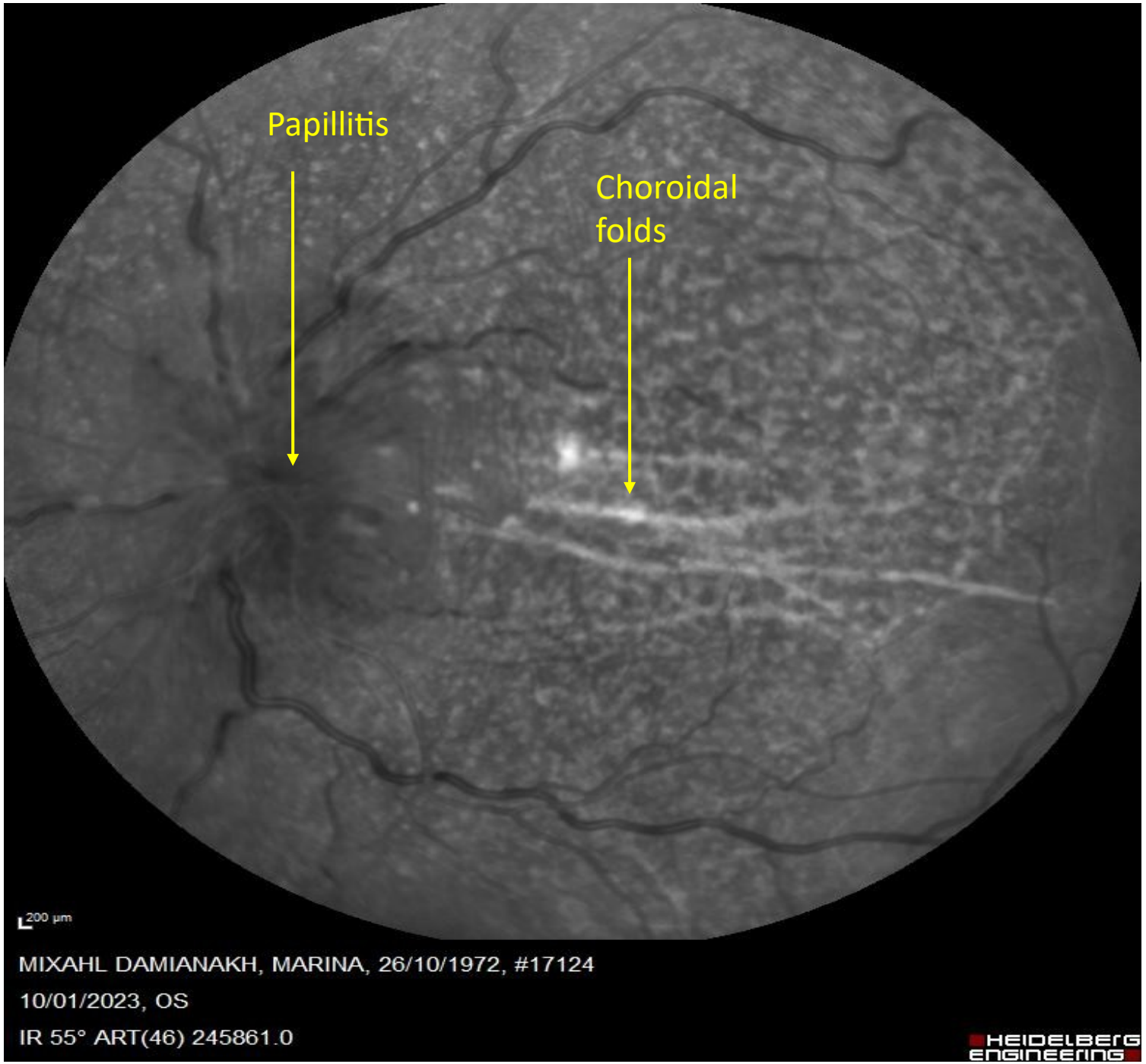
Normal left eye

Severe vitritis / biosocre 4



Infrared photo of left retina in a patient with posterior scleritis associated with rheumatoid arthritis

Treated with immunosuppression by rheumatologists




200 µm
200 µm
MIXAHL DAMIANAKH, MARINA, 26/10/1972, #17124
10/01/2023, OS
FA&&ICGA 1:25.51 55° ART(22) 1:25.48 55° ART(22) 245864.0
HEIDELBERG ENGINEERING


200 µm
200 µm
MIXAHL DAMIANAKH, MARINA, 26/10/1972, #17124
10/01/2023, OS
FA&&ICGA 5:48.57 55° ART(16) 5:48.53 55° ART(16) 245866.0
HEIDELBERG ENGINEERING

