For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer):

- Phacolytic glaucoma
- Phacoantigenic glaucoma
- Lens-particle glaucoma

- The only one described in the *Glaucoma* book as ‘rare’:
A

For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

- Phacolytic glaucoma
- Phacoantigenic glaucoma
- Lens-particle glaucoma

**The only one described in the *Glaucoma* book as ‘rare’:***

Phacoantigenic
The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

Mediated by inflammatory response to lens proteins in AC:
The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

Mediated by inflammatory response to lens proteins in AC: Phacoantigenic; phacolytic
The only one described in the *Glaucoma* book as ‘rare’:
- Phacoantigenic

Mediated by inflammatory response to lens proteins in AC:
- Phacoantigenic; phacolytic

Mediated by IgG antibodies:
The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

Mediated by inflammatory response to lens proteins in AC: Phacoantigenic; phacolytic

Mediated by IgG antibodies: Phacoantigenic
Q

For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

**Phacolytic glaucoma**  **Phacoantigenic glaucoma**  **Lens-particle glaucoma**

- The only one described in the *Glaucoma* book as ‘rare’: **Phacoantigenic**
- Mediated by inflammatory response to lens proteins in AC: **Phacoantigenic; phacolytic**
- Mediated by IgG antibodies: **Phacoantigenic**
- TM is clogged with macrophages:
The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

Mediated by inflammatory response to lens proteins in AC: Phacoantigenic; phacolytic

Mediated by IgG antibodies: Phacoantigenic

TM is clogged with macrophages: Phacolytic
The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

Mediated by inflammatory response to lens proteins in AC: Phacoantigenic; phacolytic

Mediated by IgG antibodies: Phacoantigenic

**TM is clogged with macrophages**: Phacolytic

‘TM clogged with macrophages’ applies also to another form of secondary OAG—which one?
The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

Mediated by inflammatory response to lens proteins in AC: Phacoantigenic; phacolytic

Mediated by IgG antibodies: Phacoantigenic

**TM is clogged with macrophages**: Phacolytic

‘**TM clogged with macrophages’ applies also to another form of secondary OAG—which one?**

Hemolytic glaucoma
The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

Mediated by inflammatory response to lens proteins in AC: Phacoantigenic; phacolytic

Mediated by IgG antibodies: Phacoantigenic

**TM is clogged with macrophages**: Phacolytic

‘*TM clogged with macrophages*’ applies also to another form of secondary OAG—which one?
Hemolytic glaucoma

*In phacolytic glaucoma, the macrophages are full of* two words
The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

Mediated by inflammatory response to *lens proteins* in AC: Phacoantigenic; **phacolytic**

Mediated by IgG antibodies: Phacoantigenic

**TM is clogged with macrophages**: Phacolytic

‘*TM clogged with macrophages*’ applies also to another form of secondary OAG—which one? Hemolytic glaucoma

*In phacolytic glaucoma, the macrophages are full of *lens proteins*. *
The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

Mediated by inflammatory response to lens proteins in AC: Phacoantigenic; phacolytic

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‘TM clogged with macrophages’ applies also to another form of secondary OAG—which one? Hemolytic glaucoma

*In phacolytic glaucoma, the macrophages are full of lens proteins*. What are they full of in hemolytic glaucoma?
The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

Mediated by inflammatory response to lens proteins in AC: Phacoantigenic; phacolytic

Mediated by IgG antibodies: Phacoantigenic

**TM is clogged with macrophages**: Phacolytic

‘**TM clogged with macrophages**’ applies also to another form of secondary OAG—which one?

Hemolytic glaucoma

*In phacolytic glaucoma, the macrophages are full of lens proteins*. What are they full of in hemolytic glaucoma?

Hemoglobin
The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

Mediated by inflammatory response to lens proteins in AC: Phacoantigenic; phacolytic

Mediated by IgG antibodies: Phacoantigenic

TM is clogged with macrophages: Phacolytic

Chunks of cortex may be visible in AC:
The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

Mediated by inflammatory response to lens proteins in AC: Phacoantigenic; phacolytic

Mediated by IgG antibodies: Phacoantigenic

TM is clogged with macrophages: Phacolytic

Chunks of cortex may be visible in AC: Lens particle
Lens-particle glaucoma
The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

Mediated by inflammatory response to lens proteins in AC: Phacoantigenic; phacolytic

Mediated by IgG antibodies: Phacoantigenic

TM is clogged with macrophages: Phacolytic

Chunks of cortex may be visible in AC: Lens particle

Is also known as [condition name] *uveitis*: Q
The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

Mediated by inflammatory response to lens proteins in AC: Phacoantigenic; phacolytic

Mediated by IgG antibodies: Phacoantigenic

TM is clogged with macrophages: Phacolytic

Chunks of cortex may be visible in AC: Lens particle

Is also known as [condition name] uveitis: Phacoantigenic
The only one described in the *Glaucoma* book as ‘rare’: **Phacoantigenic**

Mediated by inflammatory response to lens proteins in AC: **Phacoantigenic; phacolytic**

Mediated by IgG antibodies: **Phacoantigenic**

TM is clogged with macrophages: **Phacolytic**

Chunks of cortex may be visible in AC: **Lens particle**

Is also known as [condition name] *uveitis*: **Phacoantigenic**

Capsule is intact:
For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer):

- **Phacolytic glaucoma**
- **Phacoantigenic glaucoma**
- **Lens-particle glaucoma**

- The only one described in the *Glaucoma* book as ‘rare’: **Phacoantigenic**
- Mediated by inflammatory response to lens proteins in AC: **Phacoantigenic; phacolytic**
- Mediated by IgG antibodies: **Phacoantigenic**
- TM is clogged with macrophages: **Phacolytic**
- Chunks of cortex may be visible in AC: **Lens particle**
- Is also known as [condition name] *uveitis*: **Phacoantigenic**
- Capsule is intact: **Phacolytic**
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What does this imply about the status of the capsule in phacoantigenic and lens-particle glaucoma?
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer):

- **Phacolytic glaucoma**
- **Phacoantigenic glaucoma**
- **Lens-particle glaucoma**

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- Mediated by IgG antibodies: Phacoantigenic
- TM is clogged with macrophages: Phacolytic
- Chunks of cortex may be visible in AC: Lens particle
- Is also known as [condition name] *uveitis*: Phacoantigenic

**Capsule is intact:** Phacolytic

---

What does this imply about the status of the capsule in phacoantigenic and lens-particle glaucoma?

It implies (correctly) that the capsule is **open** in these conditions.
The only one described in the *Glaucoma* book as ‘rare’:

- **Phacoantigenic**

Mediated by inflammatory response to lens proteins in AC:

- **Phacoantigenic**; **phacolytic**

Mediated by IgG antibodies:

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TM is clogged with macrophages:

- **Phacolytic**

Chunks of cortex may be visible in AC:

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Is also known as **uveitis**: Phacoantigenic

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What does this imply about the status of the capsule in phacoantigenic and lens-particle glaucoma?

