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

*During what age range does PVD typically occur?*
What are the two nonocular risk factors for IMH? **Age** and gender

*During what age range does PVD typically occur?*
The sixth through eighth decades
What are the two nonocular risk factors for IMH? Age and gender

Which gender is at greater risk?
What are the two nonocular risk factors for IMH? Age and **gender**

*Which gender is at greater risk?*
Female
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?*
What are the two nonocular risk factors for IMH? Age and \textbf{gender}

\textit{Which gender is at greater risk?}  
Female

\textit{What is the female: male risk ratio?}  
2:1
What are the two nonocular risk factors for IMH?
- Age
- 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**
What are the two nonocular risk factors for IMH? Age and gender

What is the one ocular risk factor? Myopia

What impact does myopia have on the risk of PVD?
What are the two nonocular risk factors for IMH? Age and gender

What is the one ocular risk factor? **Myopia**

*What impact does myopia have on the risk of PVD?*
*It causes it to occur at an earlier age*
What are the two nonocular risk factors for IMH?  
**Age and gender**

What is the one ocular risk factor?  
**Myopia**

Who developed the staging system for classifying macular holes that is in wide use today?
What are the two nonocular risk factors for IMH? **Age and gender**

What is the one ocular risk factor? **Myopia**

Who developed the staging system for classifying macular holes that is in wide use today? **Donald Gass**
What are the two nonocular risk factors for IMH? **Age and gender**

What is the one ocular risk factor? **Myopia**

Who developed the staging system for classifying macular holes that is in wide use today? **Donald Gass**

What technology served as his primary tool in developing his classification scheme?
What are the two nonocular risk factors for IMH? **Age and gender**

What is the one ocular risk factor? **Myopia**

Who developed the staging system for classifying macular holes that is in wide use today? **Donald Gass**

What technology served as his primary tool in developing his classification scheme? **Biomicroscopy (ie, DFE)**
What are the two nonocular risk factors for IMH? *Age and gender*

What is the one ocular risk factor? *Myopia*

Who developed the staging system for classifying macular holes that is in wide use today? *Donald Gass*

What technology served as his primary tool in developing his classification scheme? *Biomicroscopy (ie, DFE)*

What technology has revolutionized our understanding of the pathogenesis of macular holes?
What are the two nonocular risk factors for IMH? Age and gender

What is the one ocular risk factor? Myopia

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Does IMH present unilaterally, or bilaterally?
What are the two nonocular risk factors for IMH? 
Age and gender

What is the one ocular risk factor? Myopia

Who developed the staging system for classifying macular holes that is in wide use today? Donald Gass

What technology served as his primary tool in developing his classification scheme? Biomicroscopy (ie, DFE)

What technology has revolutionized our understanding of the pathogenesis of macular holes? OCT

Does IMH present unilaterally, or bilaterally? Unilaterally
What are the two nonocular risk factors for IMH? Age and gender

What is the one ocular risk factor? Myopia

Who developed the staging system for classifying macular holes that is in wide use today? Donald Gass

What technology served as his primary tool in developing his classification scheme? Biomicroscopy (ie, DFE)

What technology has revolutionized our understanding of the pathogenesis of macular holes? OCT

Does IMH present unilaterally, or bilaterally? Unilaterally

What percent of cases are bilateral?
What are the two nonocular risk factors for IMH? Age and gender

What is the one ocular risk factor? Myopia

Who developed the staging system for classifying macular holes that is in wide use today? Donald Gass

What technology served as his primary tool in developing his classification scheme? Biomicroscopy (ie, DFE)

What technology has revolutionized our understanding of the pathogenesis of macular holes? OCT

Does IMH present unilaterally, or bilaterally? Unilaterally

What percent of cases are bilateral? About 10
What are the two nonocular risk factors for IMH? Age and gender

What is the one ocular risk factor? Myopia

Who developed the staging system for classifying macular holes that is in wide use today? Donald Gass

What technology served as his primary tool in developing his classification scheme? Biomicroscopy (ie, DFE)

What technology has revolutionized our understanding of the pathogenesis of macular holes? OCT

Does IMH present unilaterally, or bilaterally? Unilaterally

In a nutshell, what is the cause of IMH?
What are the two nonocular risk factors for IMH? **Age and gender**

What is the one ocular risk factor? **Myopia**

Who developed the staging system for classifying macular holes that is in wide use today? **Donald Gass**

What technology served as his primary tool in developing his classification scheme? **Biomicroscopy (ie, DFE)**