Pale optic disc in a patient with chronic uveitis

Papilledema in a young boy with autoimmune disorder

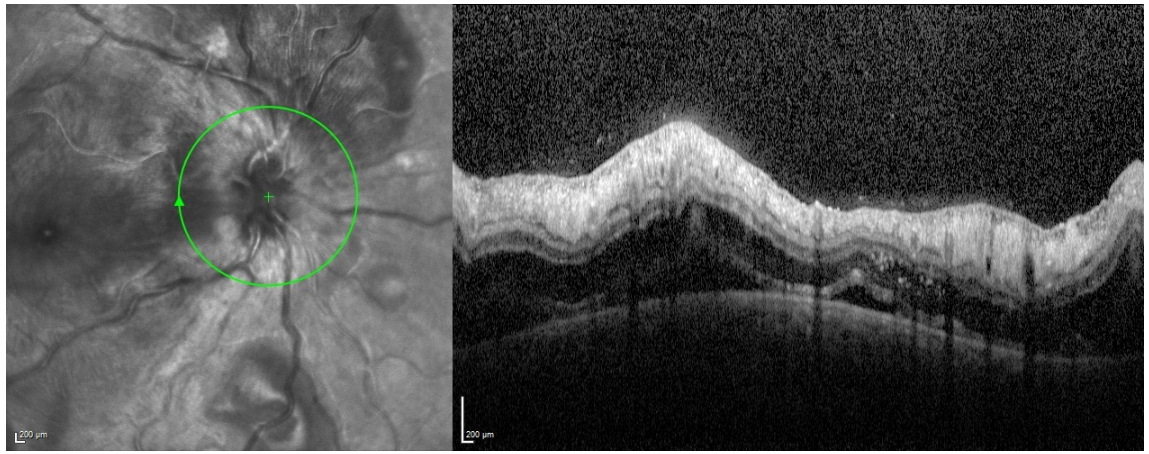
Optic disc oedema in patient with anterior uveitis associated with RA

Bilateral grade IV hypertensive retinopathy in an adolescent with

- ✓Optic disc edema
- ✓Macular edema
- ✓Retinal arteriolar narrowing
- ✓Elschnig spots
- ✓Upper peripheral serous retinal detachment