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Chunks of cortex may be visible in AC: **Lens particle**

Is also known as [condition name] *uveitis*: **Phacoantigenic**

Capsule is intact: **Phacolytic**

AC reaction is granulomatous:
The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

Mediated by inflammatory response to lens proteins in AC: Phacoantigenic; phacolytic

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Is also known as [condition name] *uveitis*: Phacoantigenic

Capsule is intact: Phacolytic

AC reaction is granulomatous: Phacoantigenic

Is a reaction to *normal* lens proteins:
The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

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Mediated by IgG antibodies: Phacoantigenic

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Capsule is intact: Phacolytic

AC reaction is granulomatous: Phacoantigenic

Is a reaction to *normal* lens proteins: Phacoantigenic
The only one described in the *Glaucoma* book as ‘rare’:

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Mediated by inflammatory response to lens proteins in AC:

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Capsule is intact: Phacolytic

AC reaction is granulomatous: Phacoantigenic

Is a reaction to *normal* lens proteins: Phacoantigenic

**For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer)**

Phacolytic glaucoma   Phacoantigenic glaucoma   Lens-particle glaucoma

---

*Why is it significant that phacoantigenic glaucoma involves an immune reaction to ‘normal’ lens proteins?*

In phakic eyes, minute amounts of lens proteins make their way through the capsule and into the AC. Because of this, normal lens proteins enjoy a certain level of immunologic privilege and are well tolerated by the eye. However, violation of the capsule results in massive amounts of lens proteins spilling into the AC. If this influx disrupts the privilege, severe inflammation, ie, phacoantigenic uveitis—and glaucoma—may result.
The only one described in the Glaucoma book as ‘rare’:

- Phacoantigenic glaucoma

Mediated by inflammatory response to lens proteins in AC:

- Phakoantigenic; phacolytic

Mediated by IgG antibodies: Phacoantigenic

TM is clogged with macrophages: Phacolytic

Chunks of cortex may be visible in AC: Lens particle

Is also known as [condition name] uveitis: Phacoantigenic

Capsule is intact: Phacolytic

AC reaction is granulomatous: Phacoantigenic

Is a reaction to normal lens proteins: Phacoantigenic

Why is it significant that phacoantigenic glaucoma involves an immune reaction to ‘normal’ lens proteins?

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Mediated by IgG antibodies: Phacoantigenic

TM is clogged with macrophages: Phacolytic

Chunks of cortex may be visible in AC: Lens-particle glaucoma

Is also known as [condition name] *uveitis*: Phacoantigenic

Capsule is intact: Phacolytic

AC reaction is granulomatous: Phacoantigenic

Is a reaction to *normal* lens proteins: Phacoantigenic

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Is a reaction to *normal* lens proteins: Phacoantigenic

Chunks of cortex may be visible in AC: Lens particle

Is also known as [condition name] *uveitis*: Phacoantigenic

Capsule is intact: Phacolytic

AC reaction is granulomatous: Phacoantigenic

Is a reaction to *denatured* lens proteins:
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

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<tr>
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- AC reaction is granulomatous: **Phacoantigenic**
- Is a reaction to *denatured* lens proteins: **Phacolytic**
The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

What does it mean to say a protein has been ‘denatured’?

Is a reaction to *denatured* lens proteins: Phacolytic
A

The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

What does it mean to say a protein has been ‘denatured’?

It means the protein has been forced out of its native conformation. Because a protein’s function is inextricably tied to its shape, denatured proteins do not behave as they do in their native form.

Is a reaction to *denatured* lens proteins: **Phacolytic**
The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

What does it mean to say a protein has been ‘denatured’?
It means the protein has been forced out of its native conformation. Because a protein’s function is inextricably tied to its shape, denatured proteins do not behave as they do in their native form.

Can you give an example of protein denaturation?

Is a reaction to *denatured* lens proteins: Phacolytic
The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

- **What does it mean to say a protein has been ‘denatured’?**
  It means the protein has been forced out of its native conformation. Because a protein’s function is inextricably tied to its shape, denatured proteins do not behave as they do in their native form.

- **Can you give an example of protein denaturation?**
  Consider egg albumin. In its native state, it’s a clear liquid. But if sufficient heat is applied, it becomes a white solid. (And if sufficient salsa is applied to the white solid, it becomes delish.)

- **Is a reaction to *denatured* lens proteins:** Phacolytic
The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)
- Phacolytic glaucoma
- Phacoantigenic glaucoma
- Lens-particle glaucoma

**What does it mean to say a protein has been ‘denatured’?**
It means the protein has been forced out of its native conformation. Because a protein’s function is inextricably tied to its shape, denatured proteins do not behave as they do in their native form.

**Can you give an example of protein denaturation?**
Consider egg albumin. In its native state, it’s a clear liquid. But if sufficient heat is applied, it becomes a white solid. (And if sufficient salsa is applied to the white solid, it becomes delish.)

**What role does denaturation play in the inflammatory process?**

**Is a reaction to denatured lens proteins:** Phacolytic
The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

<table>
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<tr>
<th>For each statement, identify the <strong>lens-related secondary OAG</strong> with which it is associated (some have more than one answer)</th>
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<td>Phacolytic glaucoma</td>
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What does it mean to say a protein has been ‘denatured’?
It means the protein has been forced out of its native conformation. Because a protein’s function is inextricably tied to its shape, denatured proteins do not behave as they do in their native form.

Can you give an example of protein denaturation?
Consider egg albumin. In its native state, it’s a clear liquid. But if sufficient heat is applied, it becomes a white solid. (And if sufficient salsa is applied to the white solid, it becomes delish.)

What role does denaturation play in the inflammatory process?
Recall that normal lens proteins enjoy a degree of immunologic privilege. In contrast, denatured proteins enjoy no such privilege, and thus tend to attract macrophages in large numbers.

Is a reaction to *denatured* lens proteins: Phacolytic
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

- Phacolytic glaucoma
- Phacoantigenic glaucoma
- Lens-particle glaucoma

- The only one described in the *Glaucoma* book as ‘rare’: **Phacoantigenic**
- Mediated by inflammatory response to lens proteins in AC: **Phacoantigenic; phacolytic**
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- TM is clogged with macrophages: **Phacolytic**
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- Is also known as [condition name] *uveitis*: **Phacoantigenic**
- Capsule is intact: **Phacolytic**
- AC reaction is granulomatous: **Phacoantigenic**
- Is a reaction to *normal* lens proteins: **Phacoantigenic**
- Is a reaction to *denatured* lens proteins: **Phacolytic**
- The presence of KP is a key clinical finding:
The only one described in the *Glaucoma* book as ‘rare’: **Phacoantigenic**

Mediated by inflammatory response to lens proteins in AC: **Phacoantigenic**; **phacolytic**

Mediated by IgG antibodies: **Phacoantigenic**

TM is clogged with macrophages: **Phacolytic**

Chunks of cortex may be visible in AC: **Lens particle**

Is also known as [condition name] *uveitis*: **Phacoantigenic**

Capsule is intact: **Phacolytic**

AC reaction is granulomatous: **Phacoantigenic**

Is a reaction to *normal* lens proteins: **Phacoantigenic**

Is a reaction to *denatured* lens proteins: **Phacolytic**

The presence of KP is a key clinical finding: **Phacoantigenic**
The only one described in the Glaucoma book as ‘rare’: Phacoantigenic

Mediated by inflammatory response to lens proteins in AC: Phacoantigenic; phacolytic

Mediated by IgG antibodies: Phacoantigenic

TM is clogged with macrophages: Phacolytic

Chunks of cortex may be visible in AC: Lens particle

Is also known as [condition name] uveitis: Phacoantigenic

Capsule is intact: Phacolytic

AC reaction is granulomatous: Phacoantigenic

Is a reaction to normal lens proteins: Phacoantigenic

Is a reaction to denatured lens proteins: Phacolytic

The presence of KP is a key clinical finding: Phacoantigenic

Are the KP granulomatous, or nongranulomatous?
For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer)

