Q

- Which embryologic cell line gives rise to the lens epithelium?
Which embryologic cell line gives rise to the lens epithelium? **Surface ectoderm**
Q

- Which embryologic cell line gives rise to the lens epithelium? **Surface ectoderm**
- T/F: The optic vesicle is a sphere containing a single layer of cuboidal cells encased within its basement membrane
A

- Which embryologic cell line gives rise to the lens epithelium? **Surface ectoderm**
- T/F: The optic vesicle is a sphere containing a single layer of cuboidal cells encased within its basement membrane **F**
Which embryologic cell line gives rise to the lens epithelium? **Surface ectoderm**

T/F: The optic vesicle is a sphere containing a single layer of cuboidal cells encased within its basement membrane **F**

T/F: The anterior cells of the lens vesicle elongate and progressively obliterate the lumen, forming the embryonic nucleus
Which embryologic cell line gives rise to the lens epithelium? Surface ectoderm

T/F: The optic vesicle is a sphere containing a single layer of cuboidal cells encased within its basement membrane F

T/F: The posterior cells of the lens vesicle elongate and progressively obliterate the lumen, forming the embryonic nucleus F
Which embryologic cell line gives rise to the lens epithelium? **Surface ectoderm**

T/F: The *optic* vesicle is a sphere containing a single layer of cuboidal cells encased within its basement membrane **F**

T/F: The *anterior* cells of the lens vesicle elongate and progressively obliterate the lumen, forming the embryonic nucleus **F**

T/F: The Y sutures are formed by the anterior and posterior interdigitations of fetal nucleus fibers
A

- Which embryologic cell line gives rise to the lens epithelium? **Surface ectoderm**
- T/F: The **lens vesicle** is a sphere containing a single layer of cuboidal cells encased within its basement membrane **F**
- T/F: The **anterior** cells of the lens vesicle elongate and progressively obliterate the lumen, forming the embryonic nucleus **F**
- T/F: The Y sutures are formed by the anterior and posterior interdigitations of fetal nucleus fibers **T**

---

**Lens Embryology**
Which embryologic cell line gives rise to the lens epithelium? 

Surface ectoderm **Lens**

T/F: The optic vesicle is a sphere containing a single layer of cuboidal cells encased within its basement membrane **F**

T/F: The anterior cells of the lens vesicle elongate and progressively obliterate the lumen, forming the embryonic nucleus **F**

T/F: The Y sutures are formed by the anterior and posterior interdigitations of fetal nucleus fibers **T**

The *lens* originates as a thickening of surface ectoderm overlying the optic vesicle (an outpouching of the primitive forebrain destined to become the neurosensory retina, RPE, and ciliary body epithelium). This thickened area is the *lens placode*. The placode subsequently invaginates, eventually forming a fluid-filled sphere containing a single layer of cells; this sphere is the *lens* (not optic!) *vesicle*. The outer ‘shell’ of the lens vesicle consists of the basement membrane of the surface ectoderm cells which now line the *inner* aspect of the vesicle; *this BM will form the lens capsule*. The cells at the *posterior* aspect of the vesicle elongate to obliterate the vesicle’s lumen and form the *embryonic nucleus*. Soon thereafter the equatorial cells elongate and insinuate themselves anteriorly and posteriorly; as they encounter one another at the anterior and posterior poles, they interdigitate themselves in a pattern that gives rise to the Y sutures. This first wave of elongating fibers comprise the *fetal nucleus*.

*(No questions—review slide)*
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**.
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The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**.

*It has three sections:*

1) The *posterior vascular capsule* arises from the **hyaloid** artery.
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**. **It has three sections:**

1) The *posterior vascular capsule* arises from the **hyaloid** artery
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. It has three sections:

1. The posterior vascular capsule arises from the hyaloid artery.

The hyaloid artery runs from where to where?

It runs from the optic nerve head to the back of the fetal lens.

Does it survive into post-fetal life?

No—it is supposed to regress prior to birth.