Blood pressure:
220/170 mmHg

<u>Complement 3</u>
<u>Glomerulonephritis</u>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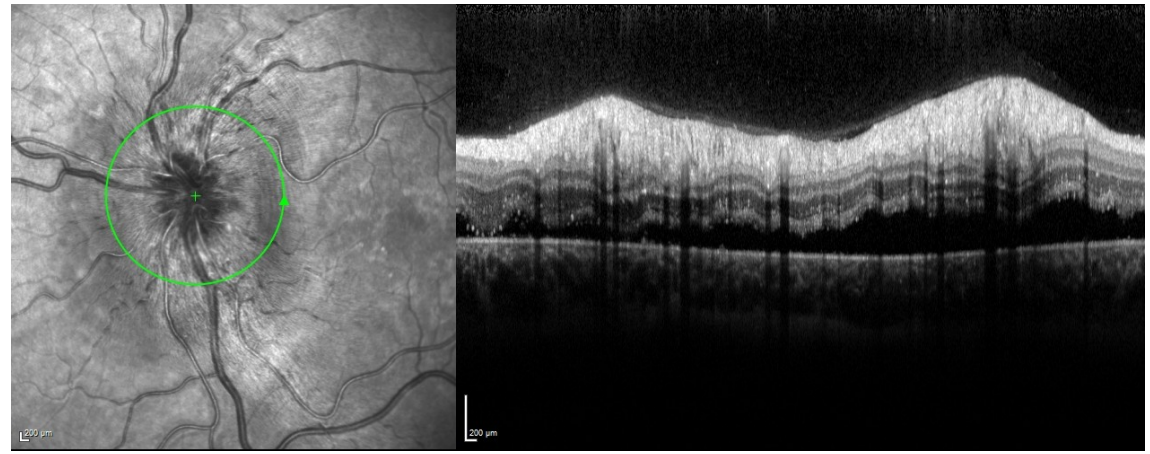
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