- Phacolytic glaucoma
- Phacoantigenic glaucoma
- Lens-particle glaucoma

- The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic
- Mediated by inflammatory response to lens proteins in AC: Phacoantigenic; phacolytic
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- Is also known as [condition name] uveitis: Phacoantigenic
- Capsule is intact: Phacolytic
- **AC reaction is granulomatous**: Phacoantigenic
- Is a reaction to *normal* lens proteins: Phacoantigenic
- Is a reaction to *denatured* lens proteins: Phacolytic
- The presence of KP is a key clinical finding: Phacoantigenic

Are the KP granulomatous, or nongranulomatous? Granulomatous
Phacoantigenic glaucoma: Granulomatous KP
The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

Mediated by inflammatory response to lens proteins in AC: Phacoantigenic; phacolytic

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Chunks of cortex may be visible in AC: Lens particle

Is also known as [condition name] uveitis: Phacoantigenic

Capsule is intact: Phacolytic

AC reaction is granulomatous: Phacoantigenic

Is a reaction to *normal* lens proteins: Phacoantigenic

Is a reaction to *denatured* lens proteins: Phacolytic

The presence of KP is a key clinical finding: Phacoantigenic

The one most likely to have a very high IOP:
The only one described in the *Glaucoma* book as ‘rare’: Phacoantigenic

Mediated by inflammatory response to lens proteins in AC: Phacoantigenic; phacolytic

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Is a reaction to *denatured* lens proteins: Phacolytic

The presence of KP is a key clinical finding: Phacoantigenic

The one most likely to have a very high IOP: Phacolytic
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer):

- Phacolytic glaucoma
- Phacoantigenic glaucoma
- Lens-particle glaucoma

**aka** *phacoanaphylactic glaucoma*: 
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

- Phacolytic glaucoma
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For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer):

- Phacolytic glaucoma
- Phacoantigenic glaucoma
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**Why is phacoanaphylactic glaucoma actually a misnomer?**
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

| Phacolytic glaucoma | Phacoantigenic glaucoma | Lens-particle glaucoma |

- **aka** _phacoanaphylactic glaucoma_: Phacoantigenic

**Why is phacoanaphylactic glaucoma actually a misnomer?**
Because the condition is not a Type 1 (anaphylactic) reaction
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

- Phacolytic glaucoma
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### Q

- **aka** *phacoanaphylactic glaucoma*: Phacoantigenic

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**Why is phacoanaphylactic glaucoma actually a misnomer?**

Because the condition is not a Type 1 (anaphylactic) reaction

**What characteristics inherent to true anaphylaxis are missing in phacoantigenic glaucoma?**
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

- Phacolytic glaucoma
- Phacoantigenic glaucoma
- Lens-particle glaucoma

**aka phacoanaphylactic glaucoma**: Phacoantigenic glaucoma

---

**Why is phacoanaphylactic glaucoma actually a misnomer?**
Because the condition is not a Type 1 (anaphylactic) reaction

**What characteristics inherent to true anaphylaxis are missing in phacoantigenic glaucoma?**
The involvement of IgE, mast cells and basophils
akaphaconaphylactic glaucoma: Phacoantigenic

- Usually unilateral:
A aka *phacoanaphylactic glaucoma*: Phacoantigenic

- Usually unilateral: *All of them*
Q

For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer)

Phacolytic glaucoma    Phacoantigenic glaucoma    Lens-particle glaucoma

- aka phacoanaphylactic glaucoma: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an adaptive immune response:
aka *phacoanaphylactic glaucoma*: Phacoantigenic

Usually unilateral: All of them

Is mediated by an *adaptive* immune response: Phacoantigenic

*(We’ll unpack the term adaptive immune response later in the slide-set)*
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer).

**Phacolytic glaucoma**  **Phacoantigenic glaucoma**  **Lens-particle glaucoma**

- aka *phacoanaphylactic glaucoma*: **Phacoantigenic**
- Usually unilateral: **All of them**
- Is mediated by an *adaptive* immune response: **Phacoantigenic**
- Associated with mature/hypermature cataract:
For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer):

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- Associated with mature/hypermature cataract: Phacolytic

What is a mature cataract?
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

- aka *phacoanaphylactic glaucoma*: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an *adaptive* immune response: Phacoantigenic
- Associated with mature/hypermature *cataract*: Phacolytic

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**What is a mature cataract?**

A cataract that has progressed to involve the entire lens
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

- Phacolytic glaucoma
- Phacoantigenic glaucoma
- Lens-particle glaucoma

- **aka phacoanaphylactic glaucoma**: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an **adaptive** immune response: Phacoantigenic
- Associated with **mature**/hypermature cataract: Phacolytic

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**What is a mature cataract?**

A cortical cataract that has progressed to involve the entire lens cortex
Phacoanaphylactic glaucoma
Usually unilateral: All of them
Is mediated by an adaptive immune response: Phacoantigenic
Associated with mature/hypermature cataract: Phacolytic

For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer).

Phacolytic glaucoma  Phacoantigenic glaucoma  Lens-particle glaucoma

What is a mature cataract?
A cortical cataract that has progressed to involve the entire lens cortex

What is a hypermature cataract?
For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer):

Phacolytic glaucoma  Phacoantigenic glaucoma  Lens-particle glaucoma

- aka *phacoanaphylactic glaucoma*: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an *adaptive* immune response: Phacoantigenic
- Associated with mature/hypermature cataract: Phacolytic

**What is a mature cataract?**
A cortical cataract that has progressed to involve the entire lens cortex

**What is a hypermature cataract?**
Mature cataracts may absorb water, transforming them into an *cortical cataract*. 
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer):

- **Phacolytic glaucoma**
- **Phacoantigenic glaucoma**
- **Lens-particle glaucoma**

- aka *phacoanaphylactic glaucoma*: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an *adaptive* immune response: Phacoantigenic
- Associated with mature/hypermature cataract: Phacolytic

---

**What is a mature cataract?**
A cortical cataract that has progressed to involve the entire lens cortex.

**What is a hypermature cataract?**
Mature cataracts may absorb water, transforming them into an *intumescent cortical cataract.*
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

*Phacolytic glaucoma*  *Phacoantigenic glaucoma*  *Lens-particle glaucoma*

- aka *phacoanaphylactic glaucoma*: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an *adaptive* immune response: Phacoantigenic
- Associated with mature/hypermature cataract

**What is a mature cataract?**
A cortical cataract that has progressed to involve the entire lens cortex

**What is a hypermature cataract?**
Mature cataracts may absorb water, transforming them into an *intumescent cortical cataract*. A *hypermature cataract* results when an intumescent cataract begins leaking water and denatured proteins through its intact anterior capsule.
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

**Phacolytic glaucoma**  **Phacoantigenic glaucoma**  **Lens-particle glaucoma**

- aka *phacoanaphylactic glaucoma*: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an *adaptive* immune response: Phacoantigenic
- Associated with mature/**hypermature cataract**: Phacolytic

---

*What is a mature cataract?*

A cortical cataract that has progressed to involve the entire lens cortex

*What is a hypermature cataract?*

Mature cataracts may absorb water, transforming them into an *intumescent cortical cataract*. A *hypermature cataract* results when an intumescent cataract begins leaking water and denatured proteins through its intact anterior capsule.