What is the name of the trans-vitreous passageway that remains after it regresses?

Cloquet's canal.
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. It has three sections:

1) The posterior vascular capsule arises from the hyaloid artery.

The hyaloid artery runs from where to where?
From the optic nerve head to the back of the fetal lens.

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The hyaloid artery runs from where to where?
From the optic nerve head to the back of the fetal lens.

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‘Supposed to regress’ implies it doesn’t always do so. Is this the case?
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. It has three sections:

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From the optic nerve head to the back of the fetal lens.

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No—it is supposed to regress prior to birth.

'Supposed to regress' implies it doesn't always do so. Is this the case?
Yes—in a significant number of people, complete regression fails to occur (to some degree).

Is this failure-to-regress clinically significant?
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. It has three sections:

1) The posterior vascular capsule arises from the hyaloid artery.

The hyaloid artery runs from where to where? From the optic nerve head to the back of the fetal lens.

Does it survive into post-fetal life? No—it is supposed to regress prior to birth.

‘Supposed to regress’ implies it doesn’t always do so. Is this the case? Yes—in a significant number of people, complete regression fails to occur (to some degree).

Is this failure-to-regress clinically significant? In the vast majority of cases, no; but it is extremely significant (ie, sight-threatening) in a few (more on this coming in hot).
The vascular supply encapsulating the developing lens is called the *tunica vasculosa lentis*. It has three sections:

1) The *posterior vascular capsule* arises from the *hyaloid* artery.
   - A common, clinically insignificant remnant is the Mittendorf dot.
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. **It has three sections:**

1) The *posterior vascular capsule* arises from the hyaloid artery
   - A common, clinically insignificant remnant is the Mittendorf dot
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**. *It has three sections:*

1) The *posterior vascular capsule* arises from the **hyaloid artery**
   - A common, clinically insignificant remnant is the **Mittendorf dot**

(works too—more about it shortly)
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**. 

**It has three sections:**

1) The *posterior vascular capsule* arises from the **hyaloid** artery
   - A common, clinically insignificant remnant is the **Mittendorf dot**

(Bergmeister papillae works too—more about it shortly)
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. It has three sections:

1. The posterior vascular capsule arises from the hyaloid artery.

How does a Mittendorf dot present clinically?

- It is a small white dot on the posterior capsule of the lens.
- No, usually it is a bit nasal of center.
- If you encounter a larger, gnarlier, more central opacification involving the posterior capsule, it is more consistent with a posterior polar cataract.
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. It has three sections:

1. The posterior vascular capsule arises from the hyaloid artery. A common, clinically insignificant remnant is the Mittendorf dot.

How does a Mittendorf dot present clinically?
As a small white dot on the posterior capsule of the lens

Is it located on the central aspect of the capsule?
No, usually it is a bit nasal of center

If you encounter a larger, gnarlier, more central opacification involving the posterior capsule, is that also a Mittendorf dot?
Perhaps, but the description is more consistent with a posterior polar cataract.
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. It has three sections:

1. The posterior vascular capsule arises from the hyaloid artery.

A common, clinically insignificant remnant is the Mittendorf dot. How does a Mittendorf dot present clinically? It is a small white dot on the posterior capsule of the lens.

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The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. It has three sections:

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Is a posterior polar cataract an insignificant finding?
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. It has three sections:

1. The posterior vascular capsule arises from the hyaloid artery.

How does a Mittendorf dot present clinically?
As a small white dot on the posterior capsule of the lens

Is it located on the central aspect of the capsule?
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If you encounter a larger, gnarlier, more central opacification involving the posterior capsule, is that also a Mittendorf dot?
Perhaps, but the description is more consistent with a posterior polar cataract

Is a posterior polar cataract an insignificant finding?
No! It greatly increases the risk of capsule rupture during cataract surgery

Lens (Vasculature) Embryology
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. It has three sections:

1. The posterior vascular capsule arises from the hyaloid artery.

How does a Mittendorf dot present clinically?
As a small white dot on the posterior capsule of the lens

Is it located on the central aspect of the capsule?
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If you encounter a larger, gnarlier, more central opacification involving the posterior capsule, is that also a Mittendorf dot?
Perhaps, but the description is more consistent with a posterior polar cataract

Is a posterior polar cataract an insignificant finding?
No! It greatly increases the risk of capsule rupture during cataract surgery

But I thought a posterior polar cataract was that vacuolated, hazy cataract that uveitis/steroid pts get…
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. It has three sections:

1. **Posterior vascular capsule** arises from the hyaloid artery.

