Which embryologic cell line gives rise to the lens epithelium?
Q/A

Which embryologic cell line gives rise to the lens epithelium? **Surface vs neuro-ectoderm**
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
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**
Surface ectoderm and lens formation:

(Advance when ready to see the points being made)
Surface ectoderm and lens formation:
--A portion of surface ectoderm thickens to form the
Surface ectoderm and lens formation:
--A portion of *surface ectoderm* thickens to form the *lens placode*
Surface ectoderm and lens formation:
--A portion of surface ectoderm thickens to form the lens placode (aka the two words)
Surface ectoderm and lens formation:
--A portion of surface ectoderm thickens to form the lens placode (aka the lens plate)
Surface ectoderm and lens formation:
--A portion of surface ectoderm thickens to form the lens placode (aka the lens plate)
--The placode invaginates to form the...
**Surface ectoderm** and lens formation:

--A portion of *surface ectoderm* thickens to form the *lens placode* (aka the *lens plate*)

--The placode invaginates to form the *lens vesicle*
Surface ectoderm and lens formation:
--A portion of surface ectoderm thickens to form the lens placode (aka the lens plate)
--The placode invaginates to form the lens vesicle
--The lens vesicle goes on to form the mature lens.
Surface ectoderm and lens formation
--A portion of surface ectoderm thickens to form the lens placode (aka the lens plate)
--The placode invaginates to form the lens vesicle
--The lens vesicle goes on to form the mature lens.

**Important:** Note that optic vesicle and lens vesicle are different structures—don’t mix them up!
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 **F**
- T/F: The anterior cells of the lens vesicle elongate and progressively obliterate the lumen, forming the embryonic nucleus
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**

- T/F: The cells of the lens vesicle elongate and progressively obliterate the lumen, forming the embryonic nucleus **F**
Posterior cells of the lens vesicle elongate to obliterate the vesicle's lumen, thus creating 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. False.

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

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

Lens: Y suture formation
Lens Embryology

- 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  T

The lens originates as a thickening of surface ectoderm overlying the optic vesicle, which is 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 wall of the lens vesicle consists of the basement membrane of the surface ectoderm cells now lining 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 both anteriorly and posteriorly; as they encounter one another at the anterior and posterior poles, they interdigitate in a manner that gives rise to the Y sutures. The fibers involved in this wave comprise the fetal nucleus.
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**.
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**.
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**. *It has three sections:*

1) ?

2) ?

3) ?
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**. 

*It has three sections:*

1) The *posterior vascular capsule*

2) The *anterior vascular capsule*

3) The *capsulopupillary portion*
Lens (Vasculature) Embryology

Tunica vasculosa lentis
In the eye of this very premature infant, the **tunica vasculosa lentis** surrounds the lens (arrows 1).

(We’ll get to Arrows 2 and 3 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**

2) The *anterior vascular capsule* derives from the **long ciliary arteries**

A common, clinically insignificant (usually) remnant is a persistent pupillary membrane. Another common remnant is the epicapsular star, colloquially referred to as 'chicken feet' on the anterior capsule.

3) The *capsulopupillary portion*
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lenticis**. 

**It has three sections:**

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

2) The *anterior vascular capsule*

3) The *capsulopupillary portion*
Tunica vasculosa lentis: Posterior vascular capsule
In the eye of this very premature infant, the *tunica vasculosa lentis* surrounds the lens (arrows 1). It is contiguous with the hyaloid artery and its branches (arrow 2).
2) The anterior vascular capsule derives from the long ciliary arteries.

- A common, clinically insignificant (usually) remnant is a persistent pupillary membrane.
- Another common remnant is the epicapsular star, colloquially referred to as 'chicken feet' on the anterior capsule.

3) The capsulopupillary portion

- 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?
  - 2) What is the name of the trans-vitreous passageway that remains after it regresses?
  - Cloquet's canal
  - Does it survive into post-fetal life?
  - No—it is supposed to regress prior to birth

3) The capsulopupillary portion
2) The anterior vascular capsule derives from the long ciliary arteries.
- A common, clinically insignificant (usually) remnant is a persistent pupillary membrane.
- Another common remnant is the epicapsular star, colloquially referred to as 'chicken feet' on the anterior capsule.

3) The capsulopupillary portion

A common, clinically insignificant (usually) remnant is the persistent pupillary membrane.
- Another common remnant is the epicapsular star, colloquially referred to as 'chicken feet' on the anterior capsule.

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.
  2) The hyaloid artery runs from the optic nerve head to the back of the fetal lens.
  3) The capsulopupillary portion
2) The anterior vascular capsule derives from the long ciliary arteries. A common, clinically insignificant (usually) remnant is a persistent pupillary membrane. Another common remnant is the epicapsular star, colloquially referred to as 'chicken feet' on the anterior capsule.

3) The capsulopupillary portion

- 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
     - What is the name of the trans-vitreous passageway that remains after it regresses?
     - Cloquet's canal

3) The capsulopupillary portion
2) The anterior vascular capsule derives from the long ciliary arteries.

- A common, clinically insignificant (usually) remnant is a persistent pupillary membrane.
- Another common remnant is the epicapsular star, colloquially referred to as 'chicken feet' on the anterior capsule.

3) The capsulopupillary portion

- 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.

1) What is the name of the trans-vitreous passageway that remains after it regresses?
Cloquet's canal.
2) The anterior vascular capsule derives from the long ciliary arteries.
- A common, clinically insignificant (usually) remnant is a persistent pupillary membrane.
- Another common remnant is the epicapsular star, colloquially referred to as ‘chicken feet’ on the anterior capsule.

3) The capsulopupillary portion
- 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.
    2) The hyaloid artery runs from where to where?
       From the optic nerve head to the back of the fetal lens.
    3) Does it survive into post-fetal life?
       No—it is supposed to regress prior to birth.
    4) What is the name of the trans-vitreous passageway that remains after it regresses?
       Cloquet's canal.

3) The capsulopupillary portion
2) The anterior vascular capsule derives from the long ciliary arteries.

- A common, clinically insignificant (usually) remnant is a persistent pupillary membrane.
- Another common remnant is the epicapsular star, colloquially referred to as ‘chicken feet’ on the anterior capsule.

3) The capsulopupillary portion

- 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.
    2) The hyaloid artery runs from where to where? From the optic nerve head to the back of the fetal lens.
    3) Does it survive into post-fetal life? No—it is supposed to regress prior to birth.
    4) What is the name of the trans-vitreous passageway that remains after it regresses? Cloquet’s canal.
    5) The hyaloid artery

3) The capsulopupillary portion
Lens (Vasculature) Embryology

Cloquet canal

Cloquet’s canal
Single loop of a persistent hyaloid artery extending anteriorly within Cloquet's canal to insert on the posterior capsule of the lens.
The anterior vascular capsule derives from the long ciliary arteries. A common, clinically insignificant (usually) remnant is a persistent pupillary membrane. Another common remnant is the epicapsular star, colloquially referred to as 'chicken feet' on the anterior capsule.

The capsulopupillary portion

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

‘Supposed to regress’ implies it doesn’t always do so. Is this the case?

3) The capsulopupillary portion
2) The anterior vascular capsule derives from the long ciliary arteries. A common, clinically insignificant (usually) remnant is a persistent pupillary membrane. Another common remnant is the epicapsular star, colloquially referred to as 'chicken feet' on the anterior capsule.

3) The capsulopupillary portion

- 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.
  2. The hyaloid artery runs from where to where? From the optic nerve head to the back of the fetal lens.
  3. 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).

4) The name of the trans-vitreous passageway that remains after it regresses is Cloquet's canal.
The anterior vascular capsule derives from the long ciliary arteries. A common, clinically insignificant (usually) remnant is a persistent pupillary membrane. Another common remnant is the epicapsular star, colloquially referred to as 'chicken feet' on the anterior capsule.

The capsulopupillary portion

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 the optic nerve head to the back of the fetal lens. It is supposed to regress prior to birth. 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).

3) The capsulopupillary portion
2) The anterior vascular capsule derives from the long ciliary arteries.

- A common, clinically insignificant (usually) remnant is a persistent pupillary membrane.
- Another common remnant is the epicapsular star, colloquially referred to as ‘chicken feet’ on the anterior capsule.

3) The capsulopupillary portion

- 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**.

**Is this failure-to-regress clinically significant?**
In the vast majority of cases, no; but it is **extremely** significant—as in sight-threatening—in a few (more on this 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](#)

2) The *anterior vascular capsule*

3) The *capsulopupillary portion*
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**

2) The *anterior vascular capsule*

3) The *capsulopupillary portion*
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* (two words works too—more about it shortly)

2) The *anterior vascular capsule*

3) The *capsulopupillary portion*
2) The anterior vascular capsule derives from the long ciliary arteries.