**Take note of the stages:**

Mature cataract  ?
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

- Phacolytic glaucoma
- Phacoantigenic glaucoma
- Lens-particle glaucoma

- aka **phacoanaphylactic glaucoma**: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an *adaptive* immune response: Phacoantigenic
- Associated with mature/hypermature cataract: Phacolytic

---

**What is a mature cataract?**
A cortical cataract that has progressed to involve the entire lens cortex

**What is a hypermature cataract?**
Mature cataracts may absorb water, transforming them into an *intumescent cortical cataract*. A hypermature cataract results when an intumescent cataract begins leaking water and denatured proteins through its intact anterior capsule.

*Take note of the stages:*

Mature cataract → intumescent cataract → ?
For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer)

Phacolytic glaucoma  Phacoantigenic glaucoma  Lens-particle glaucoma

- aka *phacoanaphylactic glaucoma*: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an *adaptive* immune response: Phacoantigenic
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*What is a mature cataract?*
A cortical cataract that has progressed to involve the entire lens cortex

*What is a hypermature cataract?*
Mature cataracts may absorb water, transforming them into an *intumescent cortical cataract*. A *hypermature cataract* results when an intumescent cataract begins leaking water and denatured proteins through its intact anterior capsule.

*Take note of the stages:*

Mature cataract  intumescent cataract  hypermature cataract
Q

For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer):

Phacolytic glaucoma  Phacoantigenic glaucoma  Lens-particle glaucoma

- aka phacoanaphylactic glaucoma: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an adaptive immune response: Phacoantigenic
- Associated with mature/hypermature cataract: Phacolytic

What is a mature cataract?
A cortical cataract that has progressed to involve the entire lens cortex.

What is a hypermature cataract?
Mature cataracts may absorb water, transforming them into an intumescent cortical cataract. A hypermature cataract results when an intumescent cataract begins leaking water and denatured proteins through its intact anterior capsule.

Take note of the stages:

Mature cataract  intumescent cataract  hypermature cataract

Cataract  water  What happens
aka phacoanaphylactic glaucoma: Phacoantigenic

Usually unilateral: All of them

Is mediated by an adaptive immune response: Phacoantigenic

Associated with mature/hypermature cataract: Phacolytic

What is a mature cataract?
A cortical cataract that has progressed to involve the entire lens cortex

What is a hypermature cataract?
Mature cataracts may absorb water, transforming them into an intumescent cortical cataract. A hypermature cataract results when an intumescent cataract begins leaking water and denatured proteins through its intact anterior capsule.

Take note of the stages:

Mature cataract  ➔  intumescent cataract  ➔  hypermature cataract

Cataract absorbs water  ➔  What happens
Q

For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

- Phacolytic glaucoma
- Phacoantigenic glaucoma
- Lens-particle glaucoma

- aka *phacoanaphylactic glaucoma*: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an *adaptive* immune response: Phacoantigenic
- Associated with mature/"**hypermature cataract**": Phacolytic

---

**What is a mature cataract?**

A cortical cataract that has progressed to involve the entire lens cortex

**What is a hypermature cataract?**

Mature cataracts may **absorb water**, transforming them into an *intumescent cortical cataract*. A **hypermature cataract** results when an intumescent cataract begins leaking water and denatured proteins through its intact anterior capsule.

---

**Take note of the stages:**

Mature cataract → intumescent cataract → hypermature cataract

Cataract *absorbs* water ← What happens → Cataract *leaks* water
For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer)

Phacolytic glaucoma  Phacoantigenic glaucoma  Lens-particle glaucoma

- aka phacoanaphylactic glaucoma: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an adaptive immune response: Phacoantigenic
- Associated with mature/hypermature cataract: Phacolytic

What is a mature cataract?
A cortical cataract that has progressed to involve the entire lens cortex

What is a hypermature cataract?
Mature cataracts may absorb water, transforming them into an intumescent cortical cataract. A hypermature cataract results when an intumescent cataract begins leaking water and denatured proteins through its intact anterior capsule.

Take note of the stages:

Mature cataract  intumescent cataract  hypermature cataract

Cataract absorbs water  →  What happens  →  Cataract leaks water*
Q

For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer)

Phacolytic glaucoma  Phacoantigenic glaucoma  Lens-particle glaucoma

- aka phacoanaphylactic glaucoma: Phacoantigenic
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What is a mature cataract?
A cortical cataract that has progressed to involve the entire lens cortex

What is a hypermature cataract?
Mature cataracts may absorb water, transforming them into an intumescent cortical cataract. A hypermature cataract results when an intumescent cataract begins leaking water and denatured proteins through its intact anterior capsule.

All three of these pose a particular challenge during an early, crucial step in cataract surgery. What step, and what challenge?

Take note of the stages:

Mature cataract  intumescent cataract  hypermature cataract
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

- Phacolytic glaucoma
- Phacoantigenic glaucoma
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---

**What is a mature cataract?**

A cortical cataract that has progressed to involve the entire lens cortex

**What is a hypermature cataract?**

Mature cataracts may absorb water, transforming them into an intumescent cortical cataract. A hypermature cataract results when an intumescent cataract begins leaking water and denatured proteins through its intact anterior capsule.

---

All three of these pose a particular challenge during an early, crucial step in cataract surgery. **What step, and what challenge?**

For all three stages, the red reflex is completely obscured. As most cataract surgeons rely on the red reflex to visualize the anterior capsule during capsulorrhexis, this step cannot be performed in a conventional manner.

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*Take note of the stages:*

**Mature cataract** → **intumescent cataract** → **hypermature cataract**
Q For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer)

Phacolytic glaucoma  Phacoantigenic glaucoma  Lens-particle glaucoma

- aka phacoanaphylactic glaucoma: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an adaptive immune response: Phacoantigenic
- Associated with mature/hypermature cataract: Phacolytic

What is a mature cataract?
A cortical cataract that has progressed to involve the entire lens cortex

What is a hypermature cataract?
Mature cataracts may absorb water, transforming them into an intumescent cortical cataract. A hypermature cataract results when an intumescent cataract begins leaking water and denatured proteins through its intact anterior capsule.

All three of these pose a particular challenge during an early, crucial step in cataract surgery. What step, and what challenge?
For all three stages, the red reflex is completely obscured. As most cataract surgeons rely on the red reflex to visualize the anterior capsule during capsulorrhexis, this step cannot be performed in a conventional manner.

What step do most surgeons take to facilitate capsulorrhexis in these cases?
They stain the anterior capsule with trypan blue.

Take note of the stages:
Mature cataract  intumescent cataract  hypermature cataract
Q/A For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer)
Phacolytic glaucoma  Phacoantigenic glaucoma  Lens-particle glaucoma

- aka phacoanaphylactic glaucoma: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an adaptive immune response: Phacoantigenic
- Associated with mature/hypermature cataract: Phacolytic

All three of these pose a particular challenge during an early, crucial step in cataract surgery. What step, and what challenge?
For all three stages, the red reflex is completely obscured. As most cataract surgeons rely on the red reflex to visualize the anterior capsule during capsulorrhexis, this step cannot be performed in a conventional manner.

What step do most surgeons take to facilitate capsulorrhexis in these cases?
They stain the anterior capsule with trypan blue.