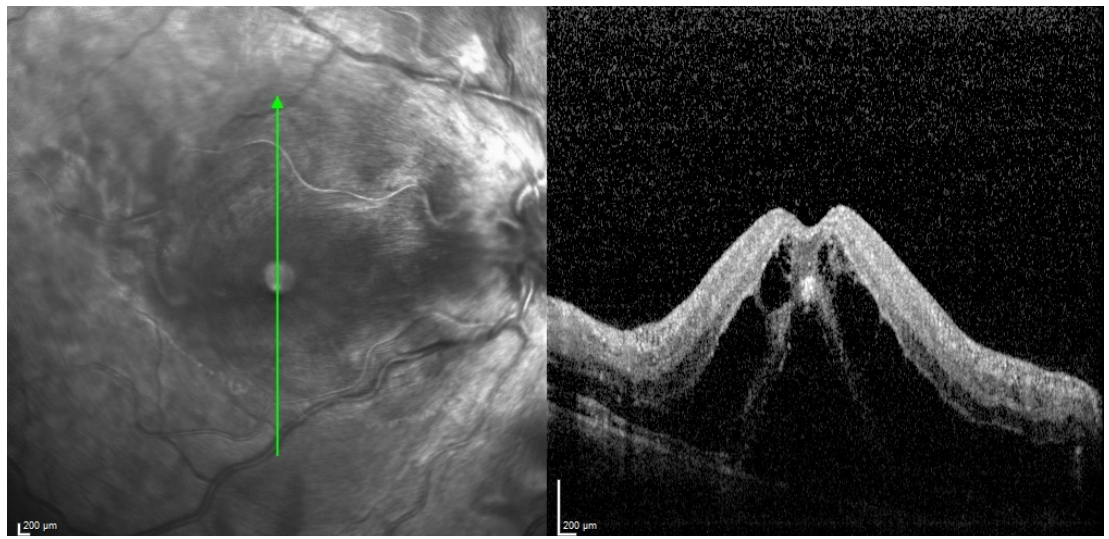
200 µm
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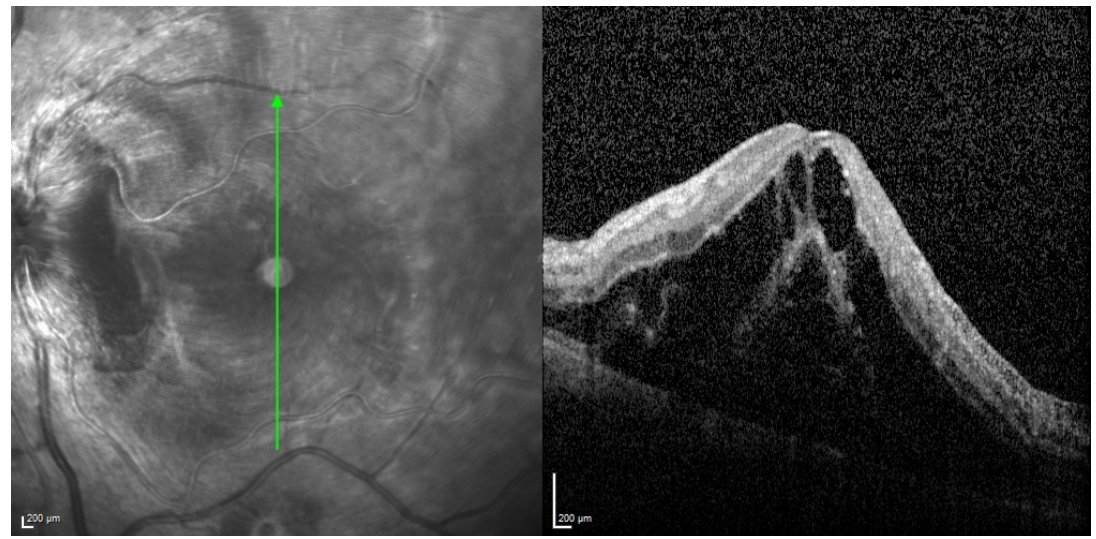
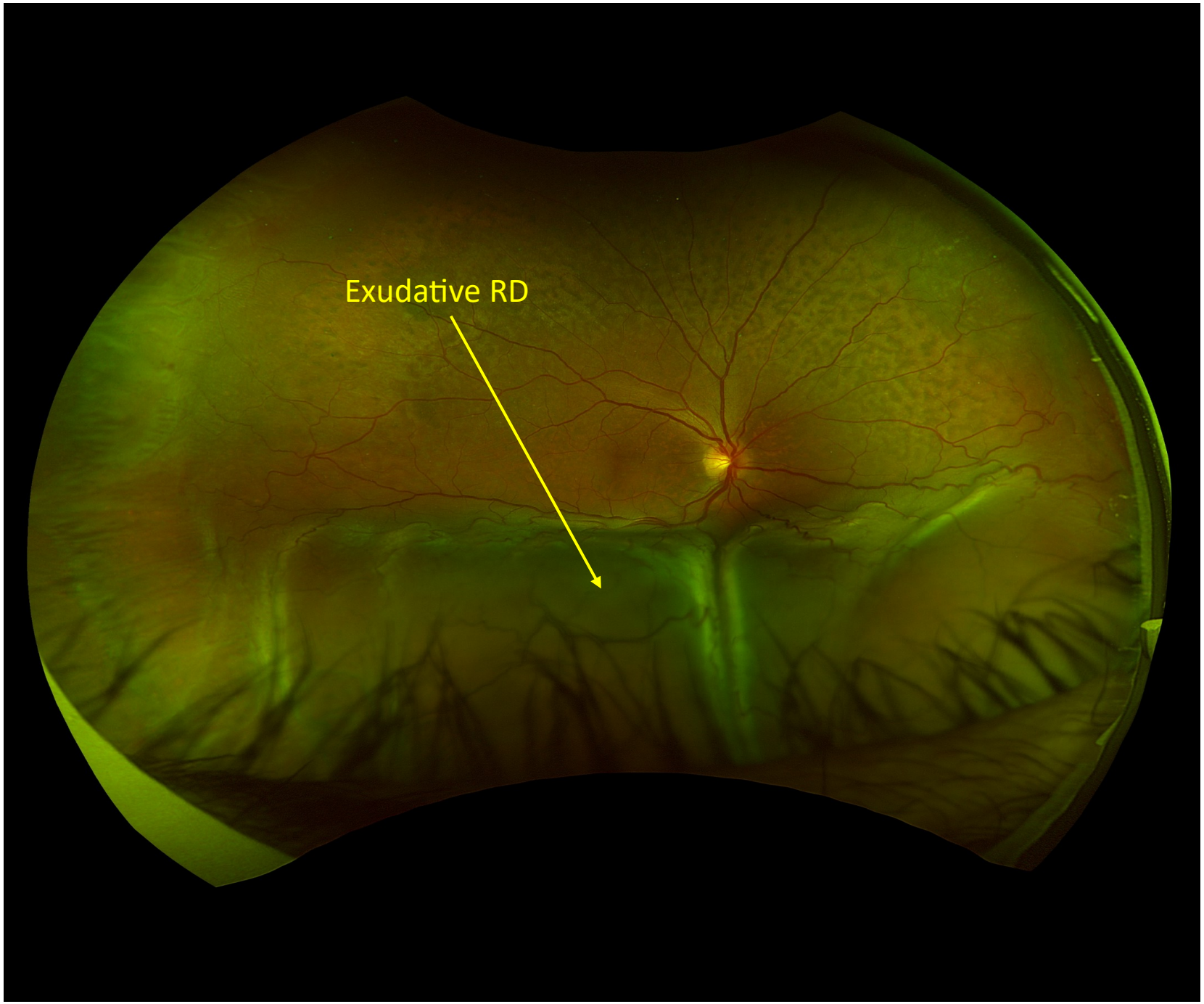
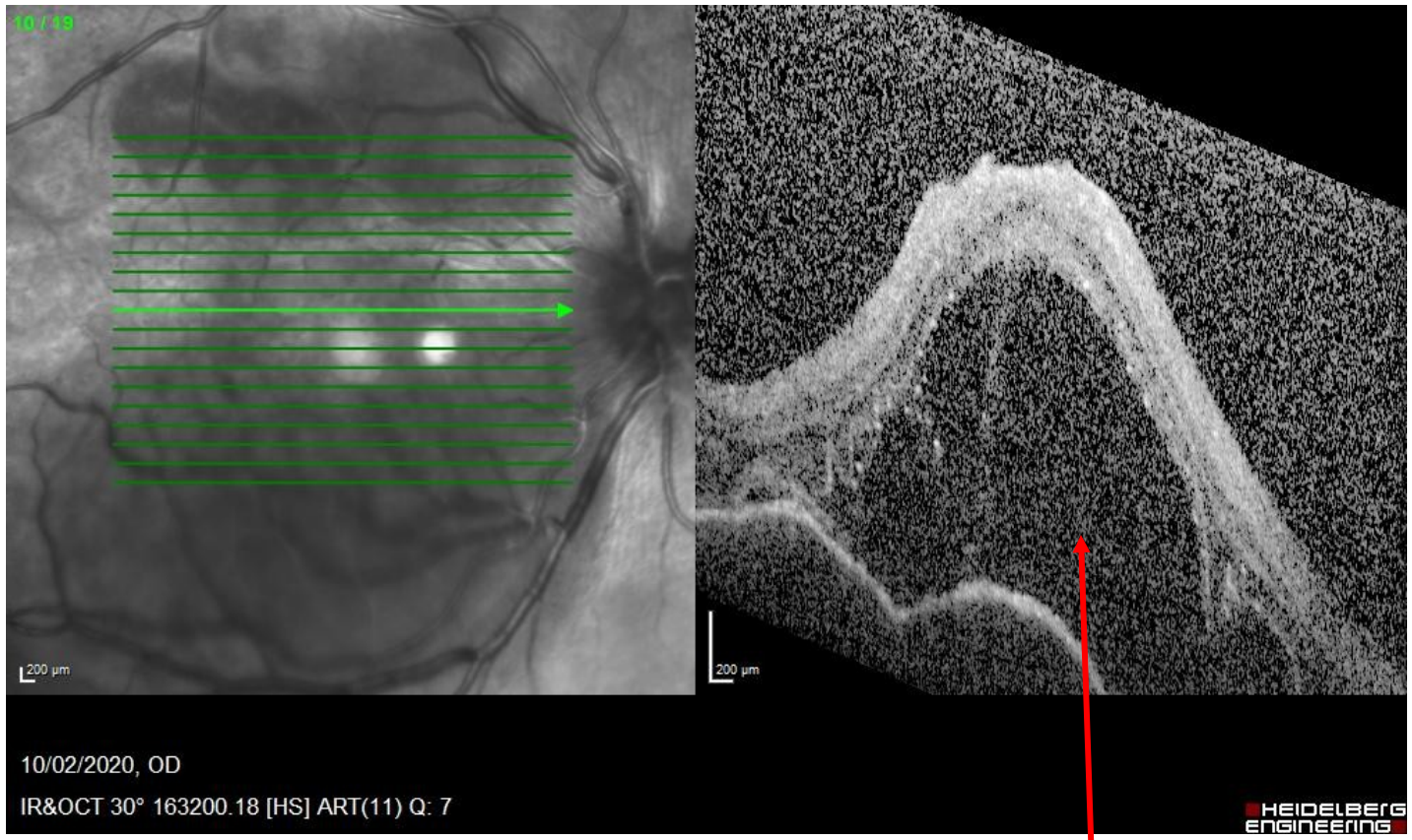