How does a Mittendorf dot present clinically?
- As a small white dot on the posterior capsule of the lens.

Is it located on the central aspect of the capsule?
- No, usually it is a bit nasal and inferior of center.

If you encounter a larger, gnarlier, more central opacification involving the posterior capsule, is that also a Mittendorf dot?
- Perhaps, but the description is more consistent with a **posterior polar cataract**.

Is a posterior polar cataract an insignificant finding?
- No! It greatly increases the risk of capsule rupture during cataract surgery.

But I thought a posterior polar cataract was that vacuolated, hazy cataract that uveitis/steroid pts get…
- That's a **posterior subcapsular cataract**, an unrelated entity located on the *inner* surface of the posterior capsule.
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. It has three sections:

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How does a Mittendorf dot present clinically?
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Is it located on the central aspect of the capsule?
No, usually it is a bit nasal and inferior of center

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Perhaps, but the description is more consistent with a posterior polar cataract.

Is a posterior polar cataract an insignificant finding?
No! It greatly increases the risk of capsule rupture during cataract surgery

But I thought a posterior polar cataract was that vacuolated, hazy cataract that uveitis/steroid pts get…
That’s a posterior subcapsular cataract (PSC), an unrelated entity located on the inner surface of the posterior capsule.
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. It has three sections:

1) The posterior vascular capsule arises from the hyaloid artery.

How does a Bergmeister papilla present clinically?
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**. It has three sections:

1) The *posterior vascular capsule* arises from the **hyaloid artery**.

**How does a Bergmeister papilla present clinically?**

As a tuft of glial-like tissue extending veil-like from the ONH a short distance into the vitreous.
The vascular supply encapsulating the developing lens is called the \textit{tunica vasculosa lentis}. It has three sections:

1) The \textit{posterior vascular capsule} arises from the \textit{hyaloid artery}.

\begin{quote}
\textit{How does a Bergmeister papilla present clinically?}
As a tuft of glial-like tissue extending veil-like from the ONH a short distance into the vitreous
\end{quote}

\begin{quote}
I saw a pt with a vascularized Bergmeister papilla. Is the vessel a hyaloid artery remnant?
\end{quote}
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How does a Bergmeister papilla present clinically?
As a tuft of glial-like tissue extending veil-like from the ONH a short distance into the vitreous.

I saw a pt with a vascularized Bergmeister papilla. Is the vessel a hyaloid artery remnant?
No, the vessel is what is known as a prepapillary vascular loop. It is a retinal vessel that has grown up into the papilla.
● The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. It has three sections:
  1) The posterior vascular capsule arises from the hyaloid artery.

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The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. It has three sections:

1) The posterior vascular capsule arises from the hyaloid artery
   - A common, clinically insignificant remnant is the Mittendorf dot
   - A less common, clinically devastating remnant is ___ abb. ___
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**. 

*It has three sections:*  
1) The *posterior vascular capsule* arises from the **hyaloid artery**  
   - A common, clinically insignificant remnant is the **Mittendorf dot**  
   - A less common, clinically devastating remnant is **PFV**
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**. It has three sections:

1) The **posterior vascular capsule** arises from the hyaloid artery
   - A common, clinically insignificant remnant is the Mittendorf dot
   - A less common, clinically devastating remnant is PFV

*Is this failure-to-regress clinically significant?*
In the vast majority of cases, no; but it is **extremely** significant (i.e., sight-threatening) in a few (more on this coming in hot)