Take note of the stages:
Mature cataract  intumescent cataract  hypermature cataract
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

| Phacolytic glaucoma | Phacoantigenic glaucoma | Lens-particle glaucoma |

- aka *phacoanaphylactic glaucoma*: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an *adaptive* immune response: Phacoantigenic
- Associated with mature/hypermature cataract: Phacolytic

---

**All three of these pose a particular challenge during an early, crucial step in cataract surgery. What step, and what challenge?**

For all three stages, the red reflex is completely obscured. As most cataract surgeons rely on the red reflex to visualize the anterior capsule during capsulorrhexis, this step cannot be performed in a conventional manner.

**What step do most surgeons take to facilitate capsulorrhexis in these cases?**

They stain the anterior capsule with trypan blue.

*Take note of the stages:*

1. **Mature cataract**
2. **intumescent cataract**
3. **hypermature cataract**
Q

For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

Phacolytic glaucoma  Phacoantigenic glaucoma  Lens-particle glaucoma

- aka *phacoanaphylactic glaucoma*: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an *adaptive* immune response: Phacoantigenic
- Associated with mature/*hypermature cataract*: Phacolytic

**Let’s drill down on** intumescent cataracts *for a moment*. In this context, *what does intumescent mean*?

All three of these pose a particular challenge during an early, crucial step in cataract surgery. What is the step, and what challenge?

For all three stages, the red reflex is completely obscured. As most cataract surgeons rely on the red reflex to visualize the anterior capsule during capsulorrhexis, this step cannot be performed in a conventional manner.

What step do most surgeons take to facilitate capsulorrhexis in these cases?

They stain the anterior capsule with *trypan blue*

**Take note of the stages**:

Mature cataract  **intumescent cataract**  hypermature cataract
For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer)

- phacoanaphylactic glaucoma: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an adaptive immune response: Phacoantigenic
- Associated with mature/hypermature cataract: Phacolytic

Let’s drill down on intumescent cataracts for a moment. In this context, what does intumescent mean? It means ‘swollen.’ As mentioned a few slides ago, the event that transforms a mature cataract into an intumescent cataract is absorption of water, and this absorption results in swelling of the lens.

What step do most surgeons take to facilitate capsulorrhexis in these cases? They stain the anterior capsule with trypan blue.

Take note of the stages:

Mature cataract → intumescent cataract → hypermature cataract
aka phacoanaphylactic glaucoma: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an *adaptive* immune response: Phacoantigenic
- Associated with mature/hypermature cataract: Phacolytic

**Q**

For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

- Phacolytic glaucoma
- Phacoantigenic glaucoma
- Lens-particle glaucoma

---

**Let’s drill down on intumescent cataracts for a moment. In this context, what does intumescent mean?**

It means ‘swollen.’ As mentioned a few slides ago, the event that transforms a mature cataract into an intumescent cataract is absorption of water, and this absorption results in swelling of the lens.

**What effect does swelling have on the internal dynamics of the lens?**

It increases the pressure within the lens.

**What step do most surgeons take to facilitate capsulorrhexis in these cases?**

They stain the anterior capsule with trypan blue.

**Take note of the stages:**

Mature cataract → **intumescent cataract** → hypermature cataract
For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer)

Phacolytic glaucoma    Phacoantigenic glaucoma    Lens-particle glaucoma

- aka phacoanaphylactic glaucoma: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an adaptive immune response: Phacoantigenic
- Associated with mature/hypermature cataract: Phacolytic

Let’s drill down on intumescent cataracts for a moment. In this context, what does intumescent mean?
It means ‘swollen.’ As mentioned a few slides ago, the event that transforms a mature cataract into an intumescent cataract is absorption of water, and this absorption results in swelling of the lens.

What effect does swelling have on the internal dynamics of the lens?
It increases the pressure within the lens.

What step do most surgeons take to facilitate capsulorrhexis in these cases?
They stain the anterior capsule with trypan blue

Take note of the stages:

Mature cataract → intumescent cataract → hypermature cataract
Q

For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer)

Phacolytic glaucoma  Phacoantigenic glaucoma  Lens-particle glaucoma

- aka phacoanaphylactic glaucoma: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an adaptive immune response: Phacoantigenic
- Associated with mature/hypermature cataract: Phacolytic

What is a mature cataract?
A cortical cataract that has progressed to involve the entire lens cortex

What is a hypermature cataract?
Mature cataracts may absorb water, transforming them into an intumescent cortical cataract. A hypermature cataract results when an intumescent cataract begins leaking water and denatured proteins through its intact anterior capsule.

Take note of the stages:
Mature cataract  intumescent cataract  hypermature cataract

Let's drill down on intumescent cataracts for a moment. In this context, what does intumescent mean?

As if obscuration of the red reflex wasn’t enough, the increased intralenticular pressure of an intumescent cataract poses an additional challenge during capsulorrhexis—what is it?

What effect does swelling have on the internal dynamics of the lens?
It increases the pressure within the lens

What step do most surgeons take to facilitate capsulorrhexis in these cases?
They stain the anterior capsule with trypan blue

Take note of the stages:
For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer)

Phacolytic glaucoma  Phacoantigenic glaucoma  Lens-particle glaucoma  

- aka *phacoanaphylactic glaucoma*: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an *adaptive* immune response: Phacoantigenic
- Associated with mature/hypermature cataract: Phacolytic

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**Let’s drill down on intumescent cataracts for a moment. In this context, what does *intumescent* mean?**

As if obscuration of the red reflex wasn’t enough, the increased intralenticular pressure of an intumescent cataract poses an additional challenge during capsulorrhexis—what is it?

When the surgeon makes the initial rent in the capsule, the increased pressure within an intumescent cataract may cause the rent to suddenly and uncontrollably extend to the periphery.

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*What effect does swelling have on the internal dynamics of the lens?*

**Increases the pressure within the lens**

*What step do most surgeons take to facilitate capsulorrhexis in these cases?*

They stain the anterior capsule with trypan blue

---

**Take note of the stages:**

Mature cataract  **intumescent cataract**  hypermature cataract

---

A
Q

For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer)

Phacolytic glaucoma  Phacoantigenic glaucoma  Lens-particle glaucoma

- aka *phacoanaphylactic glaucoma*: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an *adaptive* immune response: Phacoantigenic
- Associated with mature/hypermature cataract: Phacolytic

---

**Let’s drill down on intumescent cataracts for a moment. In this context, what does intumescent mean?**

As if obscuration of the red reflex wasn’t enough, the increased intralenticular pressure of an intumescent cataract poses an additional challenge during capsulorrhexis—what is it?

When the surgeon makes the initial rent in the capsule, the increased pressure within an intumescent cataract may cause the rent to suddenly and uncontrollably extend to the periphery.

If/when the rent runs peripherally, what is the resulting appearance of the lens?

They stain the anterior capsule with trypan blue.

Take note of the stages:

Mature cataract  →  intumescent cataract  →  hypermature cataract

---

**What effect does swelling have on the internal dynamics of the lens?**

It increases the pressure within the lens.

As if obscuration of the red reflex wasn’t enough, the increased intralenticular pressure of an intumescent cataract poses an additional challenge during capsulorrhexis—what is it?

When the surgeon makes the initial rent in the capsule, the increased pressure within an intumescent cataract may cause the rent to suddenly and uncontrollably extend to the periphery.

If/when the rent runs peripherally, what is the resulting appearance of the lens?

They stain the anterior capsule with trypan blue.