200 µm
200 µm

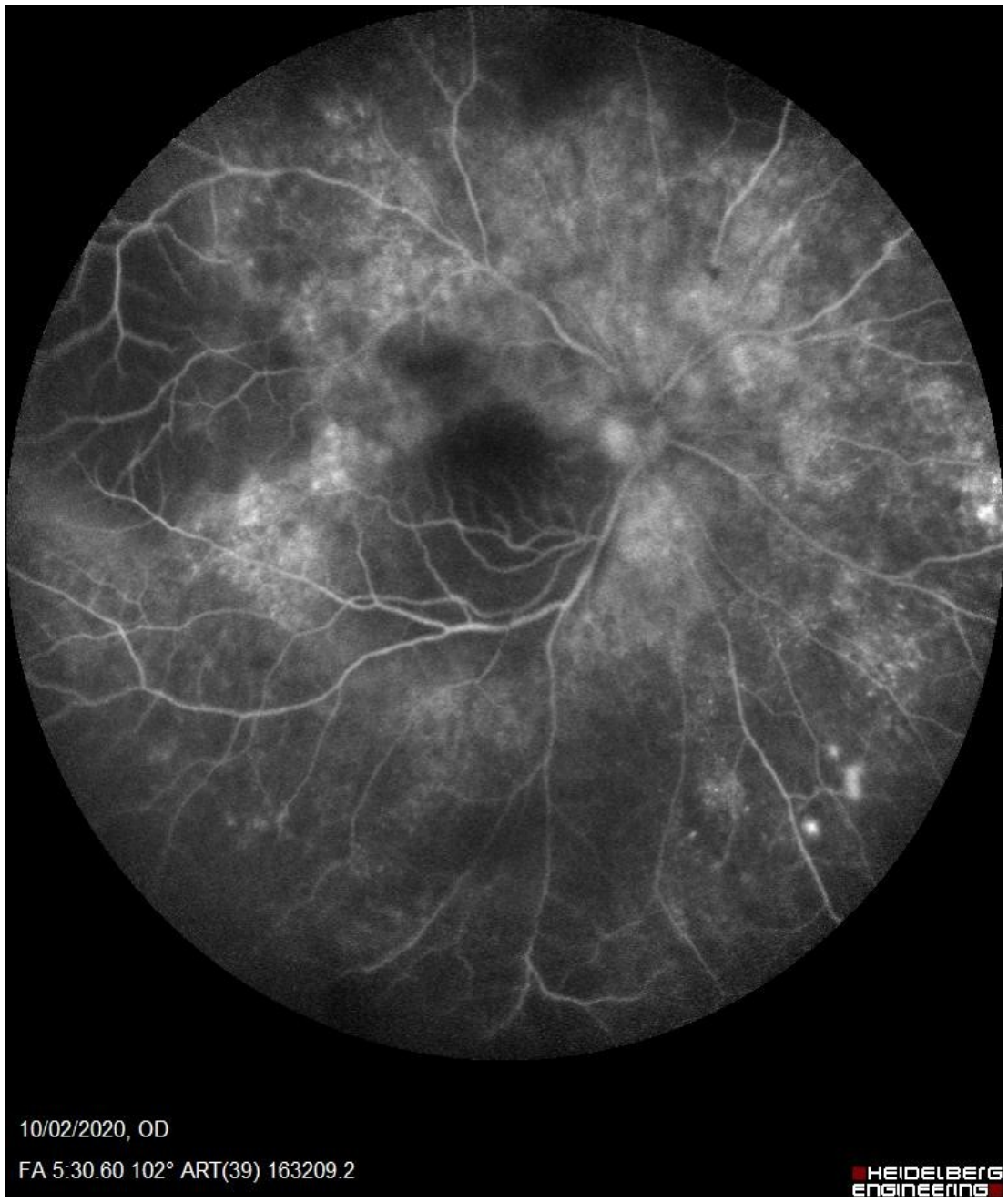
Exudative retinal detachment in a presumed Harada Disease



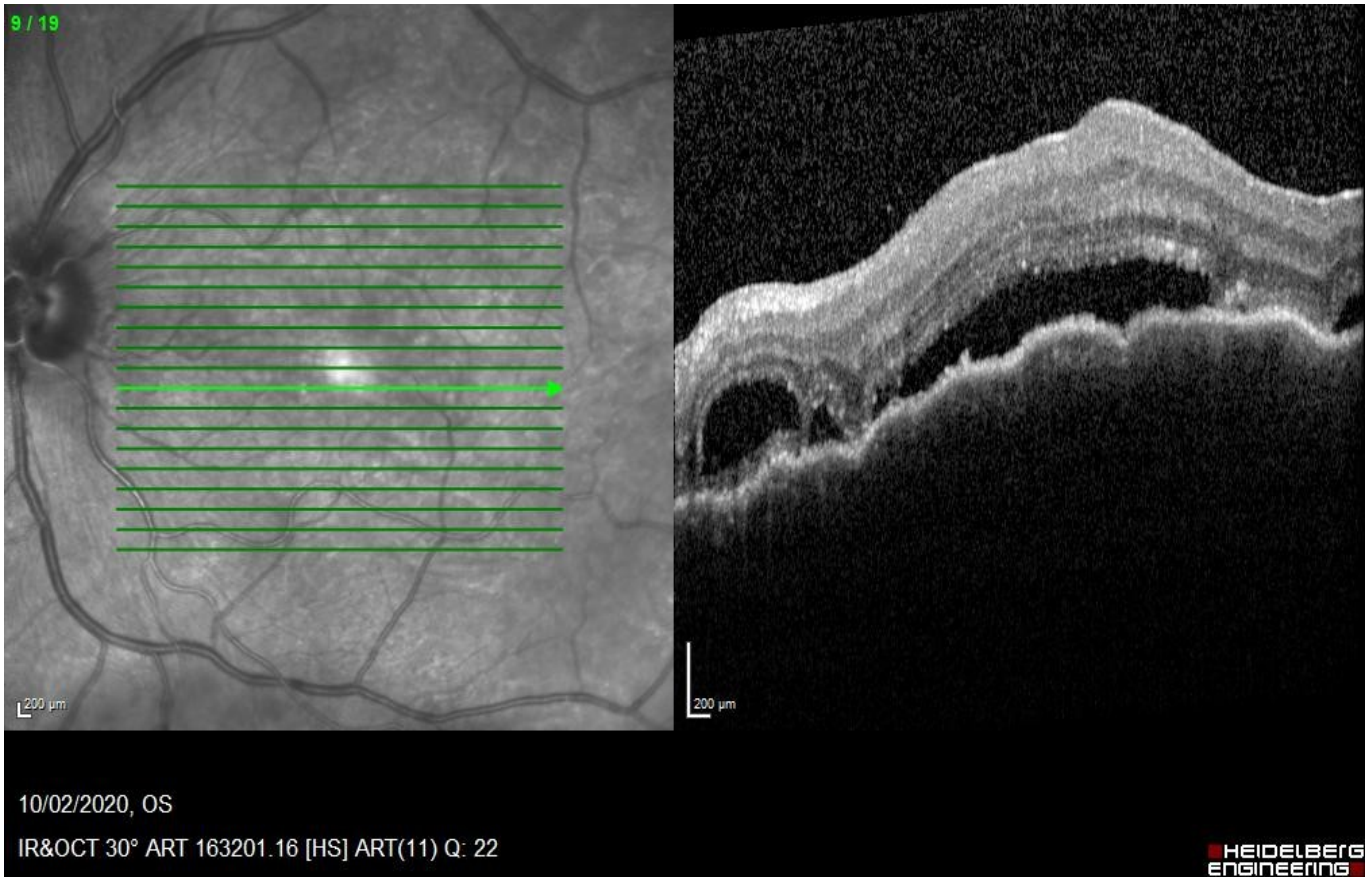
Previous Pt post Tx with oral steroids

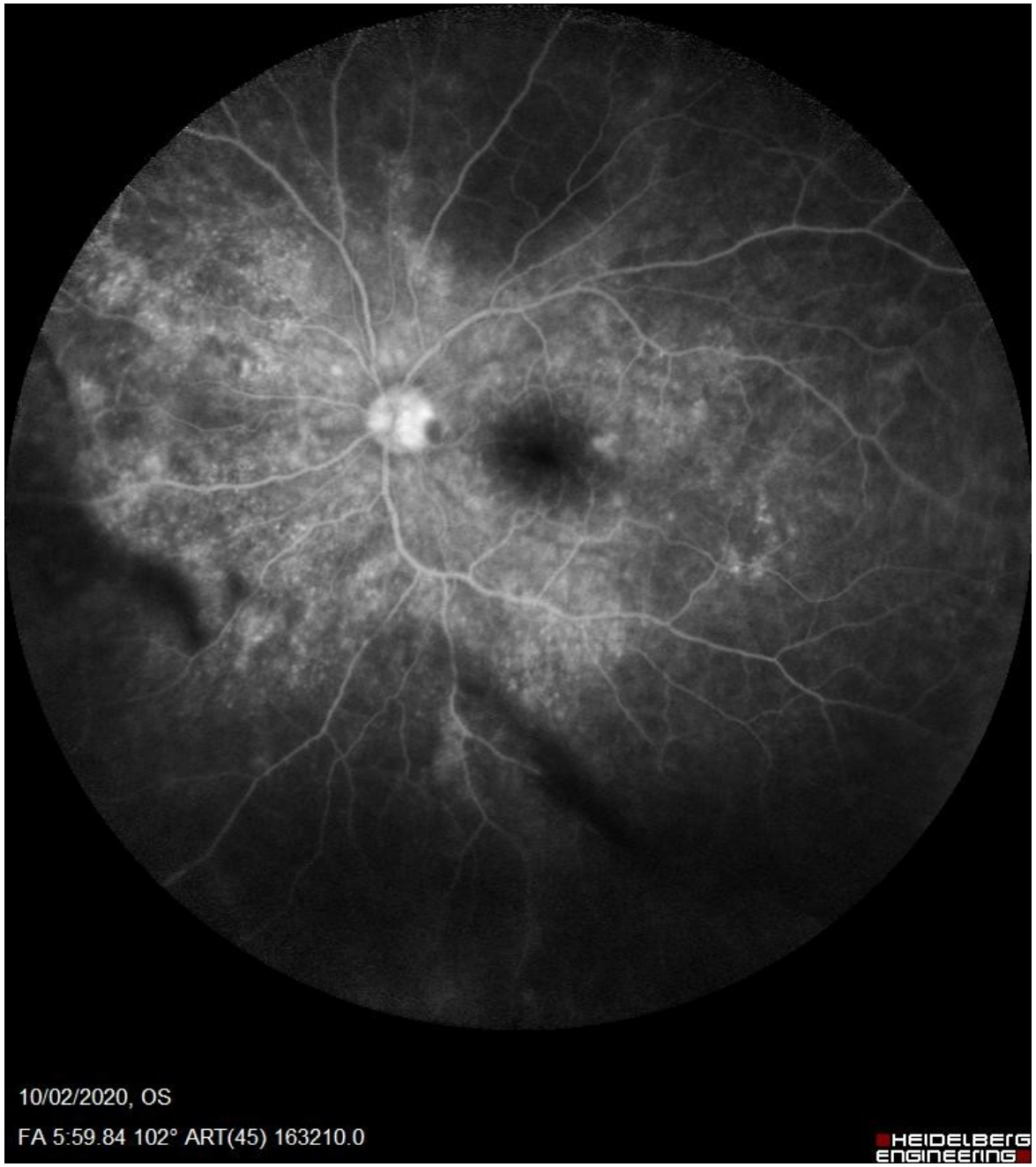


Subretinal fluid

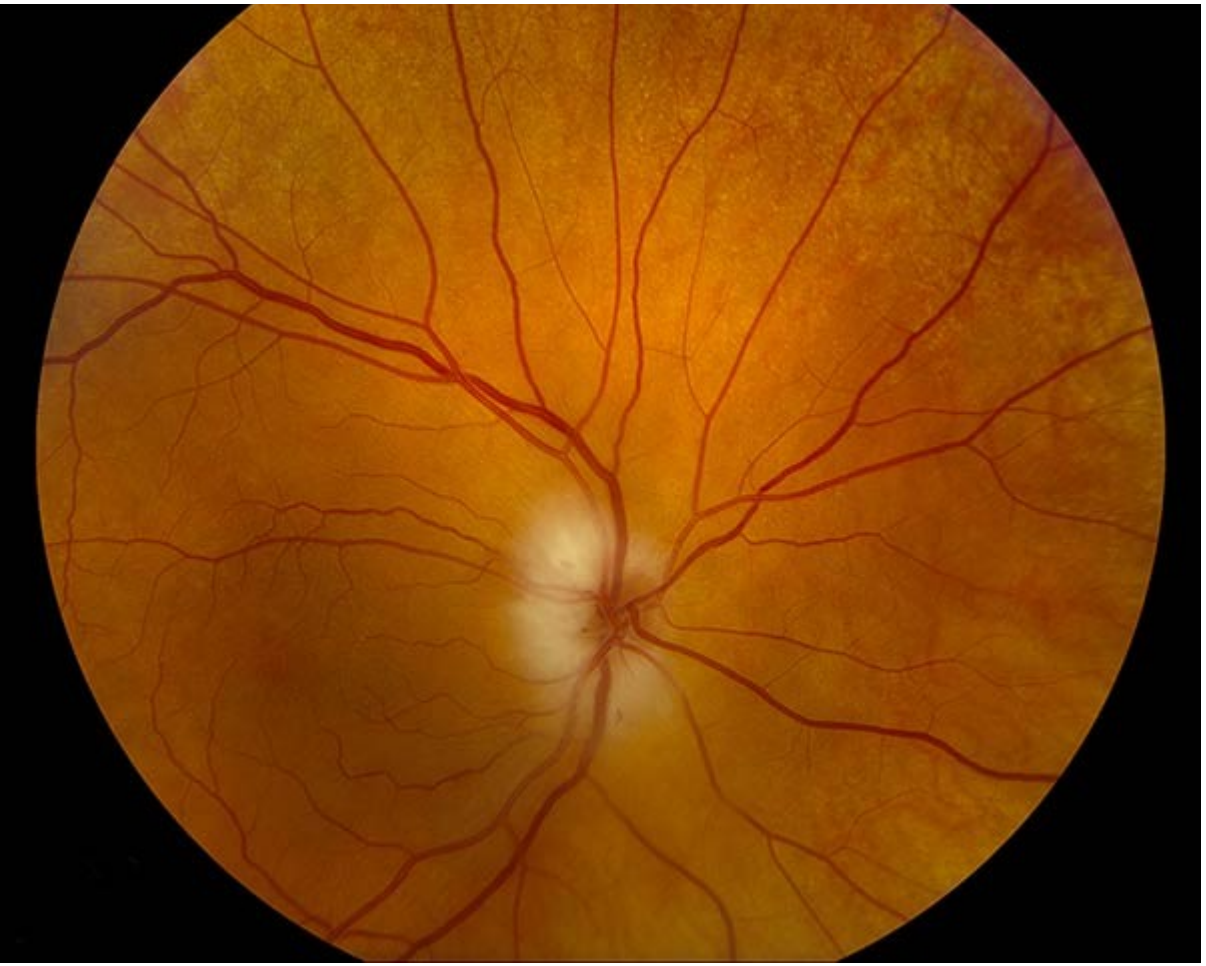


VKH disease in a 70 years old man





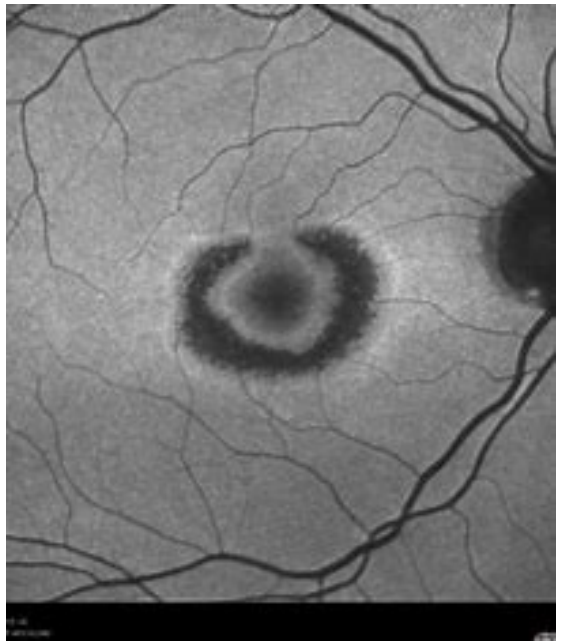
VKH in a 70 years old man



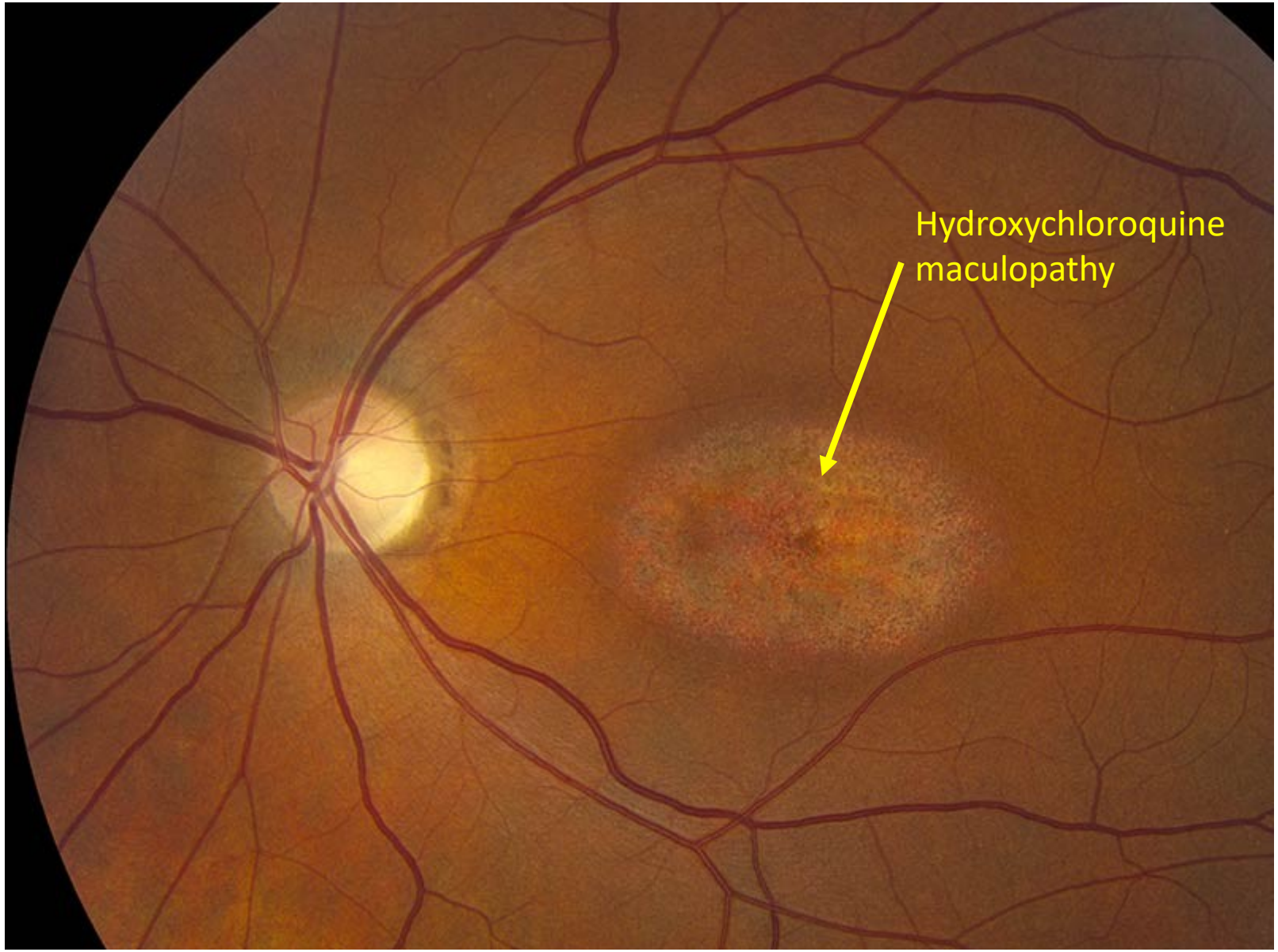
Anterior Ischemic Optic Neuropathy (AAION) in GCA

- ❑ Profound sudden vision loss
- ❑ Jaw claudication
- ❑ Scalp tenderness
- ❑ Headache
- ❑ Elevated ESR, CRP

Retinal toxicity of drugs used in rheumatology…



Regular monitoring is necessary as retinal damage is irreversible…



FUNDUS EXAMINATION

- ✓ can provide important information and guide clinicians towards the right diagnosis
- ✓ is necessary in many cases for determining if an autoimmune disease with ocular involvent is under remission or not thus tailoring treatment
- ✓ ophthalmologists and rheumatologists frequently work together as most autoimmune diseases affect the eyes
- ✓ basic fundoscopy can be done by a non ophthalmologist and in cases where a consultation by an eye specialist is not available, can provide help to the clinician for diagnostic dilemmas

Low cost handheld fundus cameras can provide clinicians useful information before referral to eye specialists

Or more expensive non mydriatic cameras…

Thank you….