

Eye Floaters: What are they and should you be concerned?

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- Carl Zeiss – c
- Genentech – c
- Regeneron – c

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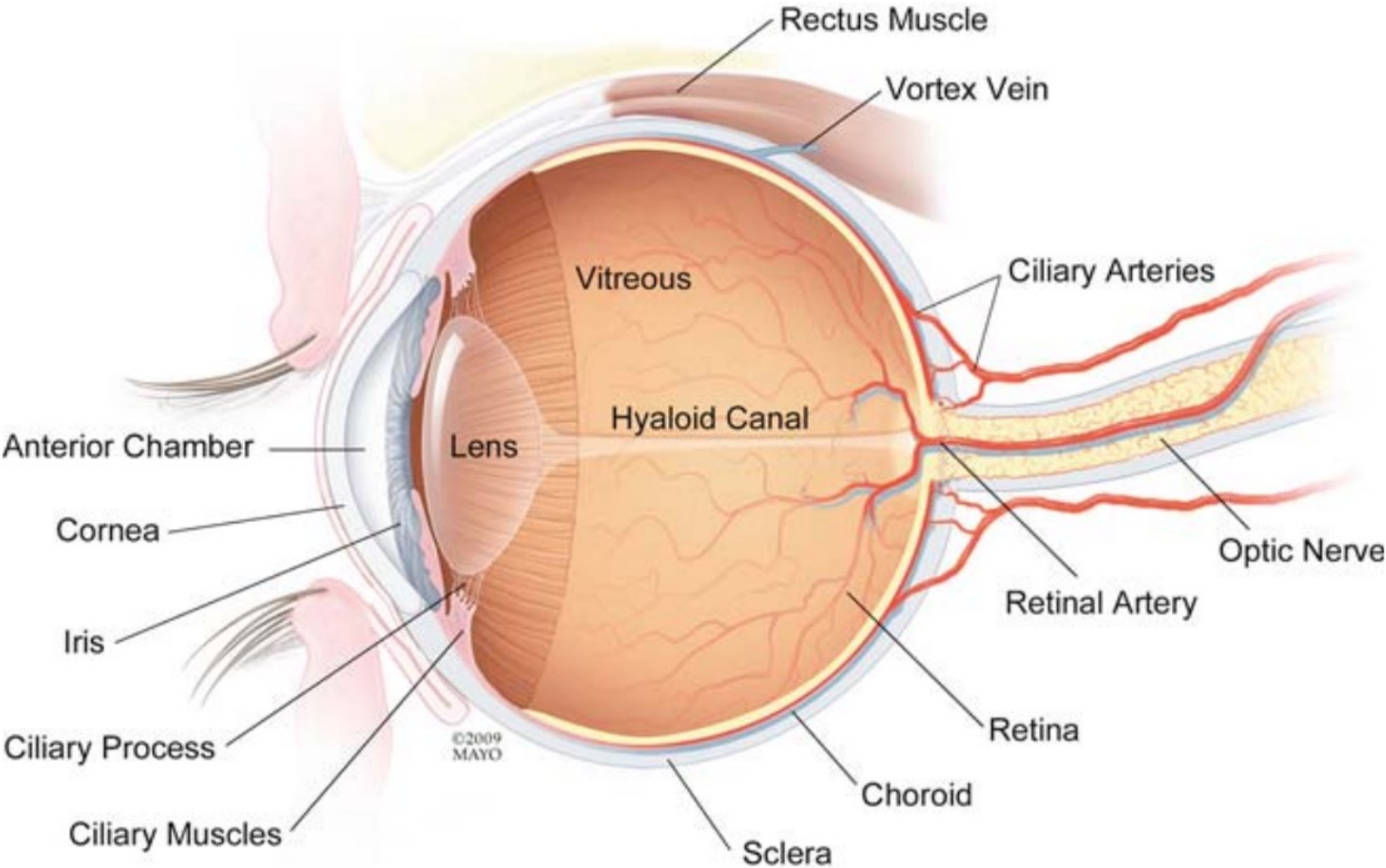
- Carl Zeiss – c

- What are floaters?
- How do floaters develop?
- When are floaters concerning?
- Do floaters need to be treated?
- How can floaters be treated?

What are Floaters?

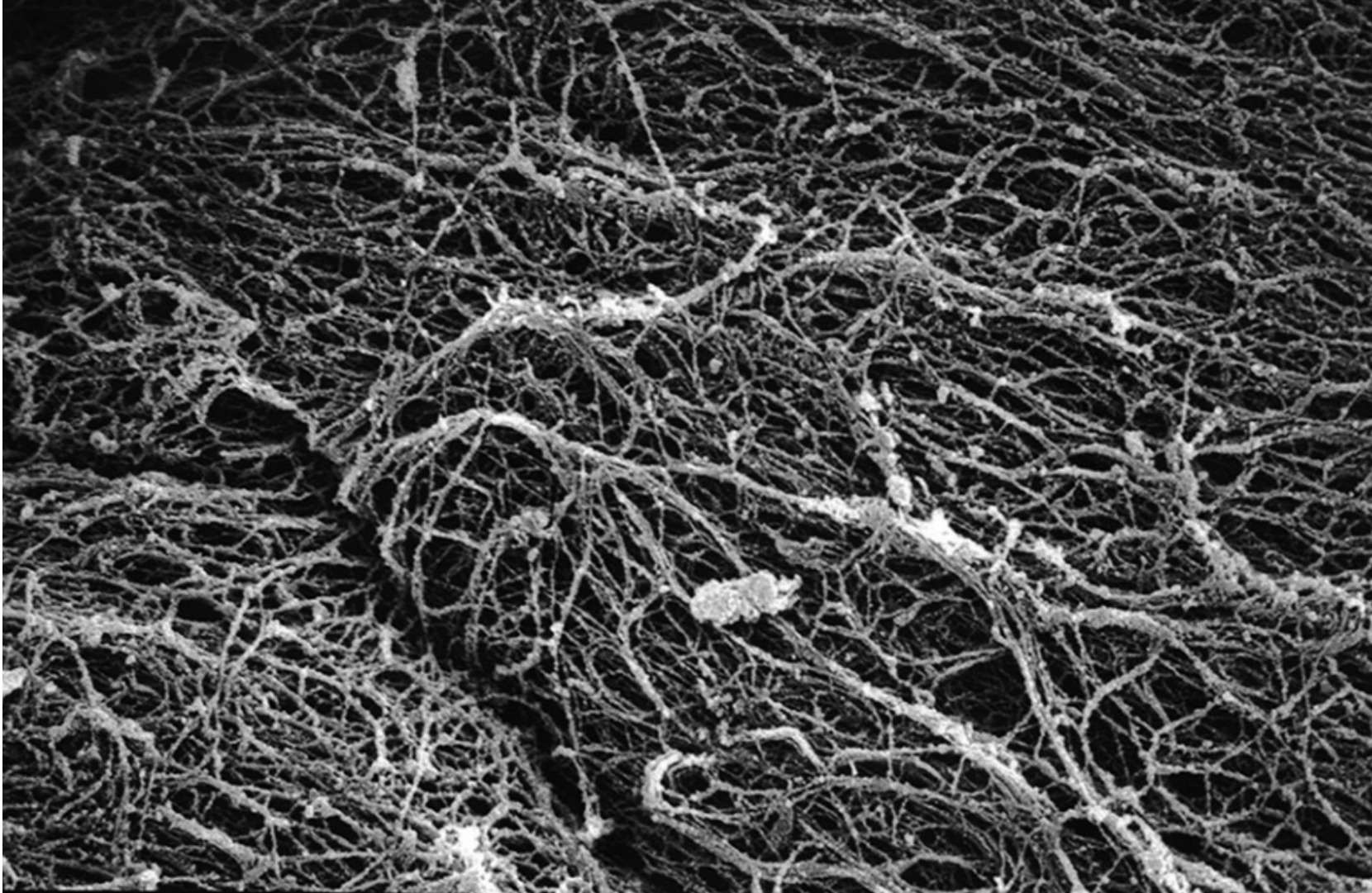
- Opacities that float around the field of vision
 - Various shapes and sizes
 - Grey-black color
 - Some partially translucent
 - Move in various directions with eye movement
 - Continue to move for a second or two after eye movement stops
- Most people (>75%) have floaters
 - Often starting in childhood or adolescence





- Gel-like material that fills the space inside the back of the eye.
 - Transparent & colorless
 - Mostly water, with some proteins & other molecules
 - Collagen (a protein) forms a structural network & hyaluronan (a glycosaminoglycan) holds together collagen fibrils
 - Affects oxygen metabolism
- Vitreous important in early life, but with age loses its importance

Collagen in Vitreous

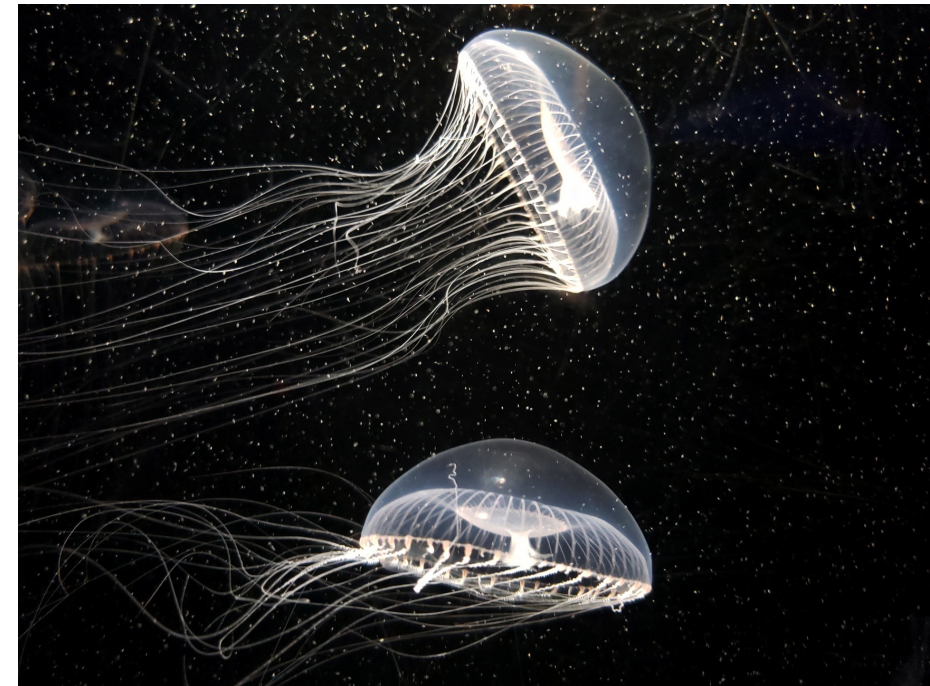


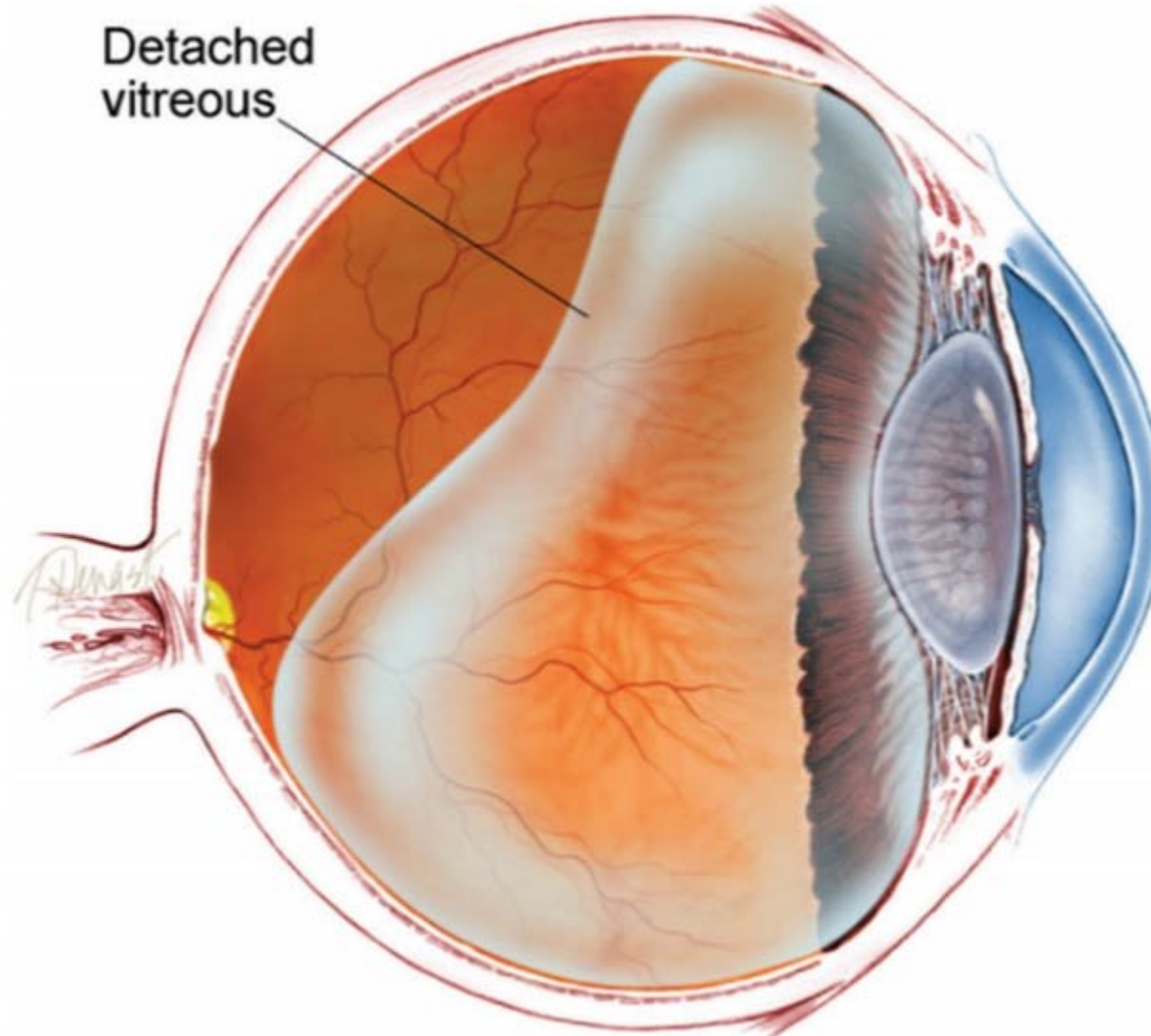
Source: Sebag J, ed. Vitreous in health and disease. 2nd ed. Springer; 2014.

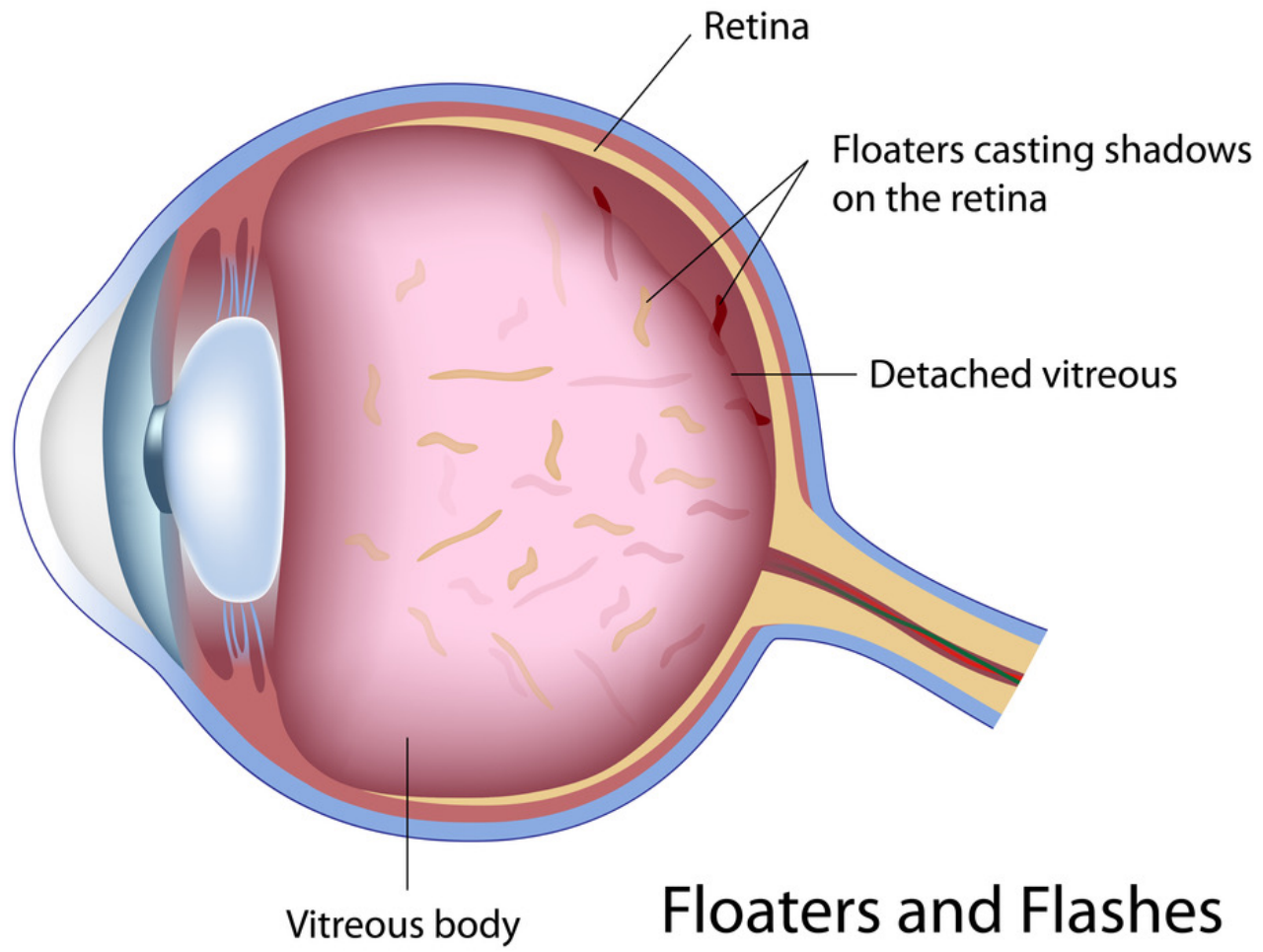
- AKA, “vitreous syneresis”
- During early childhood vitreous is basically a homogenous jelly stuck to retina
- With age, pockets of liquid form within the jelly & fibrils of collagen clump together
- The clumped collagen becomes more opaque & mobile → floaters!
- 20% of gel liquefied by teen years, and 50% of gel liquefied by age 70

Posterior Vitreous Detachment

- With age, as vitreous liquefies, its attachment to retina simultaneously weakens
- Eventually, the vitreous separates from the retina
 - Posterior vitreous detachment (PVD)
- Process of PVD takes place over years, but
 - Final stages of separation: over hours to weeks
- By 60s, >50% of people have had PVD
- Vitreous never completely separates: remains anchored behind iris
- **Complete PVD is main cause of sudden increase in floaters**



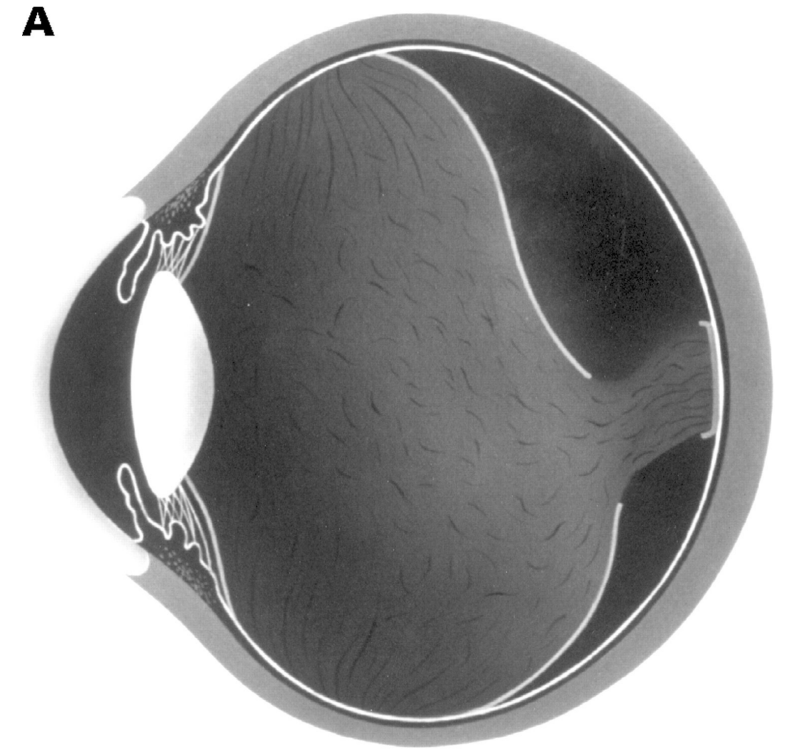




Floaters and Flashes

Why do Flashes Happen with Floaters?

- About half of patients with floaters from PVD also have flashes
- There are many causes of flashes ...
- ... But in setting of PVD they are due to retinal stimulation when vitreous pulls briefly on retina as it separates from it

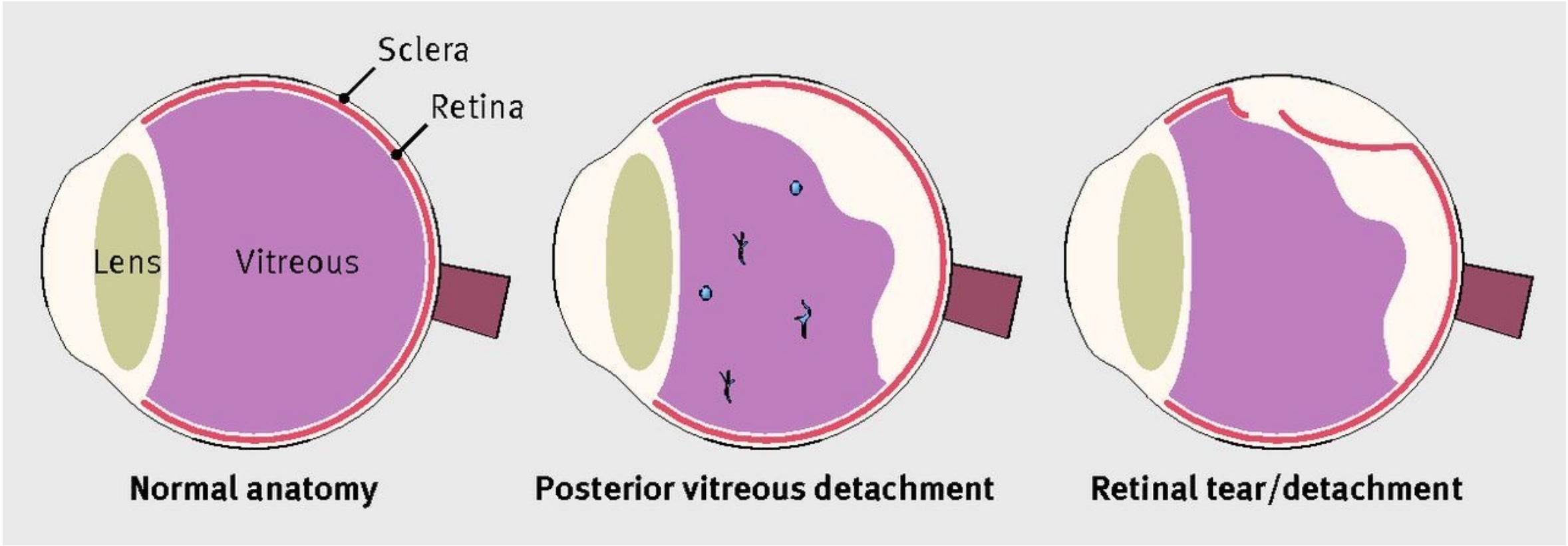


- Sudden onset of a large flash or flashes
 - Often arc-shaped and in the part of vision closer to your ear
 - More visible in dark environments
- Followed by appearance of floaters in your view
 - There may be a large floater more prominent than the others
 - May be seen as a “haze,” “film,” or “screen” over the vision
- Floaters may increase over several days

Why Are We So Concerned About PVD?



- At least 5-10% of the time, when the vitreous separates from the retina, it tears the retina and/or a retinal blood vessel
- Most patients with retinal tears following PVD progress to retinal detachment
- Retinal detachment, untreated, usually leads to permanent blindness
- Treatment of retinal detachment usually requires surgery
 - Even with treatment, often some degree of permanent vision loss
- **Symptoms are the same whether there is PVD with or without a retinal tear!**
- **Retinal detachment will start with a shadow/curtain in your side vision**

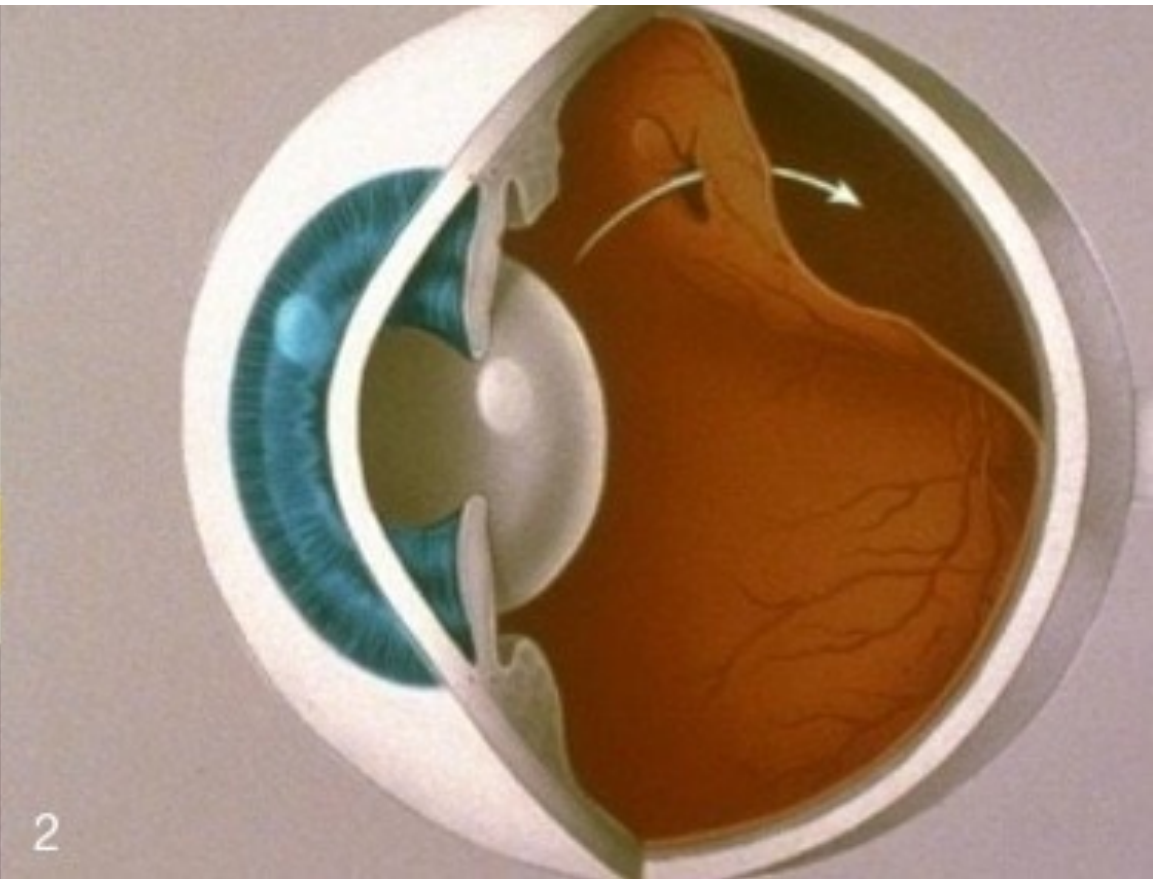
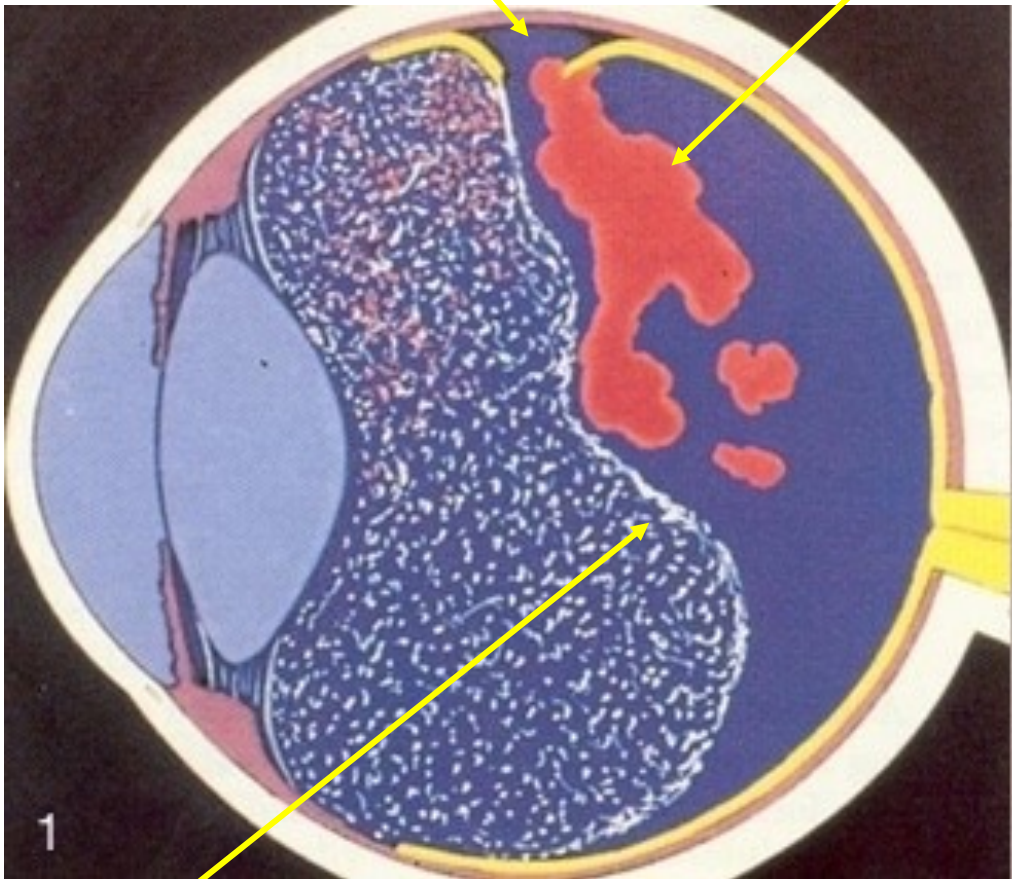


- When vitreous separates from retina, it can tear a blood vessel
- Broken blood vessel bleeds into vitreous cavity
 - “Vitreous hemorrhage”
- Blood cells and clots amount to a significant increase in floaters
 - Sometimes vision becomes very blurry +/- red tint
- Bleeding quickly stops spontaneously, but blood cells and clots persist for weeks-months
- Blood eventually clears spontaneously in most patients
- Vitreous hemorrhage increases risk that retinal tear has also occurred

Retinal tear

Blood in liquified area of vitreous

When fluid goes through retinal tear behind retina, retinal detachment forms



Vitreous separates away from retina

Why Do Some People Get Retinal Tears?

- During eye development, some people develop abnormally strong attachments between the vitreous and the retina
- Near-sighted (myopic) people are more likely to have these adhesions
- Usually there is no genetic defect and nothing else wrong with that person
- There is no way predict ahead of time who will get retinal tears
 - If retinal tear in one eye, more likely to get tear in the second eye

What Happens if I Get a Retinal Tear?

- A retinal tear can be treated in the clinic with laser
- Laser applies small scars around the tear to prevent fluid from going into it and detaching retina
- Retinal laser (“laser retinopexy”)
 - In-office procedure
 - No cutting
 - Low risk
 - Minimal discomfort
- Treated retinal tears virtually never affect vision

How Can I Prevent PVD and Retinal Tears?

- **Bottom line: You cannot prevent PVD or retinal tears!**
 - It is one of many age-related changes in the body
- Blunt trauma (e.g., getting punched in the eye)
 - Can hasten PVD onset
 - Can sometimes directly cause a retinal tear
- Sports involving repeated head trauma (e.g., boxing) likely increase the risk of retinal tears and detachment
- Rarely, in some patients, applying laser to some parts of the retina can prevent some retinal tears
 - Usually, no preventive therapy is effective

How Can I Prevent Retinal Detachment?

- If you have PVD symptoms (sudden onset of flashes and/or floaters), get a dilated retinal exam promptly!
 - Ideally within 1-2 days
 - Don't wait a week!
- Without retinal exam, you cannot tell whether you have a retinal tear
- But if you have a tear and you get examined promptly, the tear can be lasered and vision will be preserved

What Kinds of Retinal Tests Are Done in the Eye Clinic?

- First, a dilated retinal exam
 - Dilation lasts on average about 4 hours
 - While dilated
 - Lights will appear brighter
 - Up-close vision will be blurrier
- Color pictures of the retina
- Optical coherence tomography (OCT)
 - Cross-sectional slices of back part of retina
- Ultrasound

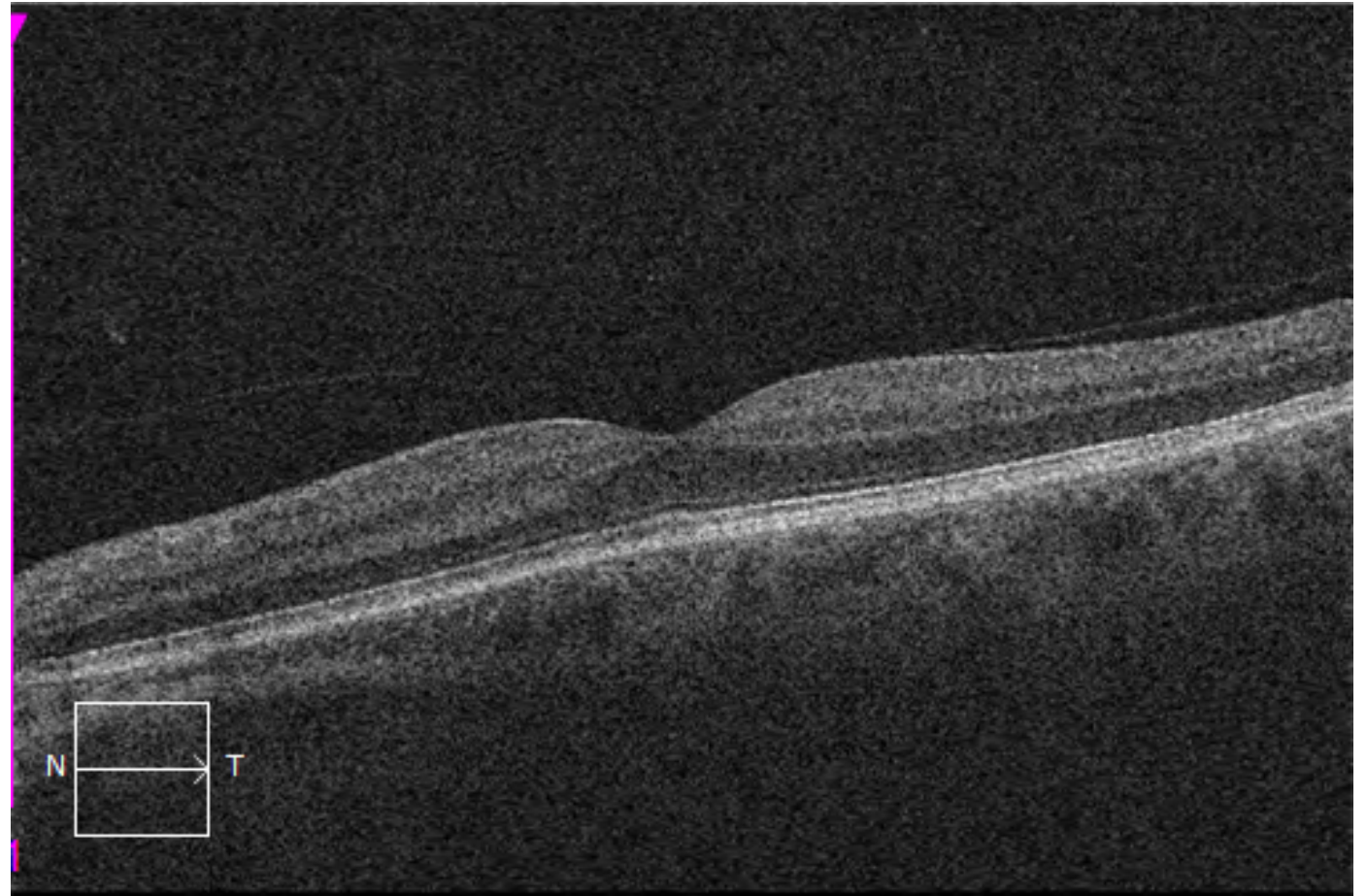
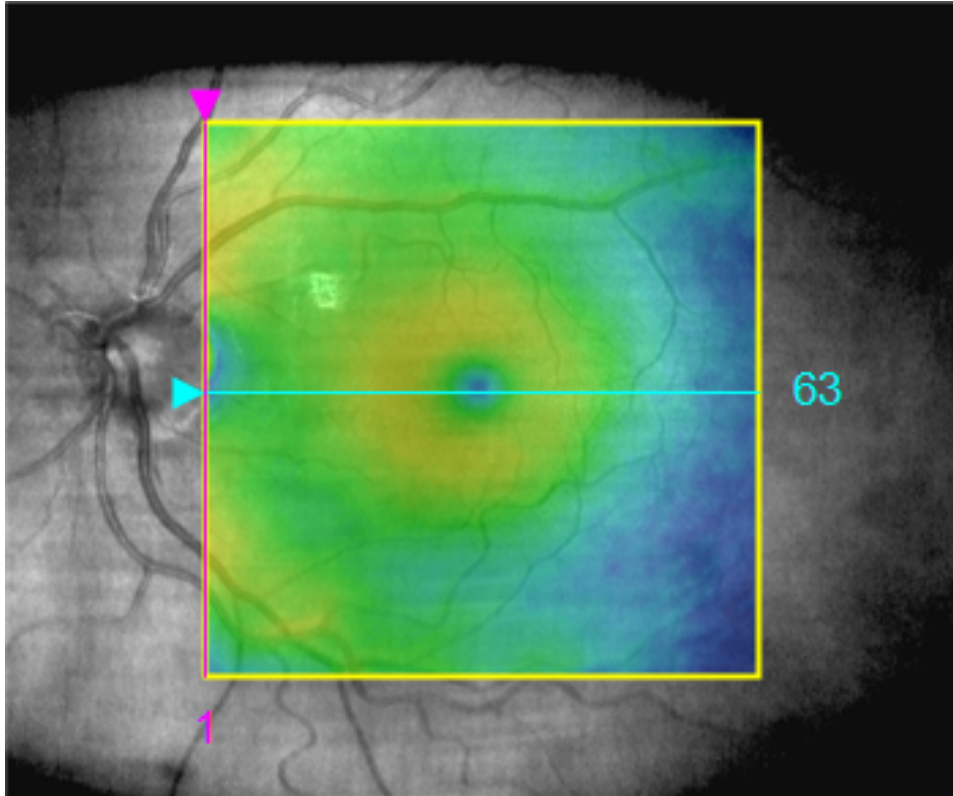
Color Fundus (Retinal) Photo

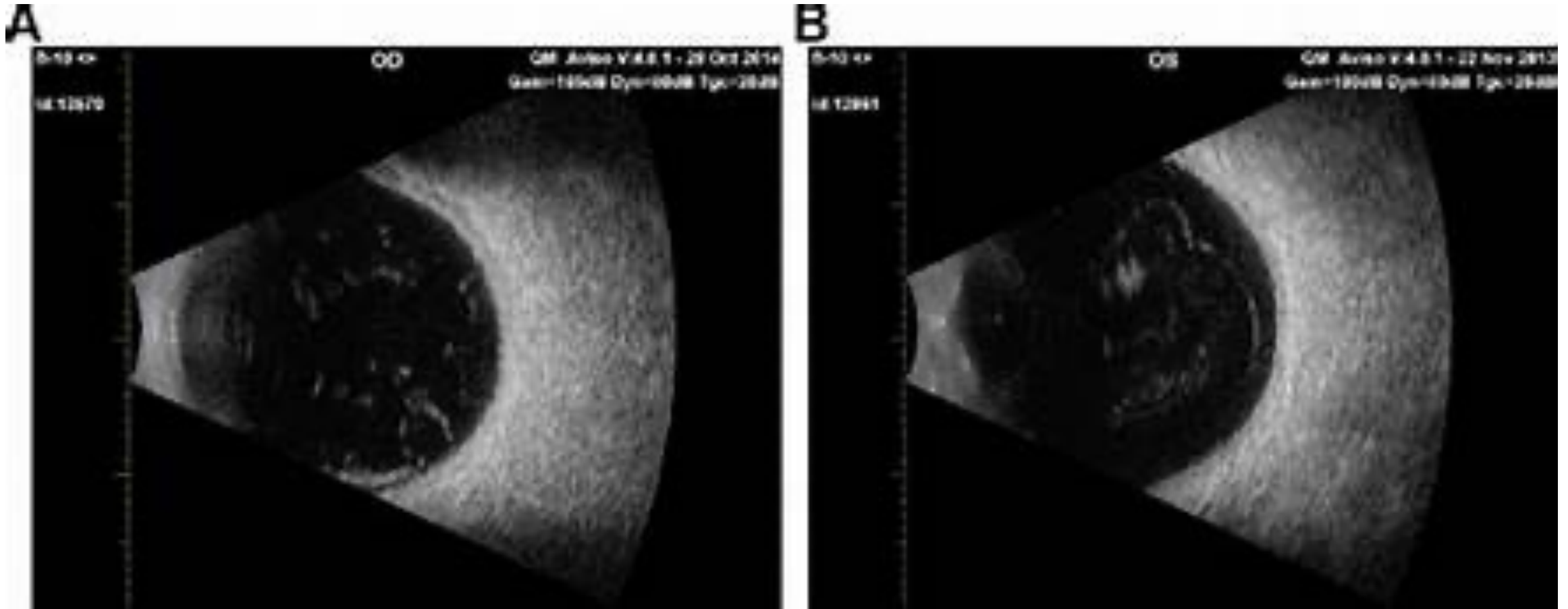


Retinal Tear



Optical Coherence Tomography





- Flashes resolve within days to few weeks (but may take months)
- Floaters improve to a stable, mild level over weeks to months
 - They never fully go away!
- The brain learns to ignore the floaters over time in most patients
 - Still present but much less bothersome
- A small % of people remain very bothered by the floaters
 - It is unclear why some people are more symptomatic than others
 - On ultrasound, more symptomatic patients have denser vitreous opacities
 - Variations in brain adaptation may also contribute

“Don’t Worry-Your Vision is 20/20”

- Visual acuity is most common measurement of visual function ...
- ... But not the only one!
- Vision *quality* can be decreased even if visual *acuity* remains 20/20
- Analogy
 - Patient with tinnitus (ringing in the ears) can still understand every word you say



- Contrast sensitivity reduced by 2/3 in patients with symptomatic floaters
- 60-70% additional relative reduction in contrast in patients with multifocal intraocular lenses
 - Compared to patients with “standard” monofocal lenses
- Tests for measuring contrast sensitivity are well-established in research settings but not practical in clinic



Sebag J, et al. Vitrectomy for floaters: Prospective Efficacy Analyses and Retrospective Safety Profile. *Retina* 2014; **34**(6): 1062.

Yee et al. *Investigative Ophthalmology & Visual Science* July 2018, Vol.59, 2199

What Can be Done if Floaters Keep Affecting my Vision?

- Observation
 - Sometimes symptoms eventually improve with more time
- YAG laser
- Surgery
 - Pars plana vitrectomy



The Good:

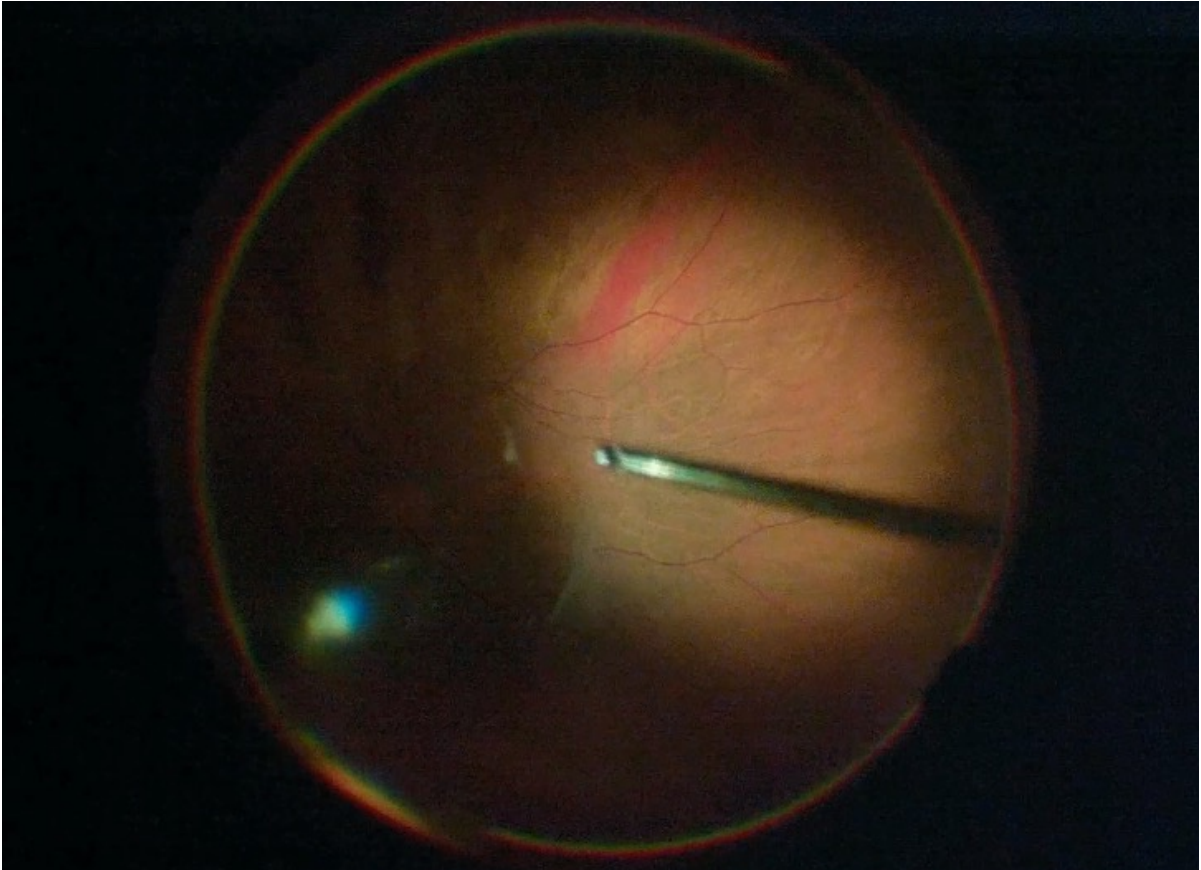
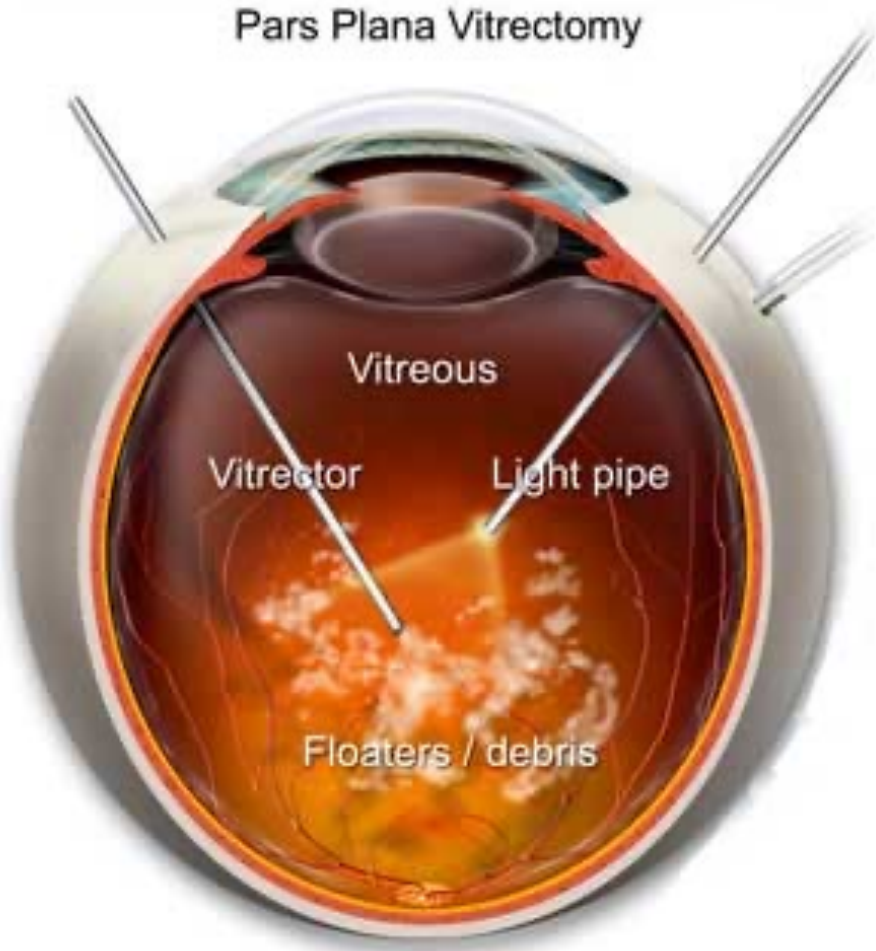
- In-office procedure without cutting or pain
- Laser breaks up vitreous opacities into smaller pieces

The Bad:

- Many patients still symptomatic afterwards
 - The solution to floaters is not as simple as breaking up big floaters
- Multiple sessions required, and may not be covered by insurance
 - Risks of procedure increase with multiple sessions
- Most retinal specialists do not perform YAG laser for floaters

- “Bread and butter” surgery of every retinal surgeon
- Day surgery, logistically similar to cataract surgery
- Three small wounds are made in sclera (white part of eye)
 - Remove jelly while replacing it with special saline fluid
 - 30 minutes or less
 - Minimal discomfort, minimally invasive
 - Wounds rarely require sutures
- Recovery similar to that after cataract surgery
- Very effective: >90% of patients have resolution of symptoms

Pars Plana Vitrectomy



- Not a risk, but an expectation: cataract progression
 - If not already had cataract surgery, will need it within 1-2 years
 - One reason why we favor PPV in patients who have already had cataract surgery
- 1-2% risk of retinal detachment
- Low risk of glaucoma (difficult to distinguish from other risk factors)
- Other very rare, but potentially serious, risks
 - Ocular infection
 - Ocular bleeding

- PPV is reasonable if floaters are persistent and substantially limiting quality of life or daily function
 - Work-related activities
 - Reading
 - Driving
 - Etc.
- We advise patients to wait at least 3 (ideally 6) months for floater symptoms to improve on their own
 - In most patients, floaters will not end up being bothersome
- **Always remember that removing floaters is an elective procedure!**

- Sudden onset of flashes and floaters: most commonly due to PVD
- Don't ignore PVD symptoms: get retinal exam promptly!
 - Cannot rule out retinal tear based on symptoms alone
- In most people, floater symptoms will end up not being bothersome
 - May take up to months
 - Floaters will not completely go away
- If persistent floaters interfere with quality of life, modern vitrectomy surgery is safe and effective



Floaters are like your kids

Sometimes they are annoying but
you don't have to "get rid of
them"!

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