Take note of the stages:

Mature cataract  →  intumescent cataract  →  hypermature cataract
Phacoanaphylactic glaucoma: Phacoantigenic glaucoma

Usually unilateral: All of them

Is mediated by an adaptive immune response: Phacoantigenic glaucoma

Associated with mature/hypermature cataract: Phacoantigenic glaucoma

For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer)

Phacolytic glaucoma

Phacoantigenic glaucoma

Lens-particle glaucoma

What is a mature cataract?
A cortical cataract that has progressed to involve the entire lens cortex

What is a hypermature cataract?
Mature cataracts may absorb water, transforming them into an intumescent cortical cataract. A hypermature cataract results when an intumescent cataract begins leaking water and denatured proteins through its intact anterior capsule.

Take note of the stages:

Mature cataract
Intumescent cataract
Hypermature cataract

For all three stages, the red reflex is completely obscured. As most cataract surgeons rely on the red reflex to visualize the anterior capsule during capsulorrhexis, this step cannot be performed in a conventional manner

What step do most surgeons take to facilitate capsulorrhexis in these cases?
They stain the anterior capsule with trypan blue

Let's drill down on intumescent cataracts for a moment. In this context, what does intumescent mean?
It means 'swollen.' As mentioned a few slides ago, the event that transforms a mature cataract into an intumescent cataract is absorption of water, and this absorption results in swelling of the lens.

What effect does swelling have on the internal dynamics of the lens?
It increases the pressure within the lens

As if obscuration of the red reflex wasn't enough, the increased intralenticular pressure of an intumescent cataract poses an additional challenge during capsulorrhexis—what is it?
When the surgeon makes the initial rent in the capsule, the increased pressure within an intumescent cataract may cause the rent to suddenly and uncontrollably extend to the periphery

When the rent runs peripherally, what is the resulting appearance of the lens?
Recall that, because of red-reflex obscuration, trypan blue is used in all these cases. As the rent runs peripherally, trypan blue will stain the anterior capsular region. When the rent runs out, the surgeon will see a white stripe (the cataract) between two areas of blue (the undisturbed, trypan blue-stained capsule).
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer).

**Common complications**
- Phacoantigenic glaucoma
- Lens-particle glaucoma
- Phacolytic glaucoma

**Phacoanaphylactic glaucoma**
- Usually unilateral
- Is mediated by an adaptive immune response
- Associated with mature/hypermature cataract

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**Problem:**
- What is a mature cataract?
- What is a hypermature cataract?

**Solutions:**
- A cortical cataract that has progressed to involve the entire lens cortex
- Mature cataracts may absorb water, transforming them into an intumescent cortical cataract.
- A hypermature cataract results when an intumescent cataract begins leaking water and denatured proteins through its intact anterior capsule.

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**Stages to take note of:**
- Mature cataract
- Intumescent cataract
- Hypermature cataract

---

**Challenge during early, crucial step in cataract surgery:**
- For all three stages, the red reflex is completely obscured.
- As most cataract surgeons rely on the red reflex to visualize the anterior capsule during capsulorrhexis, this step cannot be performed in a conventional manner.

**What step do most surgeons take to facilitate capsulorrhexis in these cases?**
- They stain the anterior capsule with **trypan blue**.

---

**Intumescent cataracts:**
- In this context, what does intumescent mean?
- It means 'swollen.'
- The event that transforms a mature cataract into an intumescent cataract is absorption of water, and this absorption results in swelling of the lens.

**What effect does swelling have on the internal dynamics of the lens?**
- **Increases the pressure within the lens**

**What is the additional challenge during capsulorrhexis for an intumescent cataract?**
- When the surgeon makes the initial rent in the capsule, the increased pressure within an intumescent cataract may cause the rent to suddenly and uncontrollably extend to the periphery.

**If/when the rent runs peripherally, what is the resulting appearance of the lens?**
- Thus, after the rent runs out, the surgeon sees a **white stripe** (the cataract) between two areas of blue (the undisturbed, trypan blue-stained capsule).

---

**Trypan blue:**
- They stain the anterior capsule with trypan blue.
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer):

- Phacoantigenic glaucoma
- Phacolytic glaucoma
- Lens-particle glaucoma

**Phacoantigenic glaucoma:** Phacoantigenic

**Phacolytic glaucoma:** Phacoantigenic

**Lens-particle glaucoma:** Phacoantigenic

---

**What is a mature cataract?**

A cortical cataract that has progressed to involve the entire lens cortex.

**What is a hypermature cataract?**

Mature cataracts may absorb water, transforming them into an intumescent cortical cataract. A hypermature cataract results when an intumescent cataract begins leaking water and denatured proteins through its intact anterior capsule.

---

As if obscuration of the red reflex wasn’t enough, the increased intralenticular pressure of an intumescent cataract poses an additional challenge during capsulorrhexis.

When the intumescent cataract may absorb water, it becomes swollen and uncontrollably extends to the periphery.

---

This appearance has led to a memorable name for this finding. **What is it?**

- **Argentinian flag sign**

---

**Take note of the stages:**

Mature cataract → intumescent cataract → hypermature cataract

---

**If/when the rent runs peripherally, what is the resulting appearance of the lens?**

**Recall that, because of red-reflex obscuration, trypan blue is used in all these cases.**

They stain the anterior capsule with trypan blue.

**They stain the anterior capsule with trypan blue**

**The surgeon sees a white stripe (the cataract) between two areas of blue (the undisturbed, trypan blue-stained capsule).**

**White stripe**

**two areas of blue**

---

**Take note of the stages:**

Mature cataract → intumescent cataract → hypermature cataract
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

Phacolytic glaucoma         Phacoantigenic glaucoma         Lens-particle glaucoma

---

**What is a mature cataract?**
- A cortical cataract that has progressed to involve the entire lens cortex

**What is a hypermature cataract?**
- Mature cataracts may absorb water, transforming them into an intumescent cortical cataract. A hypermature cataract results when an intumescent cataract begins leaking water and denatured proteins through its intact anterior capsule.

---

**Take note of the stages:**

- Mature cataract
- Intumescent cataract
- Hypermature cataract

---

**What step, and what challenge?**

For all three stages, the red reflex is completely obscured. As most cataract surgeons rely on the red reflex to visualize the anterior capsule during capsulorrhexis, this step cannot be performed in a conventional manner.

---

**What step do most surgeons take to facilitate capsulorrhexis in these cases?**

They stain the anterior capsule with trypan blue.

---

**Let's drill down on intumescent cataracts for a moment. In this context, what does intumescent mean?**

It means 'swollen.' As mentioned a few slides ago, the event that transforms a mature cataract into an intumescent cataract is absorption of water, and this absorption results in swelling of the lens.

---

**What effect does swelling have on the internal dynamics of the lens?**

It increases the pressure within the lens.

---

As if obscuration of the red reflex wasn't enough, the increased intralenticular pressure of an intumescent cataract poses an additional challenge during capsulorrhexis—what is it?

When the intumescent cataract detaches, the surgeon may no longer be able to visualize the anteriorly and uncontrollably extended capsule peripherally.

---

**When the rent runs peripherally, what is the resulting appearance of the lens?**

Recall that, because of red-reflex obscuration, trypan blue is used in all these cases. Through the rent, as it runs out, the surgeon sees a white stripe (the cataract) between two areas of blue (the undisturbed, trypan blue-stained capsule).

---

**What is the resulting appearance?**

Thus, after the rent runs out, the surgeon sees a white stripe (the cataract) between two areas of blue (the undisturbed, trypan blue-stained capsule).

---

**When the rent runs peripherally, what is the resulting appearance of the lens?**

This appearance has led to a memorable name for this finding. What is it?