PFV is the ‘rare but extremely significant’ sequelae that was alluded to previously
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**. It has three sections:

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   - A common, clinically insignificant remnant is the **Mittendorf dot**
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What does PFV stand for in this context?
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. **It has three sections:**

1) The *posterior vascular capsule* arises from the hyaloid artery
   - A common, clinically insignificant remnant is the Mittendorf dot
   - A less common, clinically devastating remnant is **PFV**

*What does PFV stand for in this context?*  
Persistent fetal vasculature
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis.**

*It has three sections:*

1) The *posterior vascular capsule* arises from the *hyaloid artery*
   - A common, clinically insignificant remnant is the **Mittendorf dot**
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**What does PFV stand for in this context?**
Persistent fetal vasculature

**By what name was this condition known previously?**
The vascular supply encapsulating the developing lens is called the \textit{tunica vasculosa lentis}. It has three sections:

1) The \textit{posterior vascular capsule} arises from the \textit{hyaloid artery}
   - A common, clinically insignificant remnant is the \textit{Mittendorf dot}
   - A less common, clinically devastating remnant is \textcolor{red}{PFV}

What does PFV stand for in this context?
Persistent fetal vasculature

By what name was this condition known previously?
Persistent hyperplastic primary vitreous (PHPV)
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis.**

**It has three sections:**

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What does PFV stand for in this context?
Persistent fetal vasculature

By what name was this condition known previously?
*Persistent hyperplastic primary vitreous (PHPV)*

We will see why this weird name makes sense later in the slide-set
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**. **It has three sections:**

1) The *posterior vascular capsule* arises from the hyaloid artery
   - A common, clinically insignificant remnant is the **Mittendorf dot**
   - A less common, clinically devastating remnant is **PFV**

*In general terms, what is PFV?*
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. It has three sections:

1) The posterior vascular capsule arises from the hyaloid artery
   - A common, clinically insignificant remnant is the Mittendorf dot
   - A less common, clinically devastating remnant is PFV.

In general terms, what is PFV?
A retrolental fibrovascular membrane that induces a variety of sight-threatening problems.
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**. It has three sections:

1) The *posterior vascular capsule* arises from the **hyaloid artery**
   - A common, clinically insignificant remnant is the **Mittendorf dot**
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---

**In general terms, what is PFV?**
A retro-lental fibrovascular membrane that induces a variety of sight-threatening problems

**What is the inheritance pattern for PFV?**
The vascular supply encapsulating the developing lens is called the *tunica vasculosa lentis*. It has three sections:

1) The *posterior vascular capsule* arises from the hyaloid artery.
   - A common, clinically insignificant remnant is the Mittendorf dot.
   - A less common, clinically devastating remnant is **PFV**.

In general terms, what is PFV? A retrolental fibrovascular membrane that induces a variety of sight-threatening problems.

What is the inheritance pattern for PFV? None (it is sporadic).
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. It has three sections:

1) The posterior vascular capsule arises from the hyaloid artery
   - A common, clinically insignificant remnant is the Mittendorf dot
   - A less common, clinically devastating remnant is PFV

In general terms, what is PFV?
A retrolental fibrovascular membrane that induces a variety of sight-threatening problems

What is the inheritance pattern for PFV?
None (it is sporadic)

Does it present unilaterally, or bilaterally?
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. It has three sections:

1) The posterior vascular capsule arises from the hyaloid artery
   - A common, clinically insignificant remnant is the Mittendorf dot
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In general terms, what is PFV?
A retrolental fibrovascular membrane that induces a variety of sight-threatening problems

What is the inheritance pattern for PFV?
None (it is sporadic)

Does it present unilaterally, or bilaterally?
It is unilateral in % of cases
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. It has three sections:

1) The posterior vascular capsule arises from the hyaloid artery
   - A common, clinically insignificant remnant is the Mittendorf dot
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In general terms, what is PFV?
A retrolental fibrovascular membrane that induces a variety of sight-threatening problems

What is the inheritance pattern for PFV?
None (it is sporadic)

Does it present unilaterally, or bilaterally?
It is unilateral in 90% of cases
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**. It has three sections:

1. The **posterior vascular capsule** arises from the hyaloid artery
   - A common, clinically insignificant remnant is the **Mittendorf dot**
   - A less common, clinically devastating remnant is **PFV**

**In general terms, what is PFV?**
A retrolental fibrovascular membrane that induces a variety of sight-threatening problems

**What are the sight-threatening manifestations of PFV?**
- 
- 
- 

**Does it present unilaterally, or bilaterally?**
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**In general terms, what is PFV?**

A retrolental fibrovascular membrane that induces a variety of sight-threatening problems

**What are the sight-threatening manifestations of PFV?**

- Cataract
- Progressive AC shallowing
- Retinal detachment

**Does it present unilaterally, or bilaterally?**

It is unilateral in 90% of cases
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis.**

*It has three sections:*

1. The *posterior vascular capsule* arises from the *hyaloid artery*
   - A common, clinically insignificant remnant is the *Mittendorf dot*
   - A less common, clinically devastating remnant is **PFV**

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**In general terms, what is PFV?**

A retrolental fibrovascular membrane that induces a variety of sight-threatening problems.

---

**What are the sight-threatening manifestations of PFV?**

- Cataract
- **Progressive AC shallowing**
- Retinal detachment

---

**How is shallowing of the AC sight-threatening?**

It is unilateral in ~85% of cases.
Lens (Vasculature) Embryology

- The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. It has three sections:
  1) The posterior vascular capsule arises from the hyaloid artery
     - A common, clinically insignificant remnant is the Mittendorf dot
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In general terms, what is PFV?
A retrolental fibrovascular membrane that induces a variety of sight-threatening problems.

What are the sight-threatening manifestations of PFV?
- Cataract
- Progressive AC shallowing
- Retinal detachment

How is shallowing of the AC sight-threatening?
It can lead to angle-closure glaucoma.

Does it present unilaterally or bilaterally?
It is unilateral in 90% of cases.
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**. It has three sections:

1) The *posterior vascular capsule* arises from the **hyaloid artery**
   - A common, clinically insignificant remnant is the **Mittendorf dot**
   - A less common, clinically devastating remnant is **PFV**.

**In general terms, what is PFV?**

A retrolental fibrovascular membrane that induces a *variety of sight-threatening problems*.

**Is PFV inevitably a blinding disease?**

---Cataract---Progressive AC shallowing---Retinal detachment

**Does it present unilaterally, or bilaterally?**

It is unilateral in 90% of cases.
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**. *It has three sections:*

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   - A common, clinically insignificant remnant is the *Mittendorf dot*
   - A less common, clinically devastating remnant is **PFV**

---

**In general terms, what is PFV?**
A retrolental fibrovascular membrane that induces *a variety of sight-threatening problems*

---

**Is PFV inevitably a blinding disease?**
No. Early cataract extraction and membranectomy may salvage the eye, and useful vision.

**Does it present unilaterally, or bilaterally?**
It is unilateral in 90% of cases.
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. 

**It has three sections:**

1) The *posterior vascular capsule* arises from the *hyaloid artery* 
   - A common, clinically insignificant remnant is the *Mittendorf dot*
   - A less common, clinically devastating remnant is *PFV*

2) The *anterior vascular capsule* derives from the *long ciliary arteries*
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**.

*It has three sections:*

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   - A common, clinically insignificant remnant is the **Mittendorf dot**
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   - A common, clinically insignificant remnant is the Mittendorf dot
   - A less common, clinically devastating remnant is PFV

2) The *anterior vascular capsule* derives from the long ciliary arteries
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Zonules are secreted by the specific cell type near the end of the third month of gestation.
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Now we will see why this weird name makes sense later in the slide set.
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**Lens (Zonules) Embryology**

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- **Primary vitreous**: The hyaloid vasculature
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- **Secondary vitreous**: The main vitreous body