A common, clinically insignificant (usually) remnant is a persistent pupillary membrane. Another common remnant is the epicapsular star, colloquially referred to as 'chicken feet' on the anterior capsule.

3) The capsulopupillary portion

A

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)

2) The anterior vascular capsule

3) The capsulopupillary portion
2) The anterior vascular capsule derives from the long ciliary arteries.

- A common, clinically insignificant (usually) remnant is a persistent pupillary membrane.
- Another common remnant is the epicapsular star, colloquially referred to as 'chicken feet' on the anterior capsule.

3) The capsulopupillary portion

- 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.
    - No, usually it is a bit nasal of center.
  2. 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.

Lens (Vasculature) Embryology
2) The anterior vascular capsule derives from the long ciliary arteries. A common, clinically insignificant (usually) remnant is a persistent pupillary membrane. Another common remnant is the epicapsular star, colloquially referred to as 'chicken feet' on the anterior capsule.

3) The capsulopupillary portion

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.

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**Lens (Vascularure) Embryology**

Mittendorf dot
2) The anterior vascular capsule derives from the long ciliary arteries.

- A common, clinically insignificant (usually) remnant is a persistent pupillary membrane.
- Another common remnant is the epicapsular star, colloquially referred to as 'chicken feet' on the anterior capsule.

3) The capsulopupillary portion

- 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 lenticis. The vascular supply arises from the hyaloid artery.

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 and inferior of center.

2) The anterior vascular capsule derives from the long ciliary arteries. A common, clinically insignificant (usually) remnant is a persistent pupillary membrane. Another common remnant is the epicapsular star, colloquially referred to as 'chicken feet' on the anterior capsule.

3) The capsulopupillary portion
2) The anterior vascular capsule derives from the long ciliary arteries. A common, clinically insignificant (usually) remnant is a persistent pupillary membrane. Another common remnant is the epicapsular star, colloquially referred to as 'chicken feet' on the anterior capsule.

3) The capsulopupillary portion

Q

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 and inferior of center.

2. 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.

3) The capsulopupillary portion
2) The anterior vascular capsule derives from the long ciliary arteries. A common, clinically insignificant (usually) remnant is a persistent pupillary membrane. Another common remnant is the epicapsular star, colloquially referred to as 'chicken feet' on the anterior capsule.

3) The capsulopupillary portion

Q/A

- 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 Mittendorf dot.

3) The capsulopupillary portion
2) The anterior vascular capsule derives from the long ciliary arteries. A common, clinically insignificant (usually) remnant is a persistent pupillary membrane. Another common remnant is the epicapsular star, colloquially referred to as ‘chicken feet’ on the anterior capsule.

3) The capsulopupillary portion

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.
Lens (Vasculature) Embryology

Mittendorf dot

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.

   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

2. A common, clinically insignificant remnant is the Mittendorf dot.

   Is a posterior polar cataract clinically insignificant a la a Mittendorf dot?
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis.

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 clinically insignificant a la a Mittendorf dot?
No! It greatly increases the risk of capsule rupture during cataract surgery.
2) The anterior vascular capsule derives from the long ciliary arteries. A common, clinically insignificant (usually) remnant is a persistent pupillary membrane. Another common remnant is the epicapsular star, colloquially referred to as ‘chicken feet’ on the anterior capsule.

3) The capsulopupillary portion

- 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 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.
  2. Another remnant is the epicapsular star, colloquially referred to as ‘chicken feet’ on the anterior capsule.

Is a posterior polar cataract clinically insignificant a la a Mittendorf dot? No! It greatly increases the risk of capsule rupture during cataract surgery.
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentic. 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 clinically insignificant a la a Mittendorf dot? No! It greatly increases the risk of capsule rupture during cataract surgery. But a posterior polar cataract is that vacuolated, hazy cataract associated with uveitis and/or steroid use. Why does it convey a risk of cap rupture?
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis.

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 clinically insignificant a la a Mittendorf dot?
No! It greatly increases the risk of capsule rupture during cataract surgery

But a posterior polar cataract is that vacuolated, hazy cataract associated with uveitis and/or steroid use. Why does it convey a risk of cap rupture?
No, that describes a posterior subcapsular cataract (PSC). PSCs are not related to posterior polar cats, and do not carry an increased risk of cap rupture.
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis.

- **Anterior Vascular Capsule**: Derives from the long ciliary arteries. A common, clinically insignificant remnant is a persistent pupillary membrane. Another common remnant is the epicapsular star, colloquially referred to as 'chicken feet' on the anterior capsule.

- **Capsulopupillary Portion**
  - The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis. It has three sections:
    - **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 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.
  - **Posterior Subcapsular Cataract** (PSC): Not related to posterior polar cataracts and do not carry an increased risk of capsule rupture.

*Is a posterior polar cataract clinically insignificant a la a Mittendorf dot? No! It greatly increases the risk of capsule rupture during cataract surgery.*

*But a posterior polar cataract is that vacuolated, hazy cataract associated with uveitis and/or steroid use. Why does it convey a risk of cap rupture? No, that describes a posterior subcapsular cataract (PSC)*
The vascular supply encapsulating the developing lens is called the tunica vasculosa lentis.

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 clinically insignificant a la a Mittendorf dot?
No! It greatly increases the risk of capsule rupture during cataract surgery

But a posterior polar cataract is that vacuolated, hazy cataract associated with uveitis and/or steroid use. Why does it convey a risk of cap rupture?
No, that describes a posterior subcapsular cataract (PSC). PSCs are not related to posterior polar cats, and do not carry an increased risk of cap rupture.
Lens (Vasculature) Embryology

PSC

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. How does a Bergmeister papilla present clinically?

2) The anterior vascular capsule 

3) The capsulopupillary portion
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.
2. **The anterior vascular capsule** derives from the long ciliary arteries.
3. **The capsulopupillary portion**

How does a Bergmeister papilla present clinically? As a tuft of glial-like tissue extending veil-like from the optic nerve head a short distance into the vitreous.
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 optic nerve head a short distance into the vitreous.

   Mittendorf dot

2) The anterior vascular capsule

3) The capsulopupillary portion
Bergmeister papillae
In the eye of this very premature infant, the **tunica vasculosa lentis** surrounds the lens (arrows 1). It is contiguous with the hyaloid artery and its branches (arrow 2). **Notice the glial sheath of the hyaloid artery** (arrow 3).
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*.

2. The *anterior vascular capsule* derives from the long ciliary arteries. Another common remnant is the *epicapsular star*, colloquially referred to as 'chicken feet' on the anterior capsule.

I saw a pt with a vascularized Bergmeister papilla. Is the vessel a hyaloid artery remnant?

3. The *capsulopupillary portion*
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.

2) The *anterior vascular capsule* derives from the long ciliary arteries. Another common remnant is the epicapsular star, colloquially referred to as 'chicken feet' on the anterior capsule.

3) The *capsulopupillary portion* of the lens (Vasculature) embryology

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**Q/A**

How does a Bergmeister papilla present clinically? As a tuft of glial-like tissue extending veil-like from the optic nerve head 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.

Bergmeister 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. A common, clinically insignificant remnant is the Mittendorf dot.

- **How does a Bergmeister papilla present clinically?** As a tuft of glial-like tissue extending veil-like from the optic nerve head a short distance into the vitreous.

2) The **anterior vascular capsule**

   *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.*

3) The **capsulopupillary portion**
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**.

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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 optic nerve head, 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.

2) The *anterior vascular capsule*

3) The *capsulopupillary portion*
Prepapillary vascular loop
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*

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2) The *anterior vascular capsule*

3) The *capsulopupillary portion*
The anterior vascular capsule derives from the long ciliary arteries. A common, clinically insignificant (usually) remnant is a persistent pupillary membrane. Another common remnant is the epicapsular star, colloquially referred to as 'chicken feet' on the anterior capsule.

The capsulopupillary portion

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

3) The *capsulopupillary portion*.
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2) The anterior vascular capsule.

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).

Remember this Q&A?

Rhetorical question—proceed when ready.
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?

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)

**Remember this Q&A?**

*PFV is the ‘rare but extremely significant’ sequelae being alluded to*
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?**
The vascular supply encapsulating the developing lens is called the \textit{tunica vasculosa lentis}. \textit{It has three sections:}

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

2) The \textit{anterior vascular capsule}

   \textit{What does PFV stand for in this context?}
   \text{Persistent fetal vasculature}

   \textit{By what name was this condition known previously?}
   \text{Persistent hyperplastic primary vitreous (PHPV)}

3) The \textit{capsulopupillary portion}
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   *What does PFV stand for in this context? Persistent fetal vasculature*

3) The *capsulopupillary portion* 
   - The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**.

*We will see why this weird name makes sense later in the slide-set*

*By what name was this condition known previously? Persistent hyperplastic primary vitreous (PHPV)*
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*In a nutshell, what is PFV?*
The anterior vascular capsule derives from the long ciliary arteries. A common, clinically insignificant (usually) remnant is a persistent pupillary membrane. Another common remnant is the epicapsular star, colloquially referred to as 'chicken feet' on the anterior capsule.

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In a nutshell, what is PFV?

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

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PFV: Retrolental fibrovascular membrane
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**In a nutshell, what is PFV?**

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**What is the inheritance pattern for PFV?**
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3) The **capsulopupillary portion**

   Does it present unilaterally, or bilaterally?
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   It is unilateral in \( \% \) of cases
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   It is unilateral in 90% of cases

3) The **capsulopupillary portion**
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*Take note! On the OKAP, PFV will always be unilateral*
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**. 

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*What is the inheritance pattern for PFV?*

None (it is **sporadic**)

*Does it present unilaterally, or bilaterally?*

It is **unilateral** in 90% of cases

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**Take note! On the OKAP, PFV will always be unilateral, and there will be no history of family members with a similar condition**

No question—proceed when ready
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis.**

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   In a nutshell, what is PFV?
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   What are the sight-threatening manifestations of PFV?
   --?
   --?
   --?

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In a nutshell, what is PFV?
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What are the sight-threatening manifestations of PFV?
- Cataract
- Progressive AC
- ?

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**How is shallowing of the AC sight-threatening?**
It can lead to angle-closure glaucoma
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**. It has three sections:

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Lens (Vascularature) Embryology

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   In a nutshell, what is PFV?
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   - Cataract
   - Progression of AC shallowing
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   Is PFV inevitably a blinding disease?
   - No. Early cataract extraction and membranectomy may salvage the eye, and useful vision.

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**Lens (Vasculature) Embryology**

Tunica vasculosa lentis: Anterior vascular capsule
Q

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Persistent pupillary membrane
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3) The **capsulopupillary portion** anastomoses the anterior and posterior sections of the tunica
The vascular supply encapsulating the developing lens is called the **tunica vasculosa lentis**. *It has three sections:*  

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3) The *capsulopupillary portion* **anastomoses** the anterior and posterior sections of the tunica
Tunica vasculosa lentis: Capsulopupillary portion
Zonules are secreted by the ciliary epithelium near the end of the third month of gestation.
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Zonules comprise the so-called tertiary vitreous.
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Zonules are secreted by the ciliary epithelium near the end of the third month of gestation.

Zonules comprise the so-called tertiary vitreous.

This begs the question: What are the primary and secondary vitreous? (Vitrei?)

Primary vitreous: The two words.
Zonules are secreted by the ciliary epithelium near the end of the third month of gestation.

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- Primary vitreous: The hyaloid vasculature
Zonules are secreted by the ciliary epithelium near the end of the third month of gestation.

Zonules comprise the so-called tertiary vitreous.

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- *Primary vitreous*: The hyaloid vasculature
  - Hence PFV is aka...

"Lens (Zonules) Embryology"
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- Primary vitreous: The hyaloid vasculature
  - Hence PFV is aka persistent hyperplastic primary vitreous
Primary vitreous
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Primary vitreous: The hyaloid vasculature

Hence PFV is aka persistent hyperplastic primary vitreous.

Now we will see why this weird name makes sense later in the slide set.
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**Primary vitreous**: The hyaloid vasculature

- Hence PFV is aka persistent hyperplastic primary vitreous

**Secondary vitreous**: The
● Zonules are secreted by the ciliary epithelium near the end of the third month of gestation
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● This begs the question: What are the primary and secondary vitreous? (Vitrei?)
  ● Primary vitreous: The hyaloid vasculature
    ● Hence PFV is aka persistent hyperplastic primary vitreous
  ● Secondary vitreous: The main vitreous body
Lens (Zonules) Embryology

(Tertiary vitreous will form the zonules)

Secondary vitreous