It is known as the **Argentinian flag sign**.
When faced with an intumescent cataract, what can the surgeon do to minimize the likelihood of seeing an Argentinian flag?

---

When the surgeon makes the initial rent in the capsule, the increased pressure within an intumescent cataract may cause the rent to suddenly and uncontrollably extend to the periphery.

If the rent runs peripherally, what is the resulting appearance of the lens? Recall that, because of red-reflex obscuration, trypan blue is used in all these cases. Thus, after the rent runs out, the surgeon sees a white stripe (the cataract) between two areas of blue (the undisturbed, trypan blue-stained capsule).

What step do most surgeons take to facilitate capsulorrhexis in these cases? They stain the anterior capsule with trypan blue.

Take note of the stages:

Mature cataract \[\to\] intumescent cataract \[\to\] hypermature cataract
Phacoanaphylactic glaucoma: Phacoantigenic

- Usually unilateral: All of them
- Is mediated by an adaptive immune response: Phacoantigenic
- Associated with mature/hypermature cataract: Phacolytic

**When faced with an intumescent cataract, what can the surgeon do to minimize the likelihood of seeing an Argentinian flag?**

-- Counteract the positive pressure within the lens by filling the AC with a high-viscosity OVD
-- Reduce intralenticular pressure by aspirating cortical material immediately upon creating the initial rent

If when the rent runs peripherally, what is the resulting appearance of the lens?

Recall that, because of red-reflex obscuration, *trypan blue* is used in all these cases.

Thus, after the rent runs out, the surgeon sees a white stripe (the cataract) between two areas of blue (the undisturbed, trypan blue-stained capsule).

**Take note of the stages:**

Mature cataract \(\rightarrow\) intumescent cataract \(\rightarrow\) hypermature cataract
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

- phacoanaphylactic glaucoma: Phacoantigenic
- Usually unilateral: All of them
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**Q**

*What is a mature cataract?*
- A cortical cataract that has progressed to involve the entire lens cortex

*What is a hypermature cataract?*
- Mature cataracts may absorb water, transforming them into an *intumescent* cortical cataract. A *hypermature cataract* results when an intumescent cataract begins leaking water and denatured proteins through its intact anterior capsule.

**Take note of the stages:**

1. **Mature cataract**
2. **intumescent cataract**
3. **hypermature cataract**

**Finally: What stage occurs after the hypermature stage?**
For each statement, identify the **lens-related secondary OAG with which it is associated** (some have more than one answer)

### Phacolytic glaucoma
- Phacoantigenic
- Usually unilateral: All of them
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**What is a mature cataract?**
A cortical cataract that has progressed to involve the entire lens cortex.

**What is a hypermature cataract?**
Mature cataracts may absorb water, transforming them into an *intumescent cortical cataract*. A **hypermature cataract** results when an intumescent cataract begins leaking water and denatured proteins through its intact anterior capsule.

Finally: **What stage occurs after the hypermature stage?**

**Take note of the stages:**

Mature cataract → intumescent cataract → hypermature cataract → Morgagnian cataract
For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer)

Phacolytic glaucoma  Phacoantigenic glaucoma  Lens-particle glaucoma

- aka *phacoanaphylactic glaucoma*: Phacoantigenic
- Usually unilateral: All of them
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**What is a mature cataract?**
A cortical cataract that has progressed to involve the entire lens cortex

**What is a hypermature cataract?**
Mature cataracts may absorb water, transforming them into an *intumescent cortical cataract*. A *hypermature cataract* results when an intumescent cataract begins leaking water and denatured proteins through its intact anterior capsule.

**What change occurs as a cortical cataract progresses from the hypermature to the Morgagnian stage?**
Further and extensive liquefaction of the cortical material

**What is the slit-lamp appearance of a Morgagnian cataract?**
The dense brown nuclear cataract is observed to be freely mobile within the liquified remnants of the cortical cataract
For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer)

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Take note of the stages:
Mature cataract
Intumescent cortical cataract
Hypermature cataract
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A cortical cataract that has progressed to involve the entire lens cortex.

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Mature cataracts may absorb water, transforming them into an **intumescent cortical cataract**. A **hypermature cataract** results when an intumescent cataract begins leaking water and denatured proteins through its intact anterior capsule.

**Take note of the stages:**

- **Mature cataract**
- **Intumescent cortical cataract**
- **Hypermature cataract**
- **Morgagnian cataract**

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**Q**

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**For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer):**

- Phacolytic glaucoma
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- Lens-particle glaucoma
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**What is a mature cataract?**
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**Take note of the stage**

**Mature cataract**

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*What effect does the leaking of water and proteins have on the volume of the cataract?*

*Intumescent cortical cataract*. A *hypermature cataract* results when an intumescent cataract begins leaking water and denatured proteins through its intact anterior capsule.*
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- Usually unilateral: All of them
- Is mediated by an *adaptive* immune response: Phacoantigenic
- Associated with mature/ hypermature cataract: Phacolytic

**Phacolytic glaucoma**  *Phacoantigenic glaucoma*  *Lens-particle glaucoma*

---

**What effect does the leaking of water and proteins have on the volume of the cataract?**

*It reduces it significantly*

---

Mature cataracts may also absorb water, causing them to become an *intumescent cortical cataract*. A *hypermature cataract* results when an intumescent cataract begins *leaking water and denatured proteins through its intact anterior capsule.*
aka phacoanaphylactic glaucoma: Phacoantigenic

Usually unilateral: All of them

Is mediated by an adaptive immune response: Phacoantigenic

Associated with mature/hypermature cataract: Phacolytic

What effect does the leaking of water and proteins have on the volume of the cataract?
It reduces it significantly

This reduction in cataract volume is responsible for a classic finding in hypermature cataracts. What is it?

In the cataract, the anterior capsule is shrunken and wrinkled.
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

Phacolytic glaucoma  Phacoantigenic glaucoma  Lens-particle glaucoma

- aka *phacoanaphylactic glaucoma*: Phacoantigenic
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- The anterior capsule is sign and sign

A hypermature cataract results when an intumescent cortical cataract begins leaking water and denatured proteins through its intact anterior capsule.
For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer).

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**What effect does the leaking of water and proteins have on the volume of the cataract?**
It reduces it significantly.

*This reduction in cataract volume is responsible for a classic finding in hypermature cataracts. What is it?*

The anterior capsule is shrunken and wrinkled.

Mature cataracts may absorb water, forming an intumescent or intumescence cortical cataract. A hypermature cataract results when an intumescent cataract begins leaking water and denatured proteins through its intact anterior capsule.
Hypermature cataract. Note the capsular wrinkling
For each statement, identify the **lens-related secondary OAG with which it is associated** (some have more than one answer)

| Phacolytic glaucoma | Phacoantigenic glaucoma | Lens-particle glaucoma |

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Q: How should lens-particle glaucoma be managed?

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*How should lens-particle glaucoma be managed?*

If possible, medical management should be employed to control the inflammation and IOP until the eye can absorb the inciting lens material
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**How should lens-particle glaucoma be managed?**
If possible, medical management should be employed to control the inflammation and IOP until the eye can absorb the inciting lens material

**If medical management proves inadequate, what is the next step?**
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

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**How should lens-particle glaucoma be managed?**

If possible, medical management should be employed to control the inflammation and IOP until the eye can absorb the inciting lens material

**If medical management proves inadequate, what is the next step?**

Surgical removal of the offending material
For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer)

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- Least likely to develop elevated IOP:
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<thead>
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*There are two broad categories of immune response—what are they?*

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There are two broad categories of immune response—what are they?
**Innate** and **adaptive** (FYI, we’re about to unpack adaptive immune response, as promised earlier)

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**Innate** and **adaptive** (FYI, we’re about to unpack **adaptive immune response**, as promised earlier)

In general, what is the nature of each, and how do they differ?

- Is mediated by an **innate immune response**: Phacolytic
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The adaptive immune response involves ‘education,’ with surveillance cells learning to recognize and remember foreign material.

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In general, what is the nature of each, and how do they differ?
The adaptive immune response involves ‘education,’ with surveillance cells learning to recognize and remember foreign material. OTOH, the innate (or natural) immune response does not require education—it relies on ‘preprogrammed’ immune cells to recognize foreign material encountered in tissue or blood.

Is mediated by an **innate immune response**: Phacolytic
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Usually unilateral: All of them

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There are two broad categories of immune response—what are they? *Innate* and *adaptive* (FYI, we’re about to unpack *adaptive immune response*, as promised earlier)

In general, what is the nature of each, and how do they differ?

The adaptive immune response involves ‘education,’ with surveillance cells learning to recognize and remember foreign material. On the other hand, the innate immune response does not require education—it relies on *preprogrammed* immune cells to recognize foreign material encountered in tissue or blood.

What are the two main effector cell types of innate immunity?

Is mediated by an *innate* immune response: Phacolytic
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

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- aka *phacoanaphylactic glaucoma*: Phacoantigenic
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- Gonioscopy reveals cortical material in the angle: Lens-particle
- Least likely to develop elevated IOP: Phacoantigenic

There are two broad categories of immune response—what are they?
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In general, what is the nature of each, and how do they differ?

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- Is mediated by an **innate** immune response: Phacolytic

What are the two main effector cell types of innate immunity?
- **Neutrophils** and **macrophages**
For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer).

And now, an overly-long sidebar regarding immunology and the lens-related OAGs:
For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer).

Hypothesis: Phacoanaphylactic glaucoma
- Usually unilateral
- Mediated by an adaptive immune response
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Hypothesis: Phacolytic glaucoma
- Mediated by an innate immune response

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Neutrophils and macrophages

Some clinicians reserve the term immune response for clinical situations in which only adaptive immunity is involved; if the clinical situation involves only an innate response, such clinicians opt to use the more general term inflammation in describing the clinical picture.

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In contrast, the Uveitis book eschews the term phacoantigenic uveitis/glaucoma entirely, using instead the term lens-induced uveitis. It goes on to describe phacolytic glaucoma in a manner consistent with the other books. Lens-particle glaucoma does not appear in its index either.
For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer).

And now, an overly-long sidebar regarding immunology and the lens-related OAGs:

Some clinicians reserve the term *immune response* for clinical situations in which only adaptive immunity is involved; if the clinical situation involves only an innate response, such clinicians opt to use the more general term *inflammation* in describing the clinical picture. That said, the signs and symptoms produced by both adaptive and innate immune responses are recognized clinically as ‘inflammation,’ and despite their underlying differences in mechanism, are usually indistinguishable at the slit lamp.

I’m going on about this because it explains what may seem to be inconsistencies among the BCSC books with regard to phacolytic, phacoantigenic, and lens-particle glaucomas. Take the Lens book. It states that “phacoantigenic uveitis” (it does not use the term phacoantigenic glaucoma) is “immune-mediated.” However, it pointedly states that phacoantigenic uveitis is not a glaucoma. In a similar fashion, the Path book puts phacoantigenic uveitis in a section entitled Inflammations, but not phacoantigenic glaucoma—it is discussed under Secondary Glaucoma with Material in the Trabecular Meshwork. These characterizations exemplify the immune response = adaptive response viewpoint described above. (The term lens-particle glaucoma does not appear in the Path book’s index.)

In contrast, the Uveitis book eschews the term phacoantigenic uveitis/glaucoma entirely, using instead the term lens-induced uveitis. It goes on to describe phacoantigenic uveitis in a manner consistent with the other books. Lens-particle glaucoma does not appear in its index either. Finally, the Glaucoma book groups all three conditions together under the heading Lens-Induced Glaucoma, and does not address the issue of innate vs adaptive immunity. Instead, it refers simply to ‘inflammation’ in the description of all three conditions. The term phacoantigenic uveitis does not appear.
And now, an overly-long sidebar regarding immunology and the lens-related OAGs:

Some clinicians reserve the term immune response for clinical situations in which only adaptive immunity is involved; if the clinical situation involves only an innate response, such clinicians opt to use the more general term inflammation in describing the clinical picture. That said, the signs and symptoms produced by both adaptive and innate immune responses are recognized clinically as ‘inflammation,’ and despite their underlying differences in mechanism, are usually indistinguishable at the slit lamp.

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TLDR When studying the lens-related secondary OAGs, you really should read about them in all four of the BCSC books that address them—Glaucoma, Uveitis, Lens and Path. But be prepared to grapple with inconsistencies in terminology when doing so.
<table>
<thead>
<tr>
<th>Statement</th>
<th>Lens-related secondary OAG</th>
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<tr>
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For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer).
A

For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer):

- Phacolytic glaucoma
- Phacoantigenic glaucoma
- Lens-particle glaucoma

- **aka phacoanaphylactic glaucoma**: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an *adaptive* immune response: Phacoantigenic
- Associated with mature/hypermature cataract: Phacolytic
- Vitritis may be present: Phacoantigenic
- Gonioscopy reveals cortical material in the angle: Lens particle
- Least likely to develop elevated IOP: Phacoantigenic
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- Least likely to develop elevated IOP: Phacoantigenic
- Is mediated by an **innate** immune response: Phacolytic
- PAS development is not a concern: Phacolytic
- Classic presentation: Elderly pt with hx longstanding poor vision in affected eye c/o new-onset redness/pain and worsening vision:
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

Phacolytic glaucoma  Phacoantigenic glaucoma  Lens-particle glaucoma

- aka *phacoanaphylactic glaucoma*: Phacoantigenic
- Usually unilateral: **All of them**
- Is mediated by an *adaptive* immune response: Phacoantigenic
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aka *phacoanaphylactic glaucoma*: Phacoantigenic

- Usually unilateral: All of them
- Is mediated by an *adaptive* immune response: Phacoantigenic

**Associated with mature/hypermature cataract:** Phacolytic

- Vitritis may be present: Phacoantigenic
- Gonioscopy reveals cortical material in the angle: Lens particle
- Least likely to develop elevated IOP: Phacoantigenic
- Is mediated by an *innate* immune response: Phacolytic
- PAS development is not a concern: Phacolytic

- Classic presentation: Elderly pt with hx longstanding poor vision in affected eye c/o new-onset redness/pain and worsening vision: Phacolytic

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**Given that their cataracts can’t get much worse, what accounts for the fact that phacolytic glaucoma pts c/o an acute worsening of VA coinciding with the onset of their pain and ocular injection?**

The IOP spike smashes their corneal endothelium, resulting in corneal edema which renders their bad VA even worse.
Phacoanaphylactic glaucoma: Phacoantigenic

Usually unilateral: All of them

Is mediated by an *adaptive* immune response: Phacoantigenic

**Associated with mature/hypermature cataract:** Phacolytic

Vitritis may be present: