Idiopathic Macular Hole

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  Age and gender

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During what age range does PVD typically occur?

Idiopathic Macular Hole

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During what age range does PVD typically occur?
The sixth through eighth decades

Idiopathic Macular Hole

- What are the two nonocular risk factors for IMH?
  Age and **gender**

  Which gender is at greater risk?

Idiopathic Macular Hole

- What are the two nonocular risk factors for IMH?
  Age and **gender**

  Which gender is at greater risk?
  Female

Idiopathic Macular Hole

- What are the two nonocular risk factors for IMH?
  Age and **gender**

  Which gender is at greater risk?
  Female

  What is the female: male risk ratio?

Idiopathic Macular Hole

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  Age and **gender**

  Which gender is at greater risk?
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  What is the female: male risk ratio?
  2:1

Idiopathic Macular Hole

- What are the two nonocular risk factors for IMH?
  Age and gender
- What is the one ocular risk factor?

Idiopathic Macular Hole

- What are the two nonocular risk factors for IMH? Age and gender
- What is the one ocular risk factor? Myopia

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What impact does myopia have on the risk of PVD?

Idiopathic Macular Hole

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What impact does myopia have on the risk of PVD?
It causes it to occur at an earlier age

Idiopathic Macular Hole

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The one-and-only
J. Donald M. Gass
1928-2005

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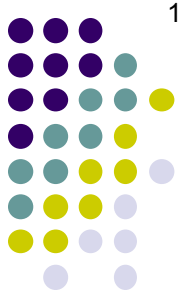

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About 10

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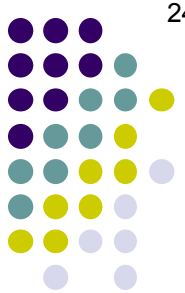
- In a nutshell, what is the cause of IMH?

Idiopathic Macular Hole



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Let's drill down on the PVD process

Idiopathic Macular Hole

What does it mean to say the posterior vitreous 'detaches'?

Let's drill down on the PVD process

Idiopathic Macular Hole

What does it mean to say the posterior vitreous 'detaches'?
It means that posterior components of the normal complement of anatomic attachments between the vitreous body and other internal ocular structures have 'let go'

Let's drill down on the PVD process

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The vitreous must undergo synchysis and syneresis

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What is synchysis*?*

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What is synchysis*?*
Liquefaction of the vitreous

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What is syneresis*?*
"Collapse" of the vitreous

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--The ora serrata
--Major retinal vessels
--The macula
--The optic nerve head

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What is the eponymous name of the attachment between the anterior vitreous and the posterior lens capsule?

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What is the eponymous name of the attachment between the anterior vitreous and the posterior lens capsule?
Weiger's ligament

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The attachment of the vitreous at the ora serrata comprises what important structure?

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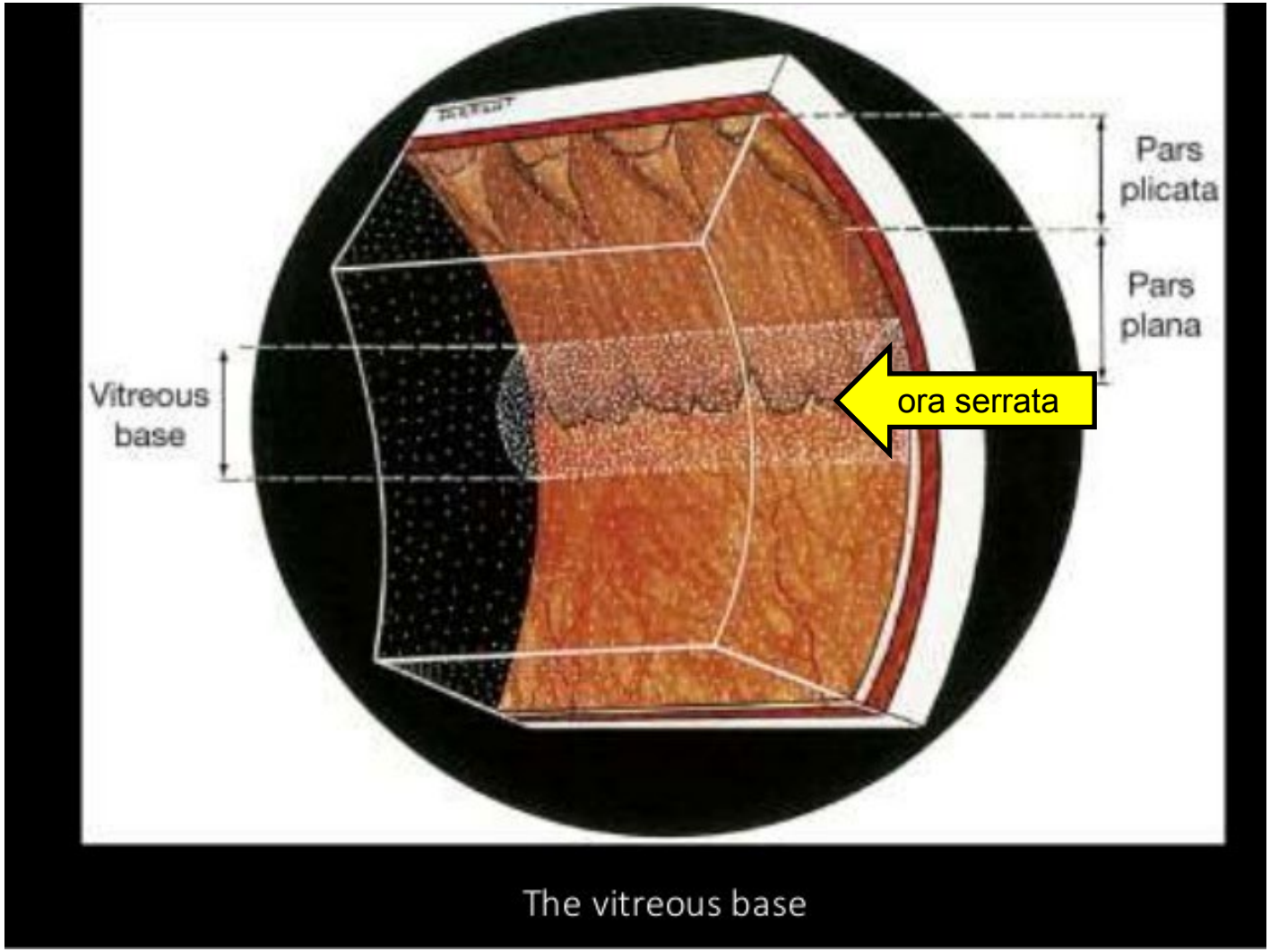
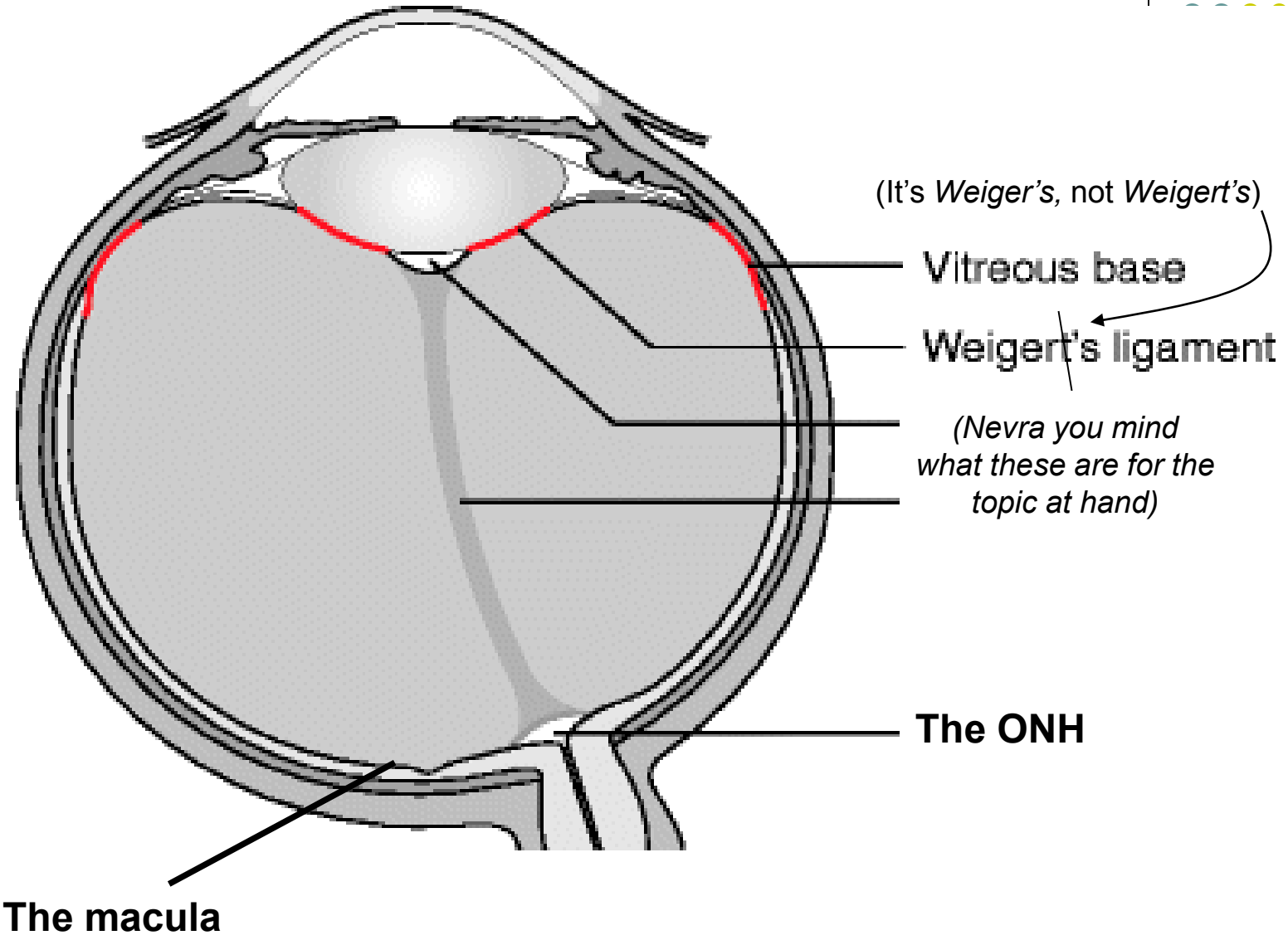
--**The ora serrata** (ie, the vitreous base)
--Major retinal vessels
--The macula
--The optic nerve he

The attachment of the vitreous at the ora serrata comprises what important structure?
The **vitreous base**

Idiopathic Macular Hole



Idiopathic Macular Hole



Vitreous attachments

Idiopathic Macular Hole

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Do Wieger's ligament and the vitreous base detach in a PVD?

Idiopathic Macular Hole

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Do Wieger's ligament and the vitreous base detach in a PVD?
Negatory good buddy. The base **never** detaches (except in cases of severe blunt trauma).

Idiopathic Macular Hole

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Do Wieger's ligament and the vitreous base detach in a PVD?
Negatory good buddy. The base **never** detaches (except in cases of severe blunt trauma). As for Wieger's ligament: Given its extremely anterior location, it shouldn't be surprising that it is spared in a **posterior** vitreous detachment.

Idiopathic Macular Hole

What specific event initiates the PVD process—that is, what 'lets go' first?

--The ora serrata (ie, the vitreous base)

--Major retinal vessels?

--The macula?

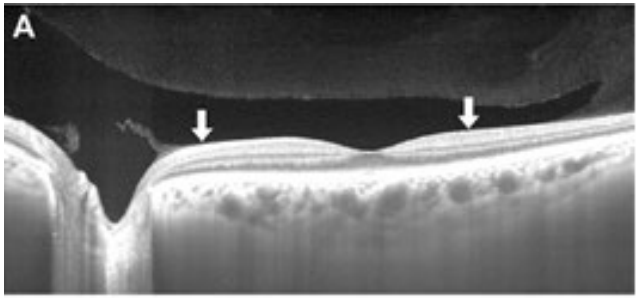
--The optic nerve head?

Idiopathic Macular Hole

What specific event initiates the PVD process—that is, what 'lets go' first?

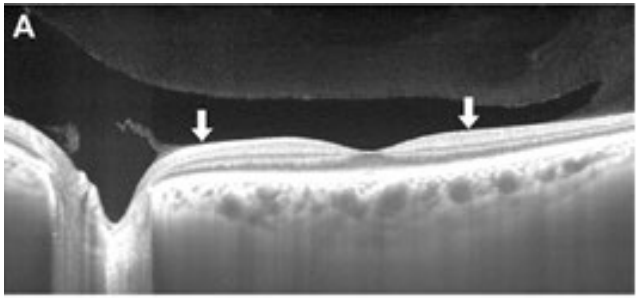
The vitreous first detaches from the perifoveal macula, along with the associated vessels.