What technology has revolutionized our understanding of the pathogenesis of macular holes? **OCT**

Does IMH present unilaterally, or bilaterally? **Unilaterally**

In a nutshell, what is the cause of IMH? **Vitreomacular traction (VMT) associated with posterior vitreous detachment (PVD)**
- What are the two nonocular risk factors for IMH? Age and gender
- What is the one ocular risk factor? Myopia
- Who developed the staging system for classifying macular holes that is in wide use today? Donald Gass
- What technology served as his primary tool in developing his classification scheme? Biomicroscopy (ie, DFE)
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- Does IMH present unilaterally, or bilaterally? Unilaterally
- In a nutshell, what is the cause of IMH? Vitreomacular traction (VMT) associated with posterior vitreous detachment (PVD)

Let’s drill down on the PVD process
What does it mean to say the posterior vitreous ‘detaches’?

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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’
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It means that posterior components of the normal complement of anatomic
attachments between the vitreous body and other internal ocular structures
have ‘let go’

With regard to normal, age-related PVD, two things must happen to the
vitreous body before the process can begin. What are they?
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With regard to normal, age-related PVD, two things must happen to the vitreous body before the process can begin. What are they?
The vitreous must undergo synchysis and syneresis
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*What is synchysis?*
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With regard to normal, age-related PVD, two things must happen to the vitreous body before the process can begin. What are they? The vitreous must undergo **synchysis** and syneresis.

*What is synchysis?*
Liquefaction of the vitreous
What does it mean to say the posterior vitreous ‘detaches’?
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What is syneresis?
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The vitreous must undergo synchysis and **syneresis**

*What is syneresis?*
“Collapse” of the vitreous
What does it mean to say the posterior vitreous ‘detaches’?
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attachments between the vitreous body and other internal ocular structures
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With regard to normal, age-related PVD, two things must happen to the
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There are five major sites of normal anatomic attachment between the
vitreous and the rest of the eye—what are they?
--
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*With regard to normal, age-related PVD, two things must happen to the vitreous body before the process can begin. What are they?*
The vitreous must undergo synchysis and syneresis

*There are five major sites of normal anatomic attachment between the vitreous and the rest of the eye—what are they?*
--The posterior lens capsule
--The ora serrata
--Major retinal vessels
--The macula
--The optic nerve head
What does it mean to say the posterior vitreous ‘detaches’?
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There are five major sites of normal anatomic attachment between the vitreous and the rest of the eye—what are they?
--- The posterior lens capsule
--- The ora serrata
--- Major retinal vessels
--- The macula
--- The optic nerve

What is the eponymous name of the attachment between the anterior vitreous and the posterior lens capsule?
What does it mean to say the posterior vitreous ‘detaches’?
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With regard to normal, age-related PVD, two things must happen to the vitreous body before the process can begin. What are they?
The vitreous must undergo synchysis and syneresis

There are five major sites of normal anatomic attachment between the vitreous and the rest of the eye—what are they?
-- The posterior lens capsule (via Weiger’s ligament)
-- The ora serrata
-- Major retinal vessels
-- The macula
-- The optic nerve

What is the eponymous name of the attachment between the anterior vitreous and the posterior lens capsule?
Weiger’s ligament
What does it mean to say the posterior vitreous ‘detaches’?
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--The posterior lens capsule (via Weiger’s ligament)
--**The ora serrata**
--Major retinal vessels
--The macula
--The optic nerve head

*The attachment of the vitreous at the ora serrata comprises what important structure?*
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The vitreous must undergo synchysis and syneresis

There are five major sites of normal anatomic attachment between the vitreous and the rest of the eye—what are they?
--The posterior lens capsule (via Weiger’s ligament)
--The ora serrata (i.e., the vitreous base)
--Major retinal vessels
--The macula
--The optic nerve head

The attachment of the vitreous at the ora serrata comprises what important structure?
The vitreous base
Idiopathic Macular Hole

 ora serrata

The vitreous base
Vitreous attachments

The macula

Vitreous base

Weigert’s ligament

The ONH

(Id it’s Weiger’s, not Weigert’s)

(Nevra you mind what these are for the topic at hand)
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--The posterior lens capsule (via Weiger’s ligament)?
--The ora serrata (ie, the vitreous base)?
--Major retinal vessels
--The macula
--The optic nerve head

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

With regard to normal, age-related PVD, two things must happen to the vitreous body before the process can begin. What are they?
The vitreous must undergo synchysis and syneresis

There are five major sites of normal anatomic attachment between the vitreous and the rest of the eye—what are they?
--The posterior lens capsule (via Weiger’s ligament)? **No**
--The ora serrata (ie, the vitreous base)? **No**
--Major retinal vessels
--The macula
--The optic nerve head

*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).
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’

With regard to normal, age-related PVD, two things must happen to the vitreous body before the process can begin. What are they? The vitreous must undergo synchysis and syneresis

There are five major sites of normal anatomic attachment between the vitreous and the rest of the eye—what are they?
--The posterior lens capsule (via Weiger’s ligament)? **No**
--The ora serrata (ie, the vitreous base)? **No**
--Major retinal vessels
--The macula
--The optic nerve head

*Do Weiger’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 Weiger’s ligament: Given its extremely anterior location, it shouldn’t be surprising that it is spared in a **posterior** vitreous detachment.
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'.

With regard to normal, age-related PVD, two things must happen to the vitreous body before the process can begin. What are they?

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There are five major sites of normal anatomic attachment between the vitreous and the rest of the eye—what are they?

--The posterior lens capsule (via Weiger's ligament)
--The ora serrata (ie, the vitreous base)
--Major retinal vessels?
--The macula?
--The optic nerve head?

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?

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

What experience do pts report that is indicative the PVD has completed?

They report seeing the fibroglial tissue that has torn loose from the edge of the ONH.
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
Evolution of a PVD. Arrows indicate the location of the posterior vitreous face.
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-- The macula (perifoveal region; later, the fovea)
-- The optic nerve head

What specific event initiates the PVD process—that is, what ‘lets go’ first? How does it proceed, i.e., what lets go next?
The vitreous first detaches from the perifoveal macula, along with the associated vessels. It next detaches from the fovea.

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.

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,’ i.e., become aware that something is going on in the eye?
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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)
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Evolution of a PVD. Arrows indicate the location of the posterior vitreous face.
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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
Hol up. This (red arrow) sure looks like a PVD. What’s going on here?

Pre-PVD

Arrows indicate the posterior vitreous face

Completed PVD

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

- Perifoveal detachment
- Foveal detachment
- Completed PVD

This image is labeled correctly, i.e., the white arrows are indicating the location of the vitreous face. The optically empty space between the formed vitreous and the macula is the premacular bursa (aka the precortical vitreous pocket). 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.
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 [predmacular bursa](aka the [precortical vitreous pocket]).

Liquefied vitreous

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.
**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 **premacular bursa** (aka the **precortical vitreous pocket**).

**Pre-PVD**

**Completed PVD**
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).
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 *premacular bursa* (aka the *precortical vitreous pocket*).

What material occupies the bursa?
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 *premacular bursa* (aka the *precortical vitreous pocket*).

*What material occupies the bursa?*
Liquefied vitreous
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 *premacular bursa* (aka the *precortical vitreous pocket*).

**What material occupies the bursa?**
Liquefied vitreous

**What purpose does the bursa serve?**

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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.
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’.

With regard to normal, age-related PVD, two things must happen to the vitreous body before the process can begin. What are they?
- The vitreous must undergo synchysis and syneresis.

There are five major sites of normal anatomic attachment between the vitreous and the rest of the eye—what are they?
- The posterior lens capsule (via Weiger’s ligament)
- 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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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?
- The ora serrata (ie, the vitreous base)
- Major retinal vessels
- The macula (perifoveal region; later, the fovea)
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vitreous and the rest of the eye—what are they?
--The posterior lens capsule (via Weiger’s ligament)
--The ora serrata (ie, the vitreous base)
--Major retinal vessels
--The macula (perifoveal region; later, the fovea)
--The optic nerve head

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?
There are usually no (or minimal) symptoms until the PVD completes, ie, detaches from the ONH
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With regard to normal, age-related PVD, two things must happen to the vitreous body before the process can begin. What are they?

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What experience do pts report that is indicative the PVD has completed?

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What experience do pts report that is indicative the PVD has completed?
They report seeing the fibroglial tissue that has torn loose from the edge of the ONH

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

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

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.

OK, we’re now ready to delve into macular holes—their ophthalmoscopic and OCT characteristics, and how those characteristics define staging.
Identify the first stage in Gass’s classification system, and provide a very brief description of the appearance of the macula.
**Idiopathic Macular Hole**

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*Identify the first stage in Gass’s classification system, and provide a very brief description of the appearance of the macula*
Idiopathic Macular Hole

IMH, stage 1A
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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

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Now the second stage, etc
## Idiopathic Macular Hole

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Idiopathic Macular Hole

IMH, stage 1B
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</table>
**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.
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Idiopathic Macular Hole

IMH, stage 2
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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.
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(Gass) sdOCT findings

- **Perifoveal vitreous detachment +**
- **Inner foveal cyst**
- **Full-thickness foveal cyst**
- **Partial cyst unroofing**
- **No PVD (ie, no Weiss ring)**
Idiopathic Macular Hole

IMH, stage 3
# Idiopathic Macular Hole

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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).
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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.
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Idiopathic Macular Hole

IMH, stage 4
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**Stage 4 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

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Again working backwards, what would go here?
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).
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.
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*The Retina book recognizes three categories of vitreomacular traction (VMT) disease: Vitreomacular adhesion, vitreomacular traction, and macular hole.*
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The Retina book recognizes three categories of vitreomacular traction (VMT) disease: **Vitreomacular adhesion** is the mildest form, and corresponds to a Stage 0 MH;
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*The Retina book recognizes three categories of vitreomacular traction (VMT) disease.*

**Vitreomacular traction syndrome** corresponds to a Stage 1 MH;
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*The Retina book recognizes three categories of vitreomacular traction (VMT) disease.*  
*Macular hole with ongoing VMT* corresponds to a Stage 2 MH; and
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The Retina book recognizes three categories of vitreomacular traction (VMT) disease. **Macular hole without VMT** corresponds to Stage 3 and 4 MH.
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)
  - Remove posterior cortical vitreous
  - Inject long-acting gas
  - Prone positioning to tamponade 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...

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Management of MH

- **Stage 1**: No treatment
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  - Inject long-acting gas
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Management of MH

- Stage 1:
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**
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**Management of MH**
- Stage 1: **No treatment**
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...

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**Management of MH**

- Stage 1: **No treatment**

*Why no treatment for a Stage I 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
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Management of MH
- Stage 1: No treatment

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

- **Stage 1:** No treatment

*Why no treatment for a Stage 1 hole? Because about 50% will resolve spontaneously*
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**Management of MH**

- Stage 1: **No treatment**
- Stage 2-4: **surgery**
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**Management of MH**

- Stage 1: **No treatment**
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**Management of MH**

- Stage 1: **No treatment**
- Stage 2-4: **Pars plana vitrectomy (PPV)**

*How does vitrectomy aid in MH repair?*
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…

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**Management of MH**

- Stage 1: No treatment
- Stage 2-4: **Pars plana vitrectomy (PPV)**

**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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**Management of MH**

- **Stage 1:** No treatment
- **Stage 2-4:** *Pars plana vitrectomy (PPV)*

List in order the main surgical maneuvers involved in PPV for macular hole: PPV intraop maneuver 1, PPV intraop maneuver 2, PPV intraop maneuver 3, PPV intraop maneuver 4, PPV POST-op maneuver.
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Management of MH

- Stage 1: **No treatment**
- Stage 2-4: **Pars plana vitrectomy (PPV)**
  - **Remove most of the vitreous**
  - PPV intraop maneuver 2
  - PPV intraop maneuver 3
  - PPV intraop maneuver 4
  - PPV POST-op maneuver
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**Management of MH**

- **Stage 1:** No treatment
- **Stage 2-4:** Pars plana vitrectomy (PPV)
  - Remove most of the vitreous
  - **Induce a PVD (if necessary)**

**PPV intraop maneuver 3**

**PPV intraop maneuver 4**

**PPV POST-op maneuver**
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**Management of MH**

- **Stage 1:** No treatment
- **Stage 2-4:** Pars plana vitrectomy (PPV)
  - Remove most of the vitreous
  - Induce a PVD (if necessary)
  - **Peel the ILM, and ERM (if present)**

*ILM = Internal limiting membrane
ERM = Epiretinal membrane*
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...

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What gas mixtures are typically used?

- C3F8, C2F6, SF6, or even just plain ol' air

What is the key factor in deciding which gas to use?

- How long the surgeon wants the gas bubble to remain

What determines how long a bubble will remain?

- The speed at which it is resorbed

How does the gas bubble aid in MH closure?

- By dehydrating the cuff of subretinal fluid that is often present
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**What is the purpose of prone positioning?**

To keep the gas bubble over the macula

What if the hole is small, and 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.

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