--The ora serrata (ie, the vitreous base)
--Major retinal vessels
--The macula (perifoveal region)
--The optic nerve head



Pre-PVD

Evolution of a PVD. Arrows indicate the location of the posterior vitreous face



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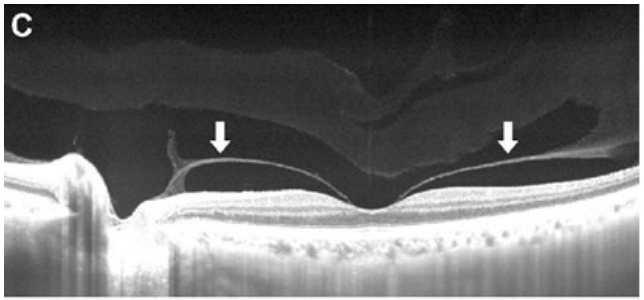

Perifoveal detachment

Evolution of a PVD. Arrows indicate the location of the posterior vitreous face

Idiopathic Macular Hole

What specific event initiates the PVD process—that is, what 'lets go' first? ***How does it proceed, ie, what lets go next?***

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--Major retinal vessels

--The macula (perifoveal region)

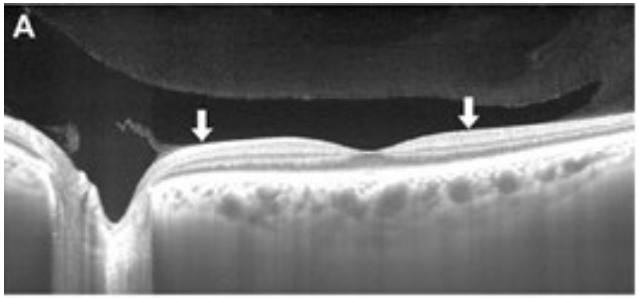
--The optic nerve head

Idiopathic Macular Hole

What specific event initiates the PVD process—that is, what 'lets go' first? ***How does it proceed, ie, what lets go next?***

The vitreous first detaches from the perifoveal macula, along with the associated vessels. **It next detaches from the fovea.**

--The ora serrata (ie, the vitreous base)
--Major retinal vessels
--**The macula** (perifoveal region; later, **the fovea**)
--The optic nerve head



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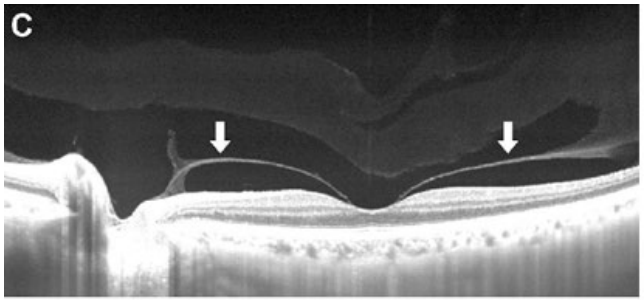
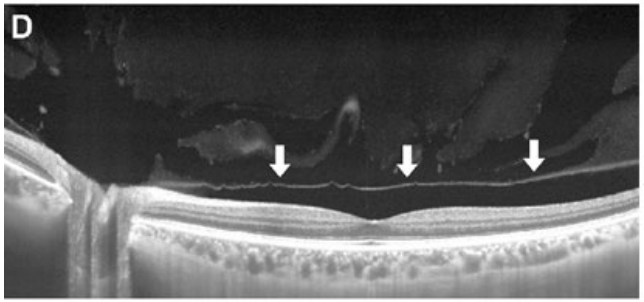


Perifoveal detachment



Foveal detachment

Evolution of a PVD. Arrows indicate the location of the posterior vitreous face

Idiopathic Macular Hole

What specific event initiates the PVD process—that is, what 'lets go' first? How does it proceed, ie, what lets go next? ***What is the final step in the PVD process?***
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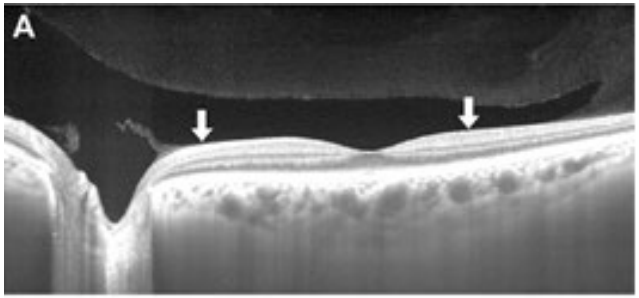
--The ora serrata (ie, the vitreous base)
--Major retinal vessels
--The macula (perifoveal region; later, the fovea)
--The optic nerve head

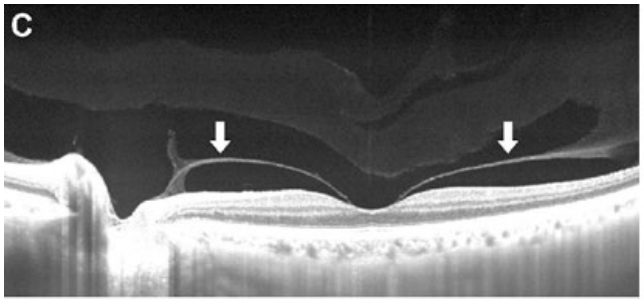
Idiopathic Macular Hole

What specific event initiates the PVD process—that is, what 'lets go' first? How does it proceed, ie, what lets go next? ***What is the final step in the PVD process?***
The vitreous first detaches from the perifoveal macula, along with the associated vessels. It next detaches from the fovea. **Finally, once it has peeled loose from the mid-peripheral retina, it comes off the ONH.**

--The ora serrata (ie, the vitreous base)
--Major retinal vessels
--The macula (perifoveal region; later, the fovea)
--**The optic nerve head**



Pre-PVD



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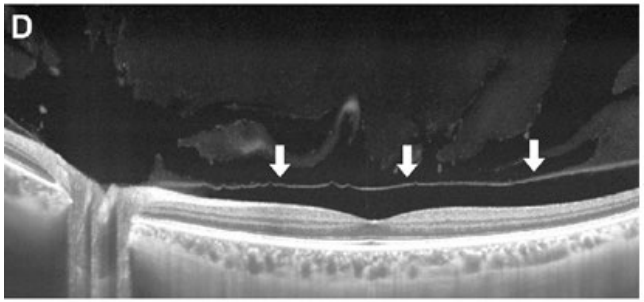
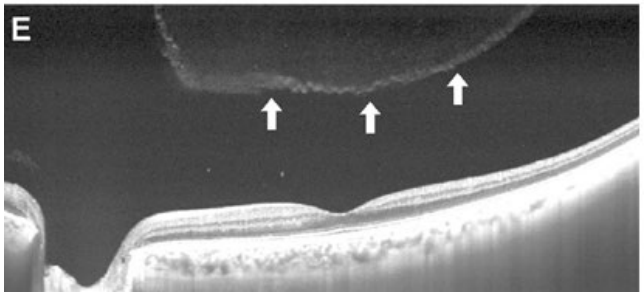


Foveal detachment



ONH detachment (complete PVD)

Evolution of a PVD. Arrows indicate the location of the posterior vitreous face

Idiopathic Macular Hole

What specific event initiates the PVD process—that is, what 'lets go' first? How does it proceed, ie, what lets go next? What is the final step in the PVD process?
The vitreous first detaches from the perifoveal macula, along with the associated vessels. It next detaches from the fovea. Finally, once it has peeled loose from the mid-peripheral retina, it comes off the ONH.

How long does this process take?

--The ora serrata (ie, the vitreous base)
--Major retinal vessels
--The macula (perifoveal region; later, the fovea)
--The optic nerve head

Idiopathic Macular Hole

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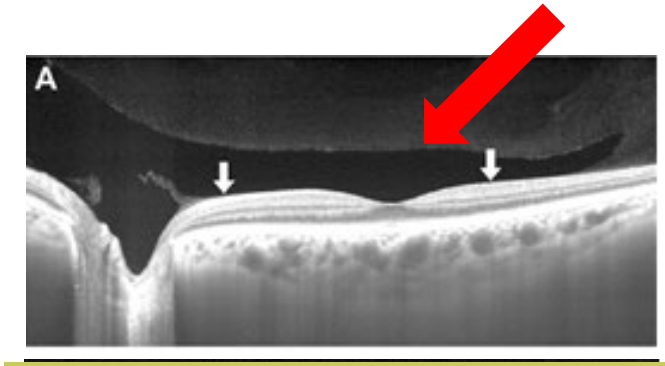
How long does this process take?
It varies of course, but is typically on the order of a number of years

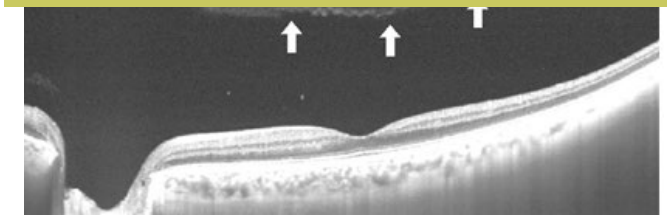
--The ora serrata (ie, the vitreous base)
--Major retinal vessels
--The macula (perifoveal region; later, the fovea)
--The optic nerve head



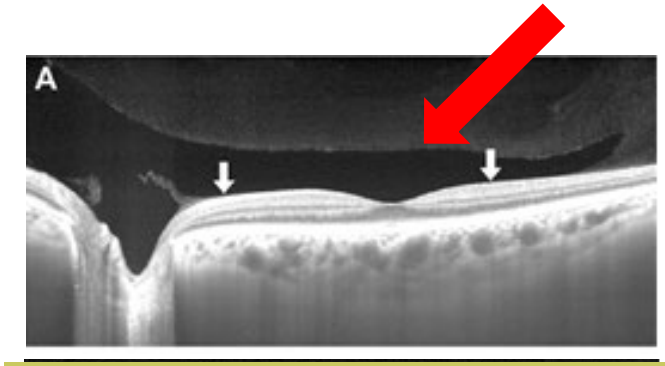
Pre-PVD

Hol up. This (red arrow) sure looks like a PVD. What's going on here?

VD. Arrows indicate the terior vitreous face



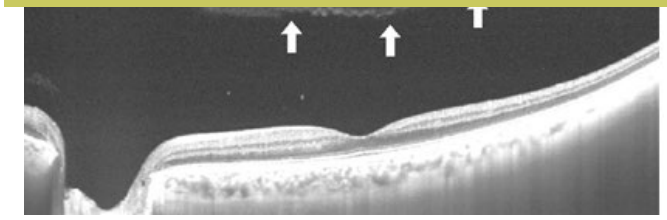
Completed PVD



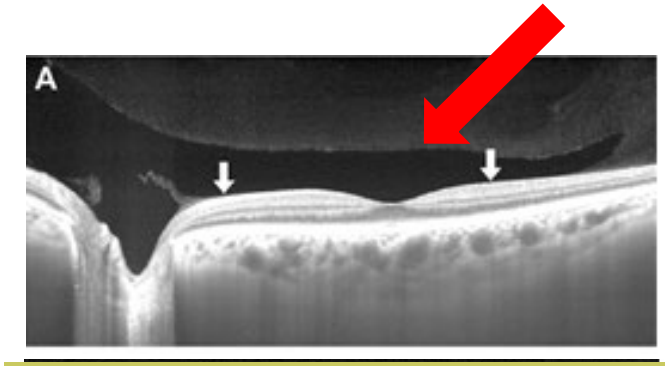
Pre-PVD

Hol up. This (red arrow) sure looks like a PVD. What's going on here?
The image is labeled correctly, ie, the white arrows are indicating the location of the vitreous face. The optically empty space between the formed vitreous and the macula is the [two words] (aka the [three words]).

VD. Arrows indicate the terior vitreous face



Completed PVD



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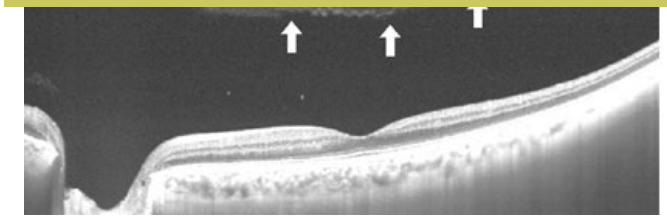

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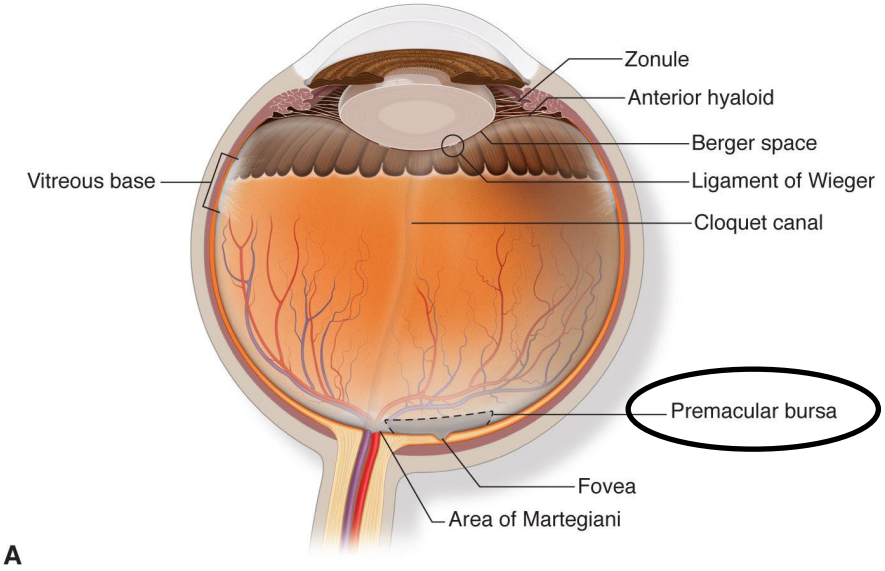
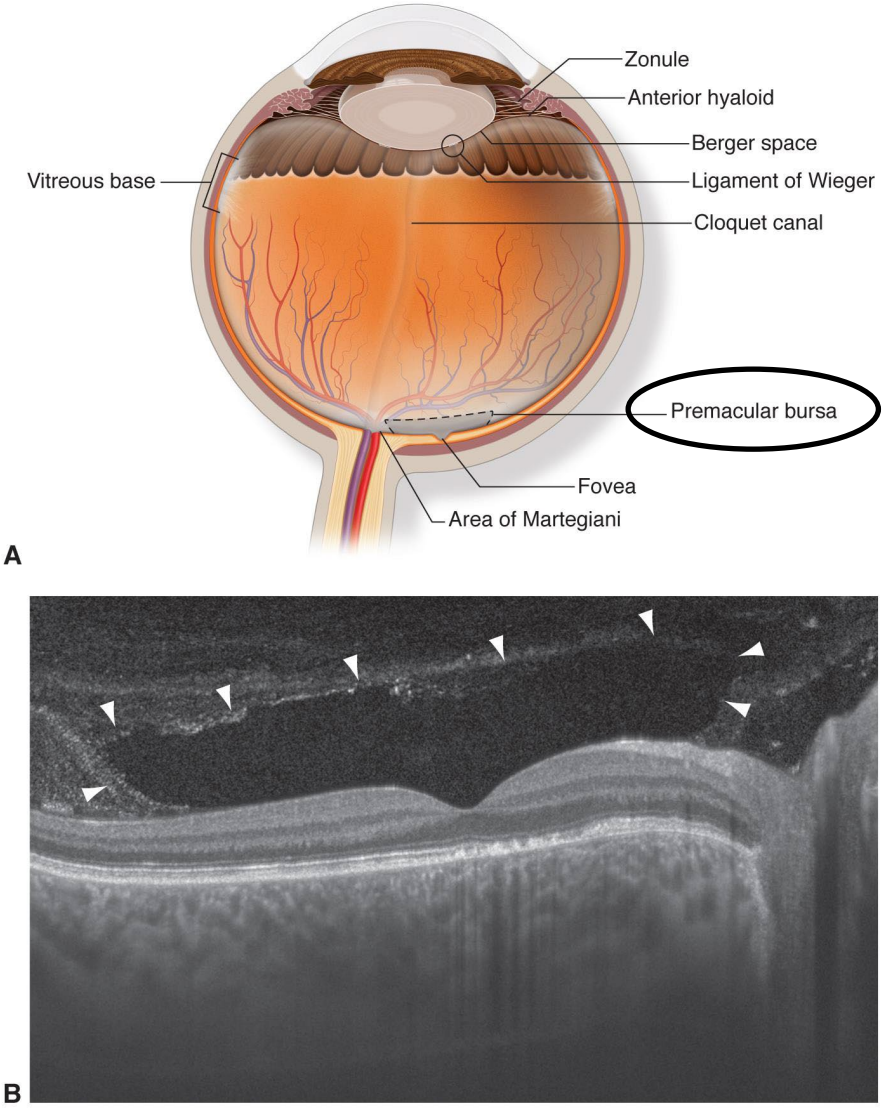
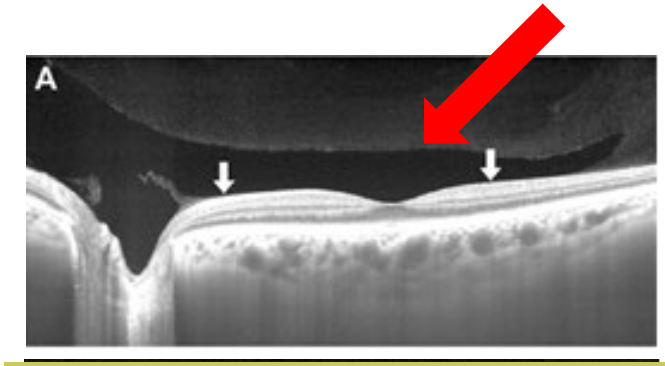


A, Anatomical features of the vitreous. A prominent area of liquefaction of the premacular vitreous gel is called the **premacular bursa**.



A, Anatomical features of the vitreous. A prominent area of liquefaction of the premacular vitreous gel is called the **premacular bursa**. **B,** SS-OCT image of posterior vitreous and macula region demonstrates the signal void in the vitreous cavity in front of the macula that represents the premacular bursa (arrowheads).



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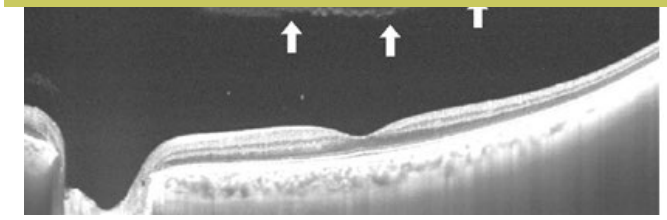
What material occupies the bursa?

VD. Arrows indicate the terior vitreous face



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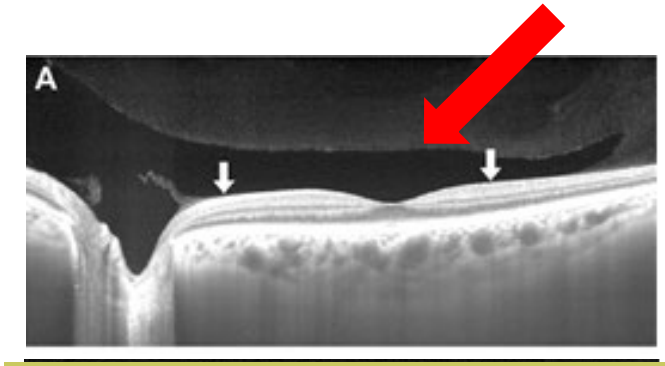

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What material occupies the bursa?
Liquefied vitreous

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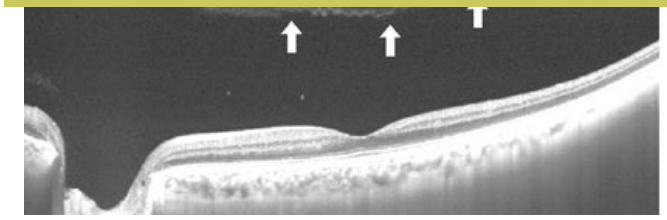

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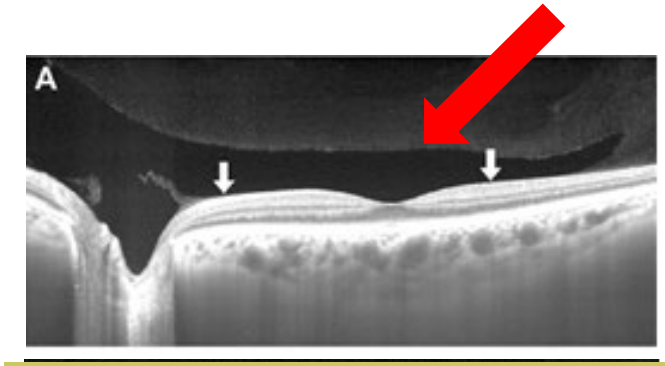

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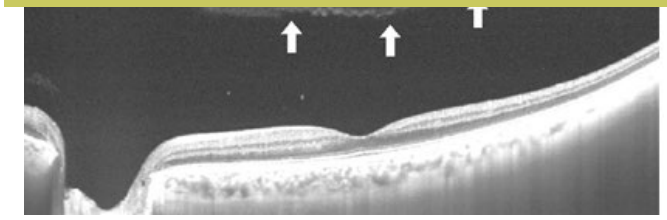
Liquefied vitreous

What purpose does the bursa serve?

VD. Arrows indicate the
terior vitreous face



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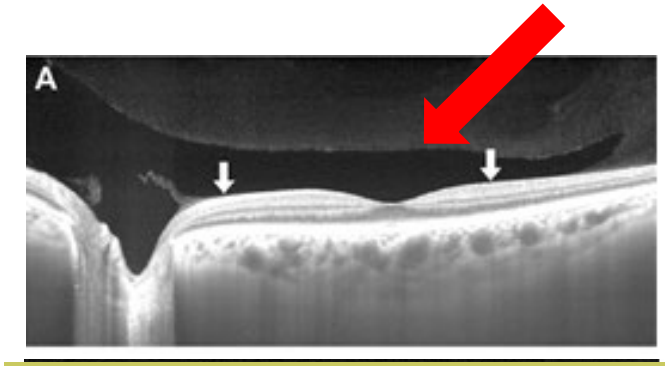

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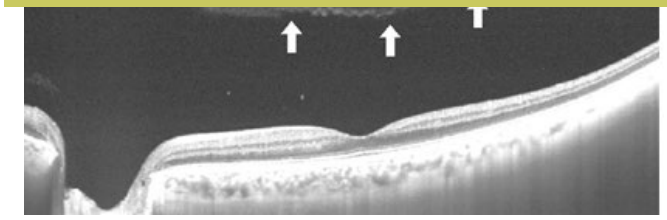
What material occupies the bursa?
Liquefied vitreous

What purpose does the bursa serve?
The absence of formed vitreous in this region means that torsional forces in the vitreous will not be transmitted directly to the macula, thus reducing traction on it

VD. Arrows indicate the
terior vitreous face



Completed PVD

Idiopathic Macular Hole

What specific event initiates the PVD process—that is, what 'lets go' first? How does it proceed, ie, what lets go next? What is the final step in the PVD process?
The vitreous first detaches from the perifoveal macula, along with the associated vessels. It next detaches from the fovea. Finally, once it has peeled loose from the mid-peripheral retina, it comes off the ONH.

How long does this process take?
It varies of course, but is typically on the order of a number of years

Under normal circumstances, at what point in the process does the individual become 'symptomatic,' ie, become aware that something is going on in the eye?

Next question

--The ora serrata (ie, the vitreous base)
--Major retinal vessels
--The macula (perifoveal region; later, the fovea)
--The optic nerve head

Idiopathic Macular Hole

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There are usually no (or minimal) symptoms until the PVD completes, ie, detaches from the ONH

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They report seeing the fibroglial tissue that has torn loose from the edge of the ONH

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What shape does this fibroglial tissue usually assume as it floats within the vitreous cavity?

Idiopathic Macular Hole

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A ring

Idiopathic Macular Hole

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Idiopathic Macular Hole

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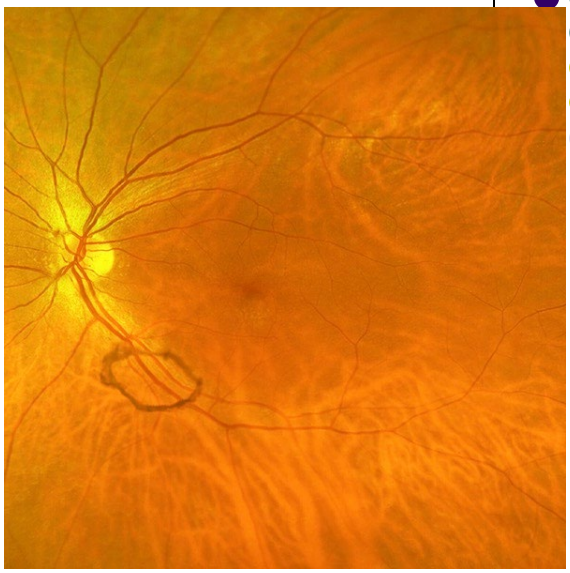
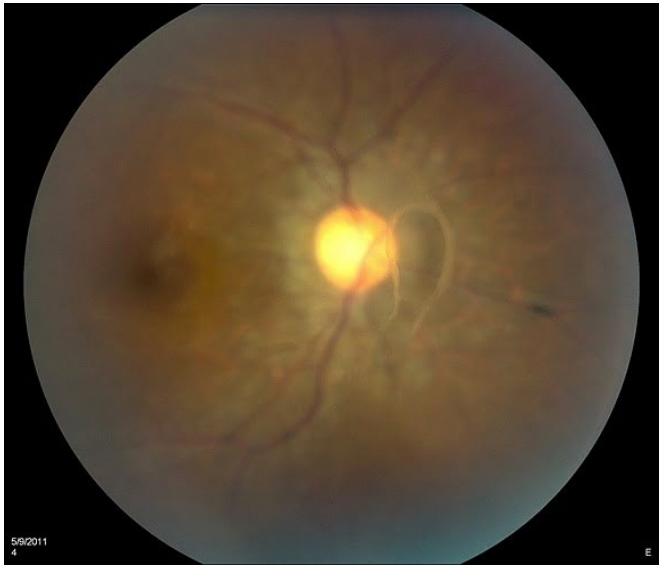
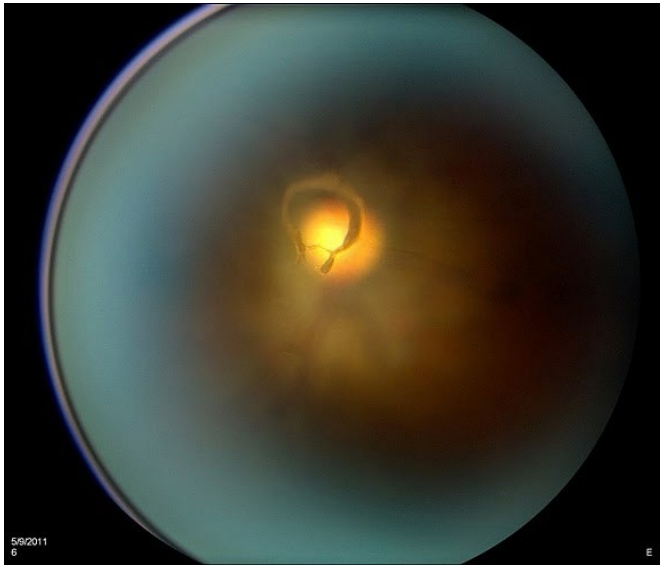
What is the eponymous name for this ring-shaped floater?
A Weiss ring

Idiopathic Macular Hole

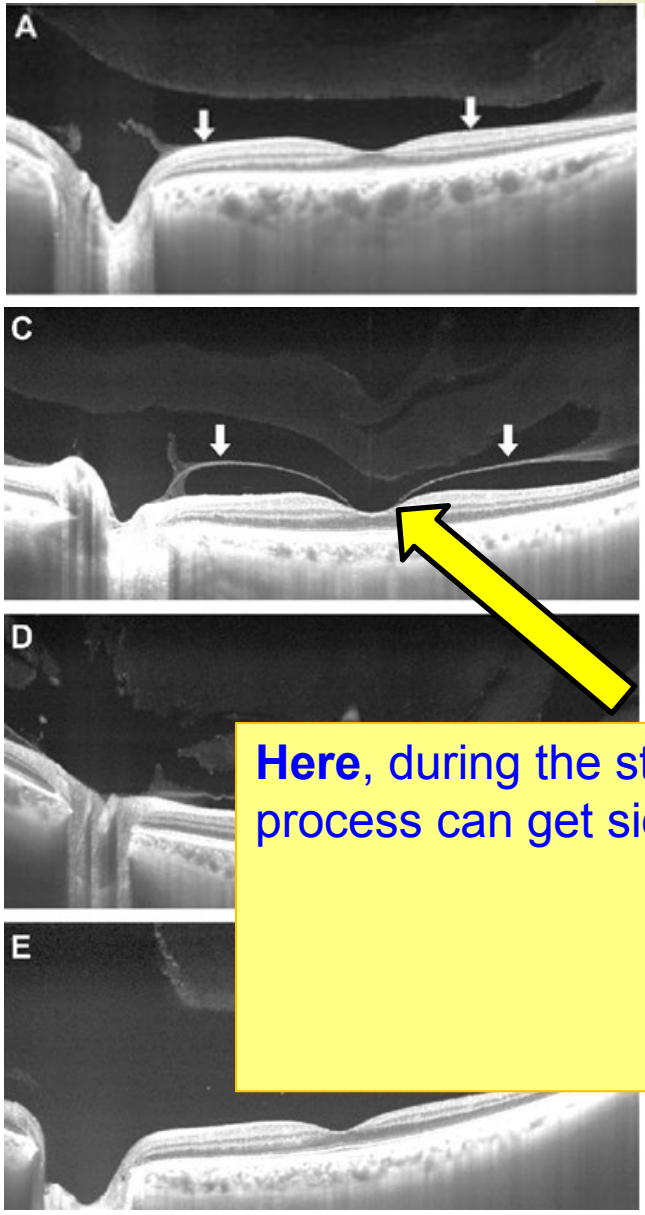


Weiss ring





Idiopathic Macular Hole

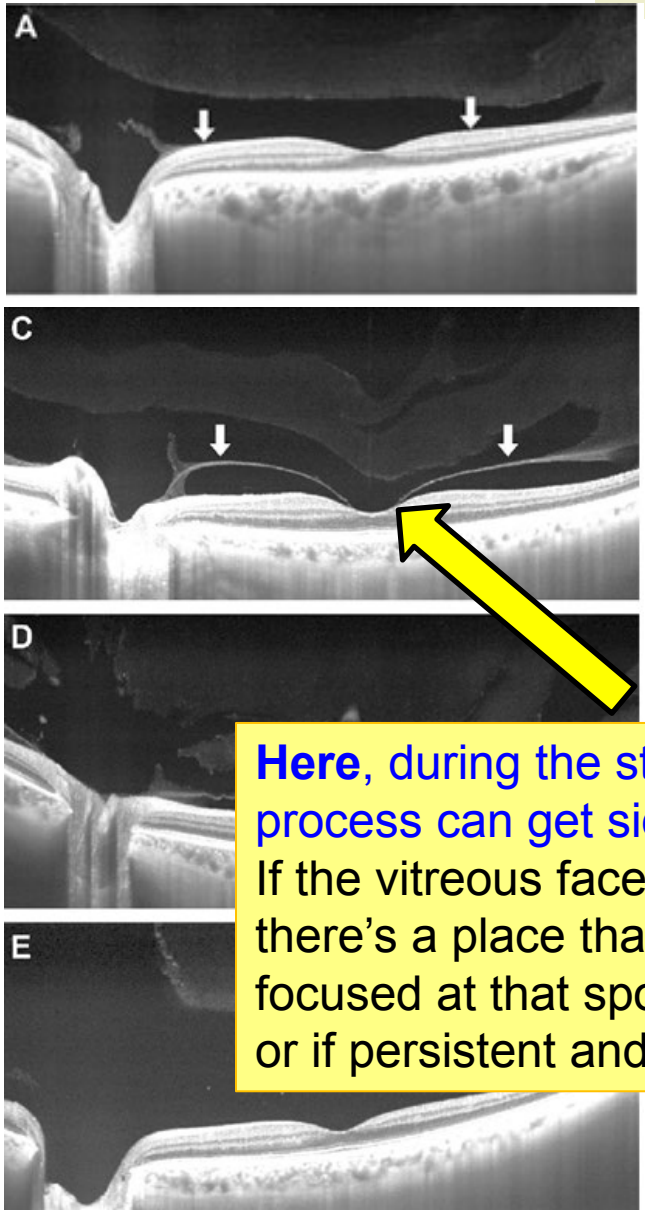


Pre-PVD

Perifoveal detachment

Here, during the stage of perifoveal detachment, is when the PVD process can get sideways, leading to the development of an IMH.

Idiopathic Macular Hole

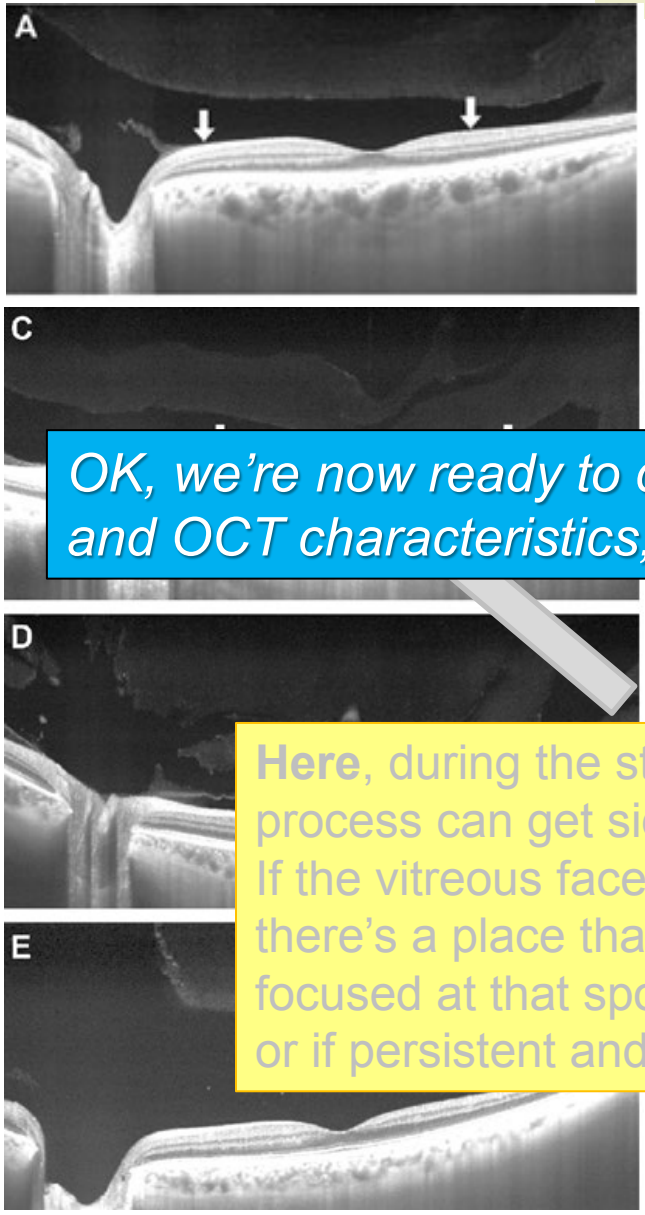


Pre-PVD

Perifoveal detachment

Here, during the stage of perifoveal detachment, is when the PVD process can get sideways, leading to the development of an IMH. If the vitreous face is overly adherent to a portion of the fovea—if there's a place that's reluctant to 'let go'—tractional forces will be focused at that spot. These forces can produce foveal distortion, or if persistent and severe enough, an IMH.

Idiopathic Macular Hole



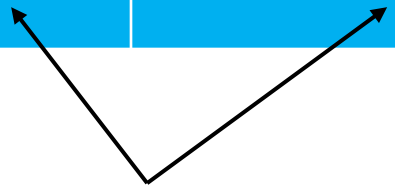
Pre-PVD

OK, we're now ready to delve into macular holes—their ophthalmoscopic and OCT characteristics, and how those characteristics define staging

Here, during the stage of perifoveal detachment, is when the PVD process can get sideways, leading to the development of an IMH. If the vitreous face is overly adherent to a portion of the fovea—if there's a place that's reluctant to 'let go'—tractional forces will be focused at that spot. These forces can produce foveal distortion, or if persistent and severe enough, an IMH.

Idiopathic Macular Hole

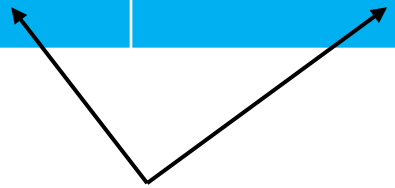
Stage (Gass)	Description (Gass)	sdOCT findings
?	?	



Identify the first stage in Gass's classification system, and provide a very brief description of the appearance of the macula

Idiopathic Macular Hole

Stage (Gass)	*Description (Gass)*	*sdOCT findings*
1A	Yellow *spot*	



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Idiopathic Macular Hole

IMH, stage 1A

Idiopathic Macular Hole

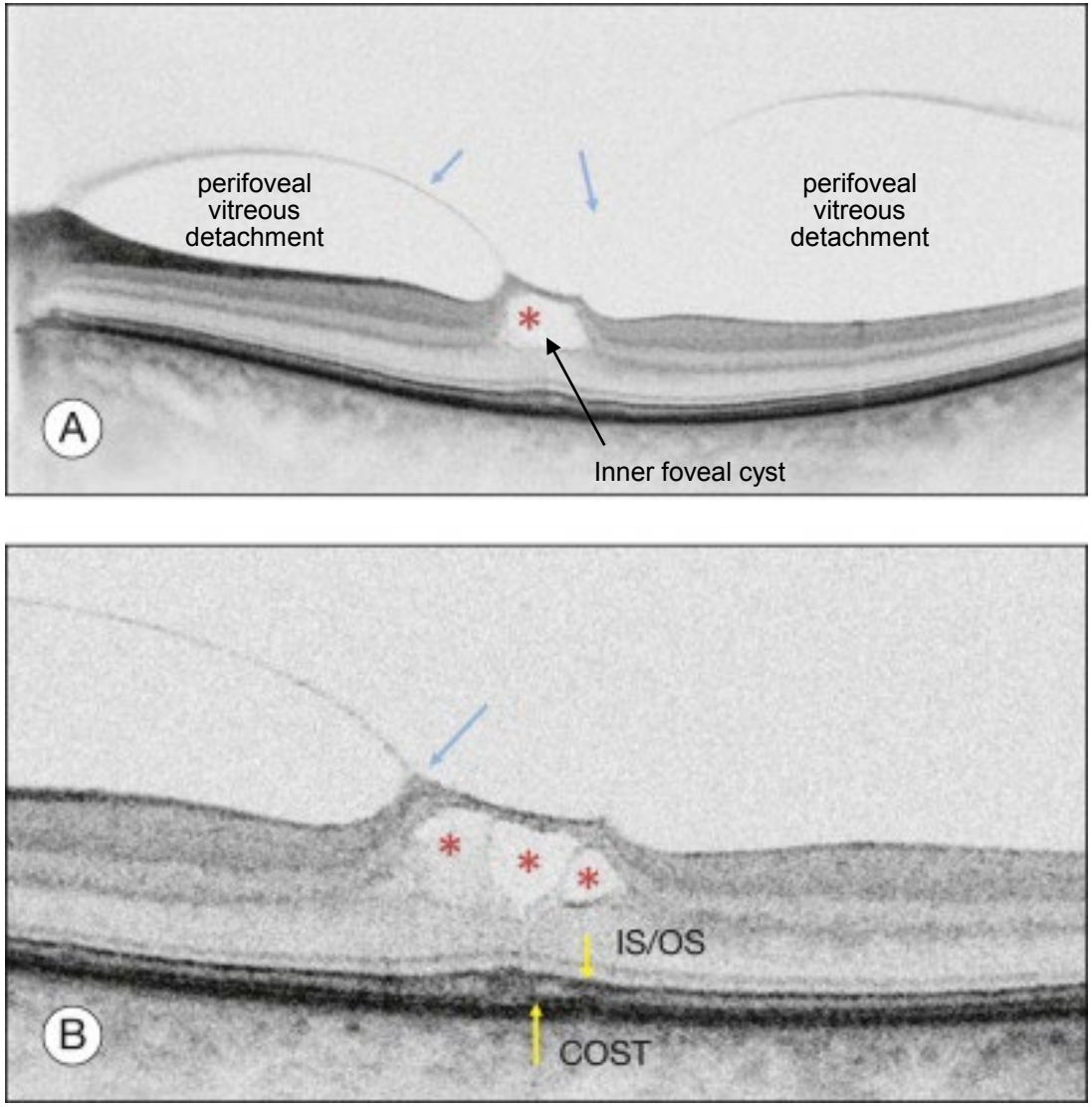
Stage (Gass)	*Description (Gass)*	*sdOCT findings*
1A	Yellow *spot*	*?*

Describe the sdOCT findings typical of this stage

Idiopathic Macular Hole

Stage (Gass)	*Description (Gass)*	*sdOCT findings*
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst

Describe the sdOCT findings typical of this stage



Stage 1A macular hole.
(A) OCT demonstrating a cyst in the inner part of the fovea (asterisk) due to the traction exerted by the incompletely detached posterior hyaloid (arrows).
(B) Magnification of (A) showing that the central cyst is divided into several cystic spaces by septa

Idiopathic Macular Hole

Stage (Gass)	*Description (Gass)*	*sdOCT findings*
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst
?	*?*	

Now the second stage, etc

Idiopathic Macular Hole

Stage (Gass)	*Description (Gass)*	*sdOCT findings*
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow *ring*	

Idiopathic Macular Hole

IMH, stage 1B

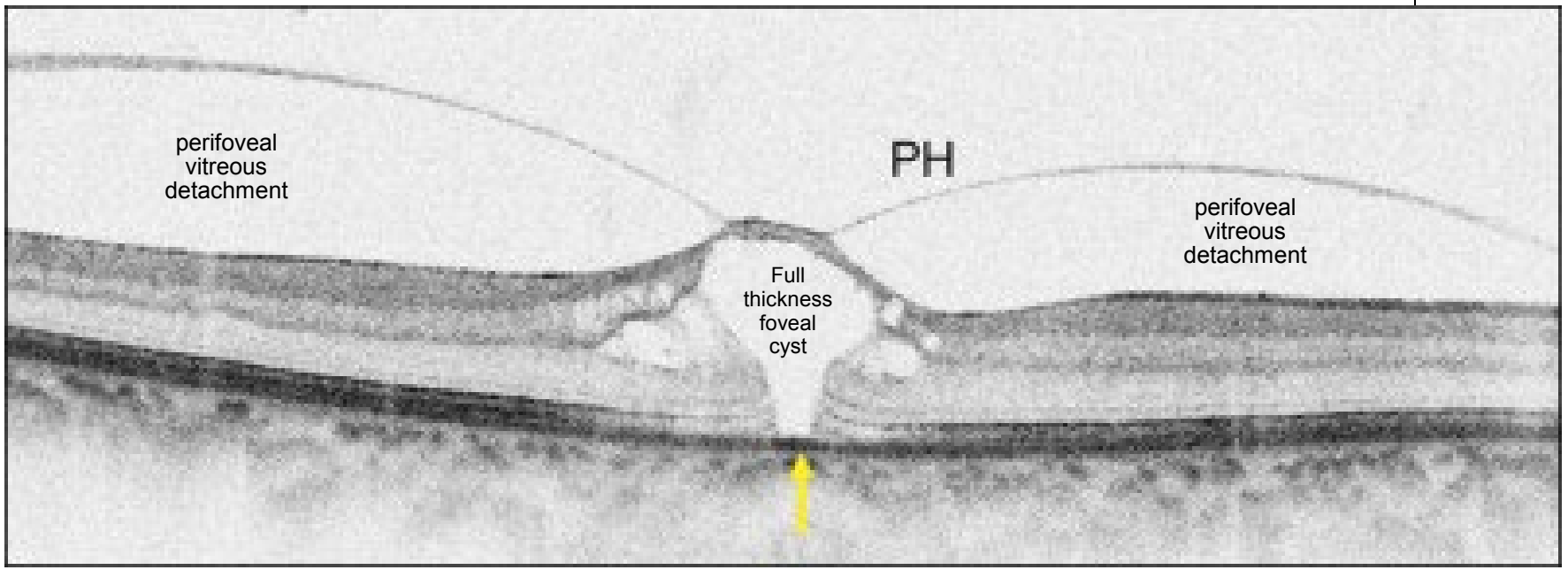
Idiopathic Macular Hole

Stage (Gass)	*Description (Gass)*	*sdOCT findings*
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow *ring*	*?*

Idiopathic Macular Hole

Stage (Gass)	*Description (Gass)*	*sdOCT findings*
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow *ring*	perifoveal vitreous detachment + full-thickness foveal cyst

Idiopathic Macular Hole



Stage 1B macular hole.
The posterior hyaloid (PH) is still attached to the roof of the cyst. The cystic space extends posteriorly and there is a break in the photoreceptor layer. Note also the cystic cavities around the central defect.

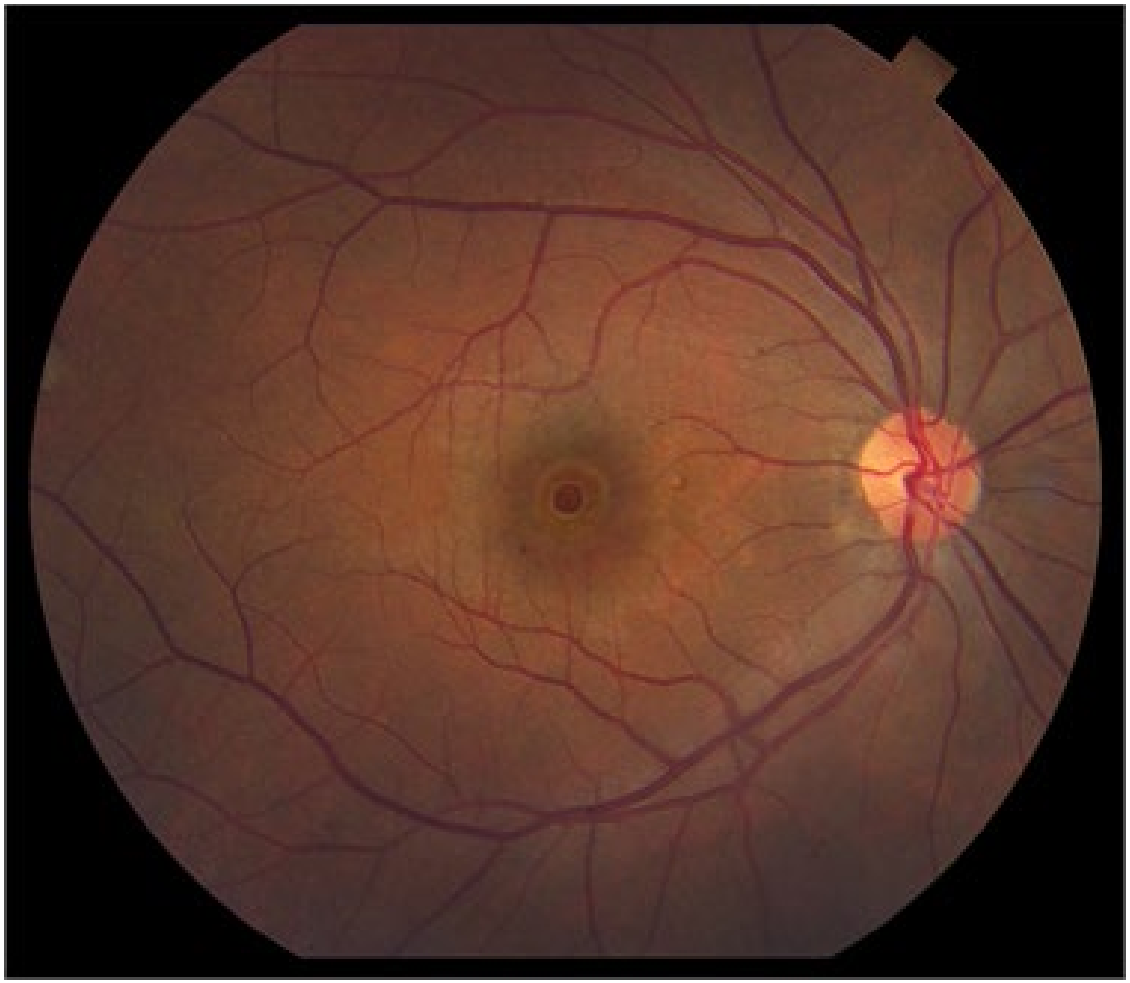
Idiopathic Macular Hole

Stage (Gass)	*Description (Gass)*	*sdOCT findings*
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow *ring*	perifoveal vitreous detachment + full-thickness foveal cyst
?	***?***	

Idiopathic Macular Hole

Stage (Gass)	*Description (Gass)*	*sdOCT findings*
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow *ring*	perifoveal vitreous detachment + full-thickness foveal cyst
2	Full-thickness macular hole, less than 400μ dia	

Idiopathic Macular Hole



IMH, stage 2

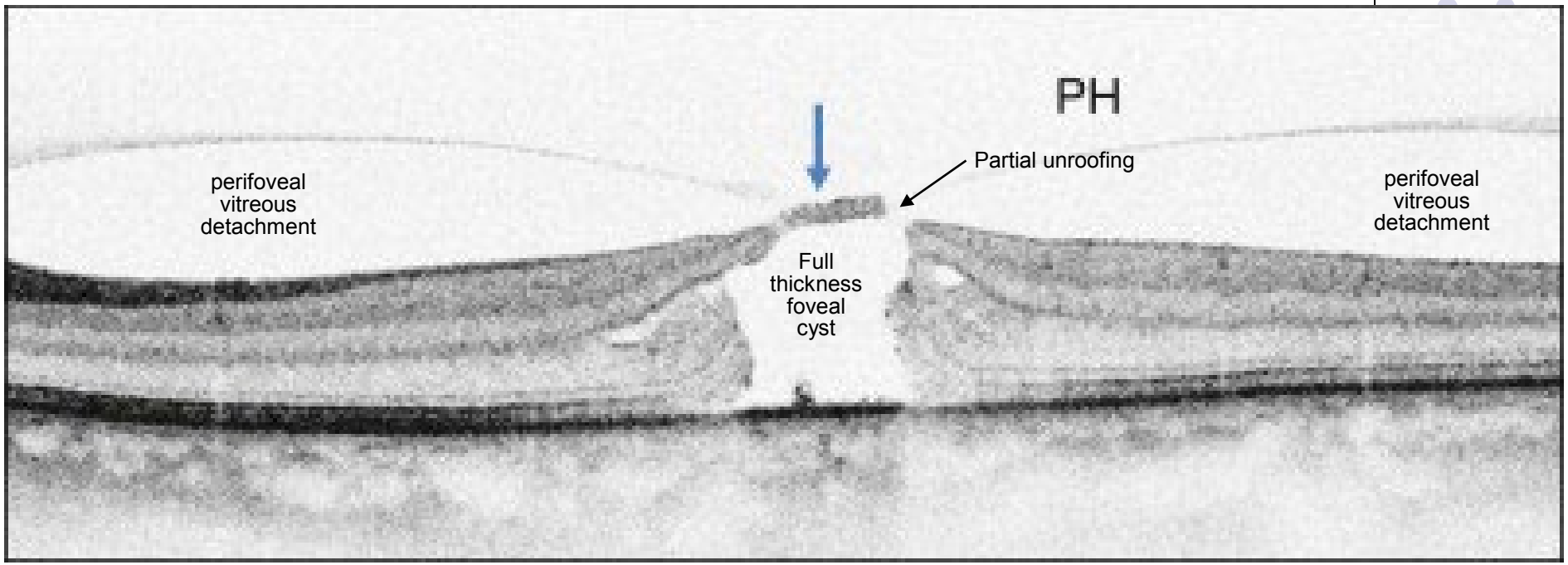
Idiopathic Macular Hole

Stage (Gass)	*Description (Gass)*	*sdOCT findings*
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow *ring*	perifoveal vitreous detachment + full-thickness foveal cyst
2	Full-thickness macular hole, less than 400μ dia	***?***

Idiopathic Macular Hole

Stage (Gass)	*Description (Gass)*	*sdOCT findings*
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow *ring*	perifoveal vitreous detachment + full-thickness foveal cyst
2	Full-thickness macular hole, less than 400μ dia	perifoveal vitreous detachment + full-thickness foveal cyst + partial cyst unroofing

Idiopathic Macular Hole



Stage 2 full-thickness macular hole.
The posterior hyaloid (PH) is still attached to the operculum (arrow). The operculum is only partially detached from the hole edge.

Idiopathic Macular Hole

Stage (Gass)	*Description (Gass)*	*sdOCT findings*
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow *ring*	perifoveal vitreous detachment + full-thickness foveal cyst
2	Full-thickness macular hole, less than 400μ dia	perifoveal vitreous detachment + full-thickness foveal cyst + partial cyst unroofing

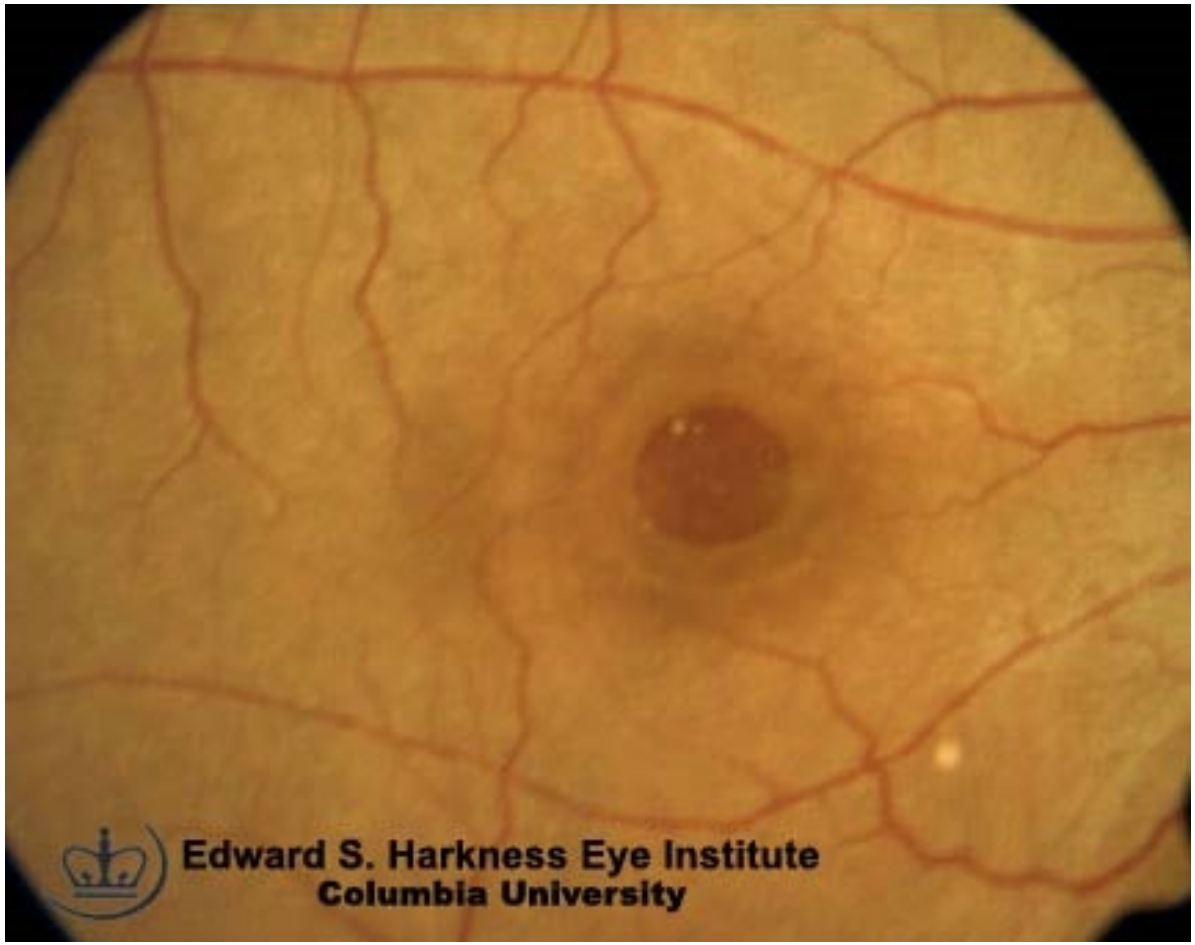
Idiopathic Macular Hole

Stage (Gass)	*Description (Gass)*	*sdOCT findings*
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow *ring*	perifoveal vitreous detachment + full-thickness foveal cyst
2	Full-thickness macular hole, less than 400μ dia	perifoveal vitreous detachment + full-thickness foveal cyst + partial cyst unroofing
?	***?***	

Idiopathic Macular Hole

Stage (Gass)	*Description (Gass)*	*sdOCT findings*
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow *ring*	perifoveal vitreous detachment + full-thickness foveal cyst
2	Full-thickness macular hole, less than 400μ dia	perifoveal vitreous detachment + full-thickness foveal cyst + partial cyst unroofing
3	Full-thickness macular hole, greater than 400μ dia no PVD (ie, no Weiss ring)	

Idiopathic Macular Hole



IMH, stage 3

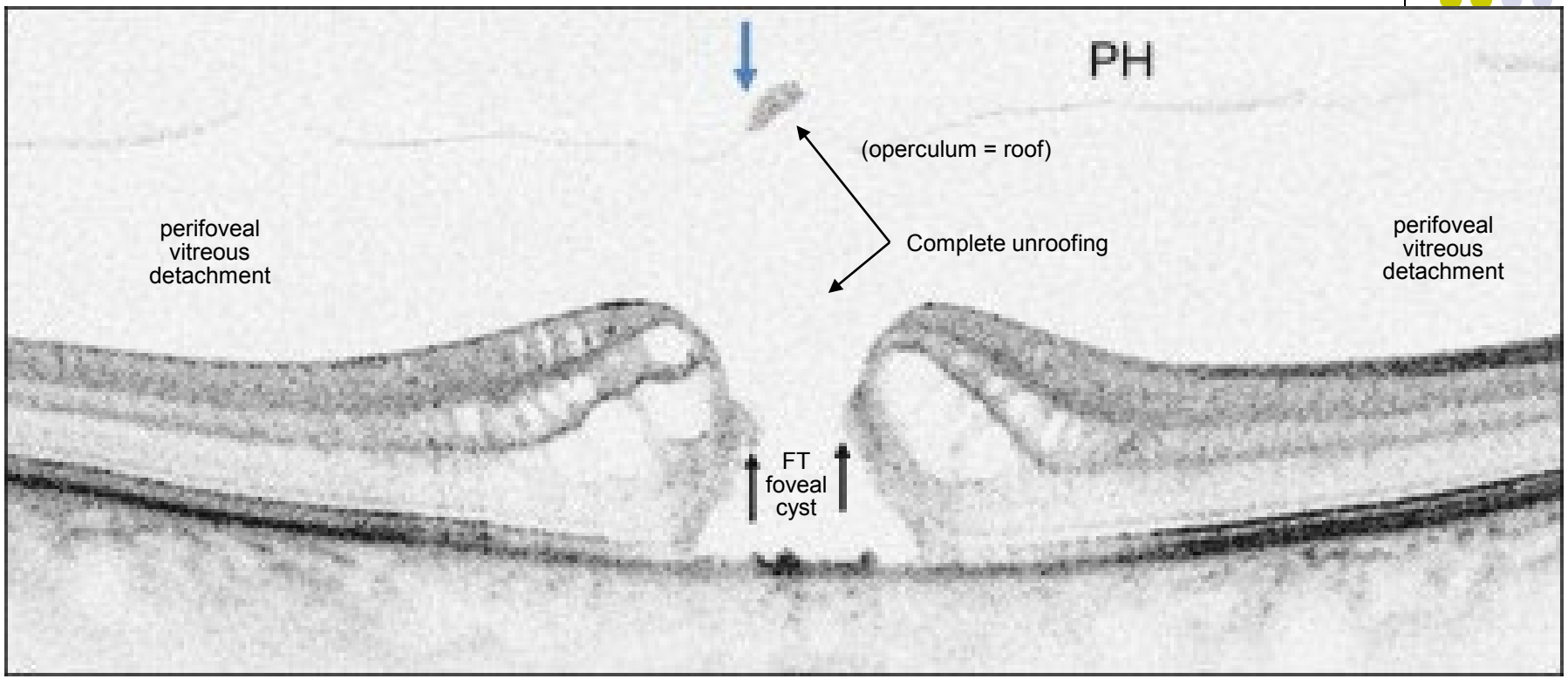
Idiopathic Macular Hole

Stage (Gass)	*Description (Gass)*	*sdOCT findings*
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow *ring*	perifoveal vitreous detachment + full-thickness foveal cyst
2	Full-thickness macular hole, less than 400μ dia	perifoveal vitreous detachment + full-thickness foveal cyst + partial cyst unroofing
3	Full-thickness macular hole, greater than 400μ dia no PVD (ie, no Weiss ring)	***?***

Idiopathic Macular Hole

Stage (Gass)	*Description (Gass)*	*sdOCT findings*
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow *ring*	perifoveal vitreous detachment + full-thickness foveal cyst
2	Full-thickness macular hole, less than 400μ dia	perifoveal vitreous detachment + full-thickness foveal cyst + partial cyst unroofing
3	Full-thickness macular hole, greater than 400μ dia no PVD (ie, no Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + *complete* cyst unroofing

Idiopathic Macular Hole



Stage 3 full-thickness macular hole.
The posterior hyaloid (PH) is detached from the macular surface and contains the operculum (blue arrow). The edge of the hole has been thickened by cystic spaces and the photoreceptors are elevated (black arrows mark the end of the outer segments of the elevated photoreceptors).

Idiopathic Macular Hole

Stage (Gass)	*Description (Gass)*	*sdOCT findings*
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow *ring*	perifoveal vitreous detachment + full-thickness foveal cyst
2	Full-thickness macular hole, **less than 400μ dia**	
3	Full-thickness macular hole, **greater than 400μ dia** no PVD (ie, no Weiss ring)	

It should be noted that, by and large, sdOCT studies have ***not*** borne out Dr Gass' description vis a vis the *size* of FTMHs. While Stage 3 holes are generally larger than Stage 2, there is considerable overlap between the two, and some Stage 2 holes are larger than some Stage 3.

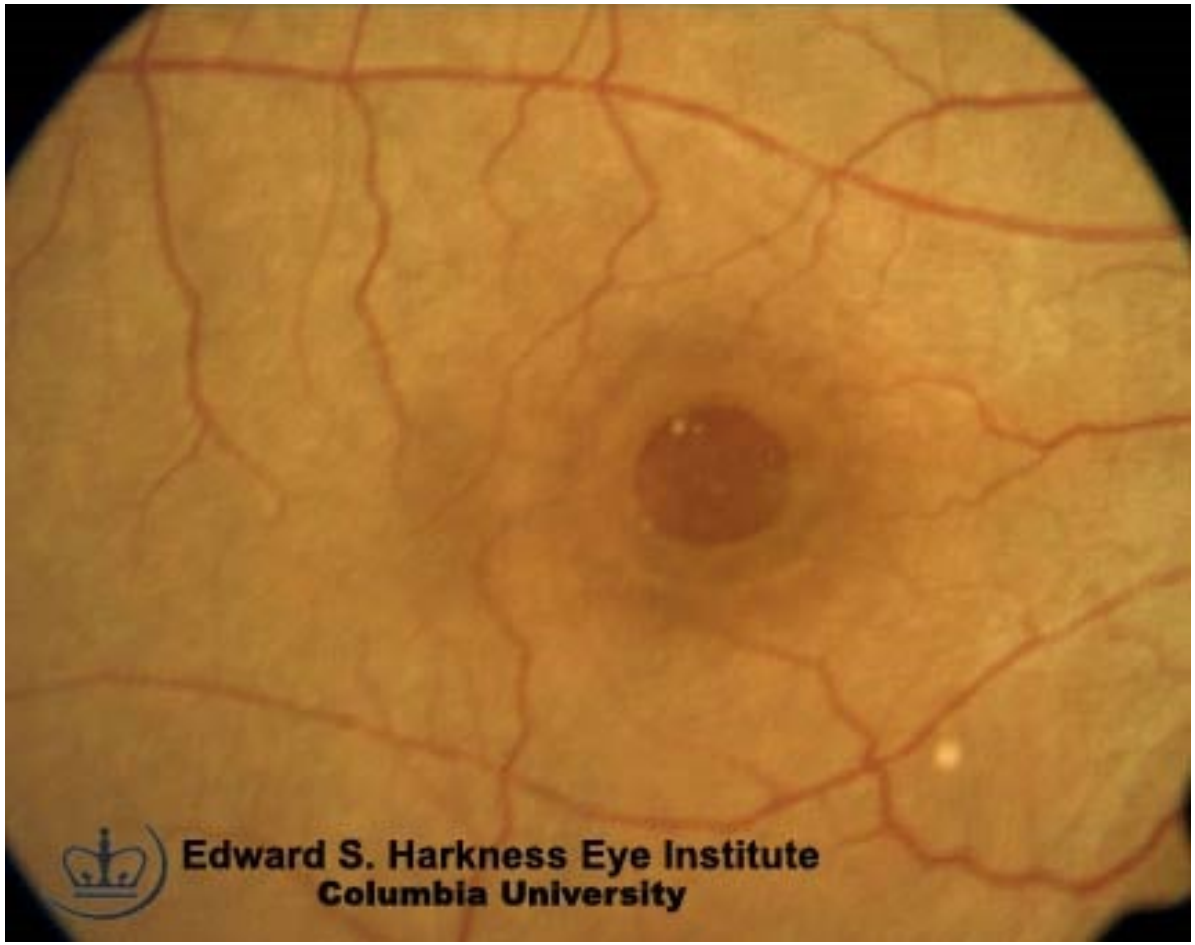
Idiopathic Macular Hole

Stage (Gass)	*Description (Gass)*	*sdOCT findings*
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow *ring*	perifoveal vitreous detachment + full-thickness foveal cyst
2	Full-thickness macular hole, less than 400μ dia	perifoveal vitreous detachment + full-thickness foveal cyst + partial cyst unroofing
3	Full-thickness macular hole, greater than 400μ dia no PVD (ie, no Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + *complete* cyst unroofing
?	***?***	

Idiopathic Macular Hole

Stage (Gass)	*Description (Gass)*	*sdOCT findings*
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow *ring*	perifoveal vitreous detachment + full-thickness foveal cyst
2	Full-thickness macular hole, less than 400μ dia	perifoveal vitreous detachment + full-thickness foveal cyst + partial cyst unroofing
3	Full-thickness macular hole, greater than 400μ dia no PVD (ie, no Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + *complete* cyst unroofing
4	Full-thickness macular hole greater than 400μ dia with PVD (ie, +Weiss ring)	

Idiopathic Macular Hole



IMH, stage 4

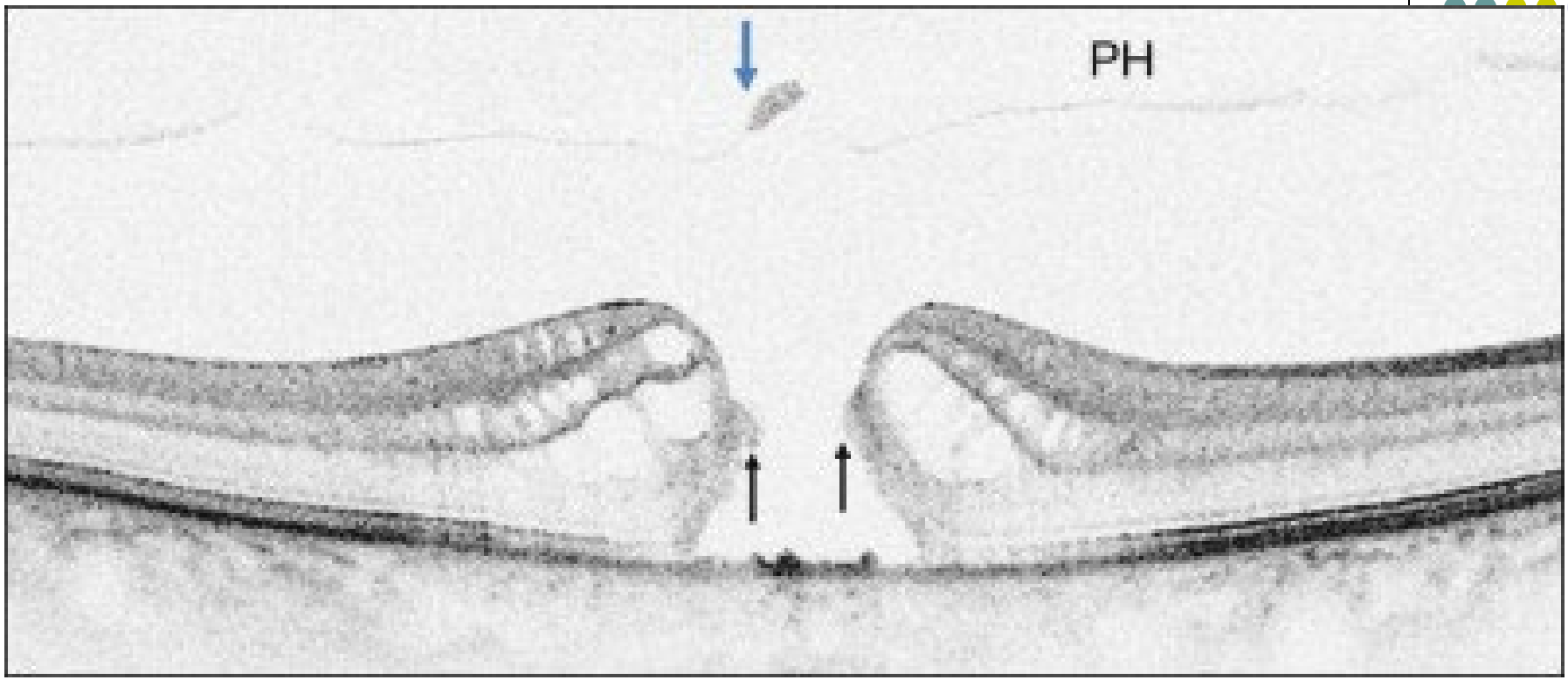
Idiopathic Macular Hole

Stage (Gass)	*Description (Gass)*	*sdOCT findings*
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow *ring*	perifoveal vitreous detachment + full-thickness foveal cyst
2	Full-thickness macular hole, less than 400μ dia	perifoveal vitreous detachment + full-thickness foveal cyst + partial cyst unroofing
3	Full-thickness macular hole, greater than 400μ dia no PVD (ie, no Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + *complete* cyst unroofing
4	Full-thickness macular hole greater than 400μ dia with PVD (ie, +Weiss ring)	*?*

Idiopathic Macular Hole

Stage (Gass)	*Description (Gass)*	*sdOCT findings*
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow *ring*	perifoveal vitreous detachment + full-thickness foveal cyst
2	Full-thickness macular hole, less than 400μ dia	perifoveal vitreous detachment + full-thickness foveal cyst + partial cyst unroofing
3	Full-thickness macular hole, greater than 400μ dia no PVD (ie, no Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + *complete* cyst unroofing
4	Full-thickness macular hole greater than 400μ dia with PVD (ie, +Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + complete cyst unroofing + Weiss ring

Idiopathic Macular Hole



Stage 4full-thickness macular hole.
The posterior hyaloid (PH) is detached from the macular surface and contains the operculum (blue arrow). The edge of the hole has been thickened by cystic spaces and the photoreceptors are elevated (black arrows mark the end of the outer segments of the elevated photoreceptors).

Idiopathic Macular Hole

Stage (Gass)	*Description (Gass)*	***sdOCT findings***
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow *ring*	perifoveal vitreous detachment + full-thickness foveal cyst
2	Full-thickness macular hole, <400μ dia	perifoveal vitreous detachment + full-thickness foveal cyst + partial cyst unroofing
3	Full-thickness macular hole, greater than 400μ dia no PVD (ie, no Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + *complete* cyst unroofing
4	Full-thickness macular hole greater than 400μ dia with PVD (ie, +Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + complete cyst unroofing + Weiss ring

Based on the progression of the stages on sdOCT…

Stage (Gass)	Description (Gass)	sdOCT findings
		?
1A	Yellow spot	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow ring	perifoveal vitreous detachment + full-thickness foveal cyst
2	Full-thickness macular hole, less than 400μ dia	perifoveal vitreous detachment + full-thickness foveal cyst + partial cyst unroofing
3	Full-thickness macular hole, greater than 400μ dia no PVD (ie, no Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + *complete* cyst unroofing
4	Full-thickness macular hole greater than 400μ dia with PVD (ie, +Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + complete cyst unroofing + Weiss ring

…working backwards, what might go here?

Based on the progression of the stages on sdOCT…

Stage (Gass)	Description (Gass)	sdOCT findings
		perifoveal vitreous detachment
1A	Yellow spot	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow ring	perifoveal vitreous detachment + full-thickness foveal cyst
2	Full-thickness macular hole, less than 400μ dia	perifoveal vitreous detachment + full-thickness foveal cyst + partial cyst unroofing
3	Full-thickness macular hole, greater than 400μ dia no PVD (ie, no Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + *complete* cyst unroofing
4	Full-thickness macular hole greater than 400μ dia with PVD (ie, +Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + complete cyst unroofing + Weiss ring

…working backwards, what might go here?

Based on the progression of the stages on sdOCT…

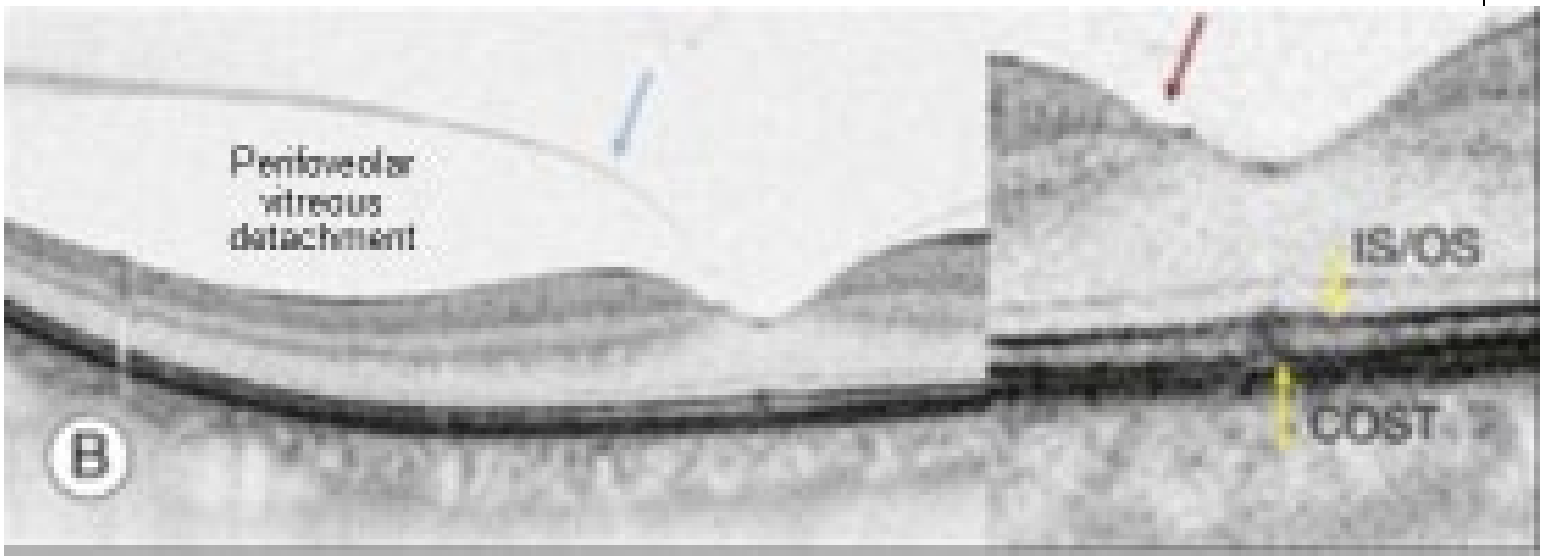
Stage (Gass)	Description (Gass)	sdOCT findings
?		perifoveal vitreous detachment
1A	Yellow spot	perifoveal vitreous detachment + inner foveal cyst
1B	Yello[illegible]	[illegible]eous detachment + full-thickness foveal cyst
2	Full-thickness macular hole, less than 400μ dia	perifoveal vitreous detachment + full-thickness foveal cyst + partial cyst unroofing
3	Full-thickness macular hole, greater than 400μ dia no PVD (ie, no Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + *complete* cyst unroofing
4	Full-thickness macular hole greater than 400μ dia with PVD (ie, +Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + complete cyst unroofing + Weiss ring

Again working backwards, what would go here?

Stage (Gass)	Description (Gass)	sdOCT findings
'0'		*perifoveal vitreous detachment*
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst
1B	Yello[illegible]	[illegible]eous detachment + full-thickness foveal cyst
2	Full-thickness macular hole, less than 400μ dia	perifoveal vitreous detachment + full-thickness foveal cyst + partial cyst unroofing
3	Full-thickness macular hole, greater than 400μ dia no PVD (ie, no Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + *complete* cyst unroofing
4	Full-thickness macular hole greater than 400μ dia with PVD (ie, +Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + complete cyst unroofing + Weiss ring

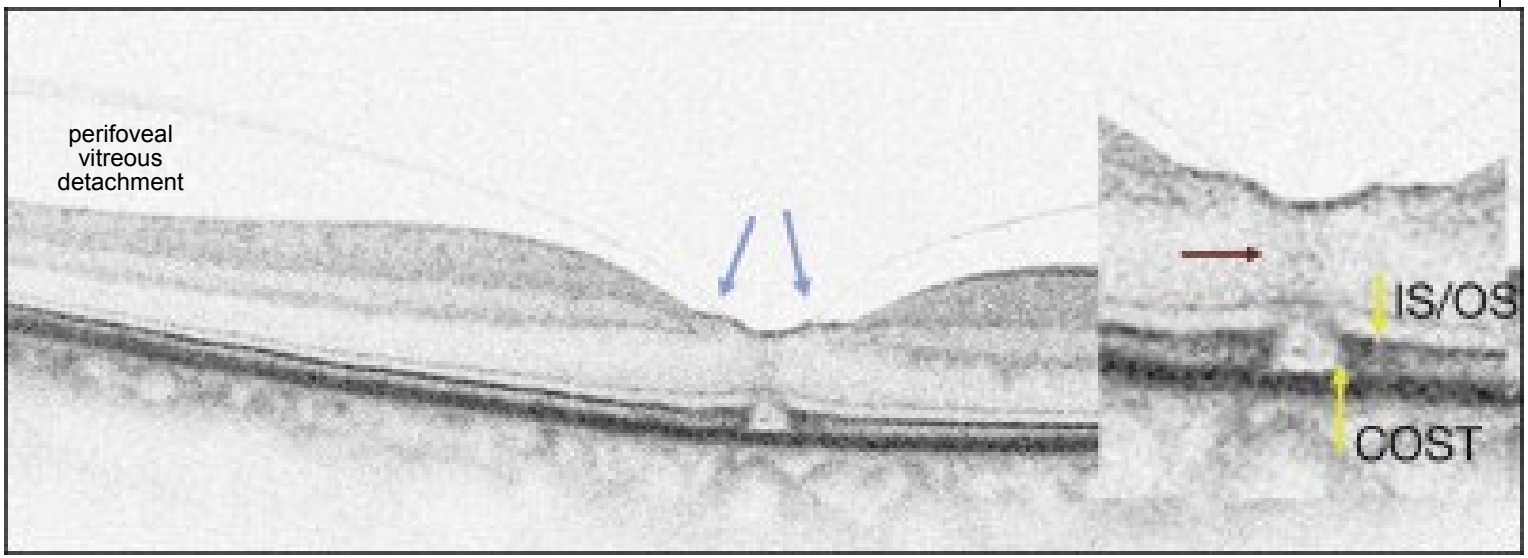
Again working backwards, what would go here?

Idiopathic Macular Hole



Stage 0 macular holes.
(B) OCT showing most of the posterior hyaloid (blue arrow) detached from the macular surface, except at the edge of the foveal pit, to which it still adheres.
(Inset: detail of part B). Change in the inner foveal curvature at the point of traction exerted by the posterior hyaloid (red arrow). The inner segment/outer segment (IS/OS) line (yellow arrow) is intact, but a small section of the cone outer segment tips (COST) line is detached (yellow arrow).

Idiopathic Macular Hole



Stage 0 macular hole.
Partial detachment of the posterior hyaloid, which still adheres to the foveal floor, creating two small elevations of the foveal pit contour (blue arrows).

(Inset: detail.) Foveal elevation of the cone outer segment tips (COST) and inner segment/outer segment (IS/OS) lines. A hyperreflective columnar structure links the internal and external limiting membranes. The eye is asymptomatic and vision is 20/20.

Stage (Gass)	Description (Gass)	sdOCT findings
'0'		perifoveal vitreous detachment
1A	Yellow spot	oveal vitreous detachment + inner foveal cyst
1B	Yellow *ring*	perifoveal vitreous detachment + full-thickness foveal cyst
2	Full-thickness macular hole, less than 400μ dia	perifoveal vitreous detachment + full-thickness foveal cyst + partial cyst unroofing
3	Full-thickness macular hole, greater than 400μ dia no PVD (ie, no Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + *complete* cyst unroofing
4	Full-thickness macular hole greater than 400μ dia with PVD (ie, +Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + complete cyst unroofing + Weiss ring

Take note:

The Retina *book recognizes three categories of vitreomacular traction (VMT) disease:* **Vitreomacular adhesion, vitreomacular traction,** *and* **macular hole**.

Stage (Gass)	Description (Gass)	sdOCT findings
'0'		*perifoveal vitreous detachment*
1A	Yellow spot	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow *ring*	perifoveal vitreous detachment + full-thickness foveal cyst
2	Full-thickness macular hole, less than 400μ dia	perifoveal vitreous detachment + full-thickness foveal cyst + partial cyst unroofing
3	Full-thickness macular hole, greater than 400μ dia no PVD (ie, no Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + *complete* cyst unroofing
4	Full-thickness macular hole greater than 400μ dia with PVD (ie, +Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + complete cyst unroofing + Weiss ring

The Retina *book recognizes three categories of vitreomacular traction (VMT) disease:* ***Vitreomacular adhesion*** is the mildest form, and corresponds to a Stage 0 MH;

Stage (Gass)	Description (Gass)	sdOCT findings
'0'		*perifoveal vitreous detachment*
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow *ring*	perifoveal vitreous detachment + full-thickness foveal cyst
2	Full-thickness macular hole,	perifoveal vitreous detachment + full-thickness foveal cyst +
3	Full-thickness macular hole, greater than 400μ dia no PVD (ie, no Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + *complete* cyst unroofing
4	Full-thickness macular hole greater than 400μ dia with PVD (ie, +Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + complete cyst unroofing + Weiss ring

The Retina *book recognizes three categories of vitreomacular traction (VMT) disease.* ***Vitreomacular traction syndrome*** corresponds to a Stage 1 MH;

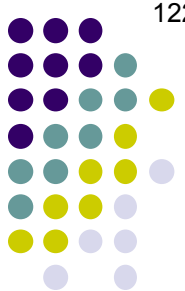
Stage (Gass)	Description (Gass)	sdOCT findings
'0'		*perifoveal vitreous detachment*
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow *ring*	perifoveal vitreous detachment + full-thickness foveal cyst
2	Full-thickness macular hole, less than 400μ dia	perifoveal vitreous detachment + full-thickness foveal cyst + partial cyst unroofing
3	Full-thickness macular hole, greater than 400μ dia	perifoveal vitreous detachment + full-thickness foveal cyst +
4	Full-thickness macular hole greater than 400μ dia with PVD (ie, +Weiss ring)	full-thickness foveal cyst + complete cyst unroofing + Weiss ring

The Retina *book recognizes three categories of vitreomacular traction (VMT) disease.*
Macular hole with ongoing VMT corresponds to a Stage 2 MH; and

Stage (Gass)	Description (Gass)	sdOCT findings
'0'		*perifoveal vitreous detachment*
1A	Yellow *spot*	perifoveal vitreous detachment + inner foveal cyst
1B	Yellow *ring*	perifoveal vitreous detachment + full-thickness foveal cyst
2	less than 400μ dia	full-thickness foveal cyst + partial cyst unroofing
3	Full-thickness macular hole, greater than 400μ dia no PVD (ie, no Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + *complete* cyst unroofing
4	Full-thickness macular hole greater than 400μ dia with PVD (ie, +Weiss ring)	perifoveal vitreous detachment + full-thickness foveal cyst + complete cyst unroofing + Weiss ring

The Retina *book recognizes three categories of vitreomacular traction (VMT) disease.*
Macular hole* without *VMT corresponds to Stage 3 and 4 MH.

Idiopathic Macular Hole



- A patient has a full-thickness MH in one eye. What is the risk of developing a Stage 2+ MH in the fellow eye if it has…
  - …a stage 1 hole? high/medium/low

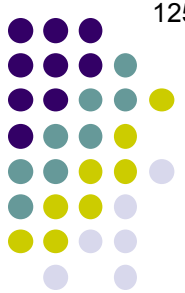
Idiopathic Macular Hole

- A patient has a full-thickness MH in one eye. What is the risk of developing a Stage 2+ MH in the fellow eye if it has…
  - …a stage 1 hole? **High risk**

Idiopathic Macular Hole

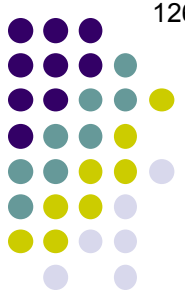
- A patient has a full-thickness MH in one eye. What is the risk of developing a Stage 2+ MH in the fellow eye if it has…
  - …a stage 1 hole? High risk
  - …a normal macula and no PVD? ditto

Idiopathic Macular Hole



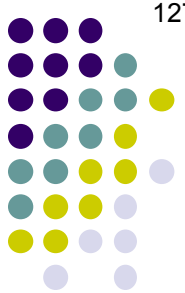
- A patient has a full-thickness MH in one eye. What is the risk of developing a Stage 2+ MH in the fellow eye if it has…
  - …a stage 1 hole? High risk
  - …a normal macula and no PVD? **Intermediate risk**

Idiopathic Macular Hole



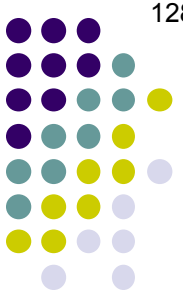
- A patient has a full-thickness MH in one eye. What is the risk of developing a Stage 2+ MH in the fellow eye if it has…
  - …a stage 1 hole? High risk
  - …a normal macula and no PVD? Intermediate risk
  - …a normal macula and a PVD? ditto

Idiopathic Macular Hole



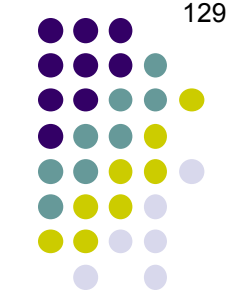
- A patient has a full-thickness MH in one eye. What is the risk of developing a Stage 2+ MH in the fellow eye if it has…
  - …a stage 1 hole? High risk
  - …a normal macula and no PVD? Intermediate risk
  - …a normal macula and a PVD? **Low risk**

Idiopathic Macular Hole



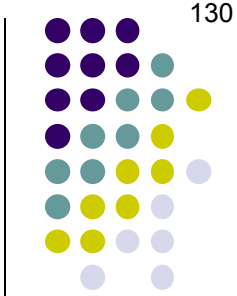
- A patient has a full-thickness MH in one eye. What is the risk of developing a Stage 2+ MH in the fellow eye if it has…
  - …a stage 1 hole? High risk
  - …a normal macula and no PVD? Intermediate risk
  - …a normal macula and a PVD? Low risk
- Management of MH
  - Stage 1:

Idiopathic Macular Hole



- A patient has a full-thickness MH in one eye. What is the risk of developing a Stage 2+ MH in the fellow eye if it has…
  - …a stage 1 hole? High risk
  - …a normal macula and no PVD? Intermediate risk
  - …a normal macula and a PVD? Low risk
- Management of MH
  - Stage 1: No treatment

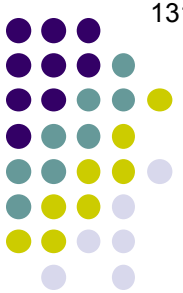
Idiopathic Macular Hole



- A patient has a full-thickness MH in one eye. What is the risk of developing a Stage 2+ MH in the fellow eye if it has…
  - …a stage 1 hole? High risk
  - …a normal macula and no PVD? Intermediate risk
  - …a normal macula and a PVD? Low risk
- Management of MH
  - Stage 1: No treatment

Why no treatment for a Stage I hole?

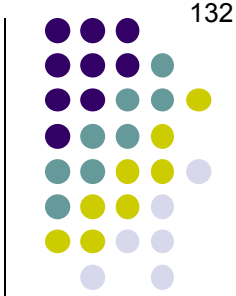
Idiopathic Macular Hole



- A patient has a full-thickness MH in one eye. What is the risk of developing a Stage 2+ MH in the fellow eye if it has…
  - …a stage 1 hole? High risk
  - …a normal macula and no PVD? Intermediate risk
  - …a normal macula and a PVD? Low risk
- Management of MH
  - Stage 1: No treatment

Why no treatment for a Stage I hole?
Because about % will resolve spontaneously

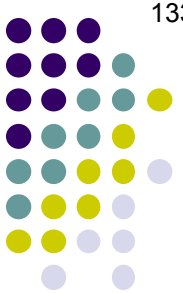
Idiopathic Macular Hole



- A patient has a full-thickness MH in one eye. What is the risk of developing a Stage 2+ MH in the fellow eye if it has…
  - …a stage 1 hole? High risk
  - …a normal macula and no PVD? Intermediate risk
  - …a normal macula and a PVD? Low risk
- Management of MH
  - Stage 1: No treatment

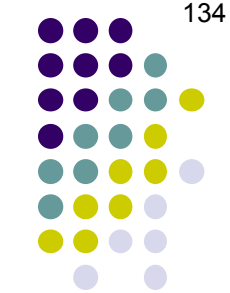
Why no treatment for a Stage I hole?
Because about 50% will resolve spontaneously

Idiopathic Macular Hole



- A patient has a full-thickness MH in one eye. What is the risk of developing a Stage 2+ MH in the fellow eye if it has…
  - …a stage 1 hole? High risk
  - …a normal macula and no PVD? Intermediate risk
  - …a normal macula and a PVD? Low risk
- Management of MH
  - Stage 1: No treatment
  - Stage 2-4: surgery

Idiopathic Macular Hole



- A patient has a full-thickness MH in one eye. What is the risk of developing a Stage 2+ MH in the fellow eye if it has…
  - …a stage 1 hole? High risk
  - …a normal macula and no PVD? Intermediate risk
  - …a normal macula and a PVD? Low risk
- Management of MH
  - Stage 1: No treatment
  - Stage 2-4: Pars plana vitrectomy (PPV)

Idiopathic Macular Hole

- A patient has a full-thickness MH in one eye. What is the risk of developing a Stage 2+ MH in the fellow eye if it has…
  - …a stage 1 hole? High risk
  - …a normal macula and no PVD? Intermediate risk
  - …a normal macula and a PVD? Low risk
- Management of MH
  - Stage 1: No treatment
  - Stage 2-4: **Pars plana vitrectomy (PPV)**

How does vitrectomy aid in MH repair?

Idiopathic Macular Hole

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How does vitrectomy aid in MH repair?
It was long thought that the primary action of vitrectomy was to release vitreous traction at the margin of the hole. While release of vitreous traction may play a role in the surgical repair of Stage 2 MHs, sdOCT indicates such traction does not exist in Stage 2 and/or 3 MHs. Thus, the primary role of vitrectomy is not the release of ongoing vitreous traction, but rather to facilitate later intra-op maneuvers. Speaking of which…

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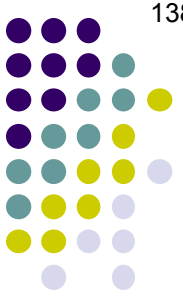
  - Stage 1: No treatment
  - Stage 2-4: Pars plana vitrectomy (PPV)
    - **PPV intraop maneuver 1**
    - PPV intraop maneuver 2
    - PPV intraop maneuver 3
    - PPV intraop maneuver 4
    - PPV *POST-op* maneuver

List in order the main surgical maneuvers involved in PPV for macular hole

Idiopathic Macular Hole



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  - Stage 2-4: Pars plana vitrectomy (PPV)
    - **Remove most of the vitreous**
    - **PPV intraop maneuver 2**
    - PPV intraop maneuver 3
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    - **Induce a PVD (if necessary)**
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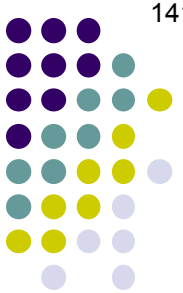
  - Stage 2-4: Pars plana vitrectomy (PPV)
    - Remove most of the vitreous
    - Induce a PVD (if necessary)
    - **Peel the ILM, and ERM (if present)**
    - **PPV intraop maneuver 4**
    - PPV *POST-op* maneuver

ILM = Internal limiting membrane
ERM = Epiretinal membrane

Idiopathic Macular Hole



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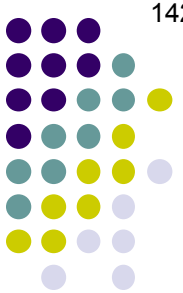
    - **Inject long-acting gas**
    - PPV *POST-op* maneuver

Idiopathic Macular Hole



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What gas mixtures are typically used?

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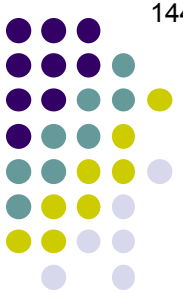

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How long the surgeon wants the gas bubble to remain

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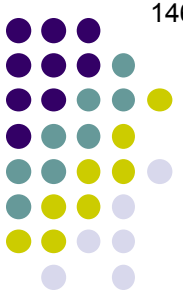

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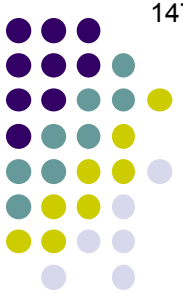

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How does the gas bubble aid in MH closure?
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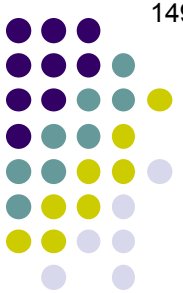

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How does the gas bubble aid in MH closure?
--By dehydrating the cuff of subretinal fluid that is often present
--By preventing fluid eddies from disturbing the edges of the hole during the healing process

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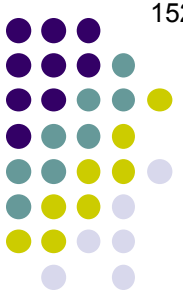
    - **Prone positioning**

Idiopathic Macular Hole



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What is the purpose of prone positioning?

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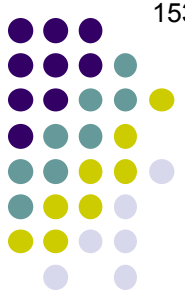

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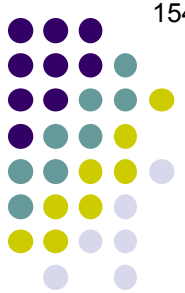
What is the purpose of prone positioning?
To keep the gas bubble over the hole

Idiopathic Macular Hole



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What if the hole is small, and/or the bubble large—does the pt still need to prone out?

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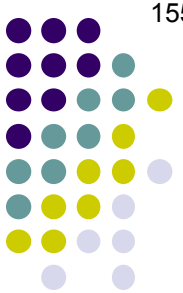

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What if the hole is small, and/or the bubble large—does the pt still need to prone out?
Probably not. The key is that the hole **must** be kept isolated from any remaining liquid vitreous until it starts to close. Thus, factors such as the size of the hole, the size of the bubble, the rate of gas absorption, etc, all factor into determining the length of time (if any) for which the pt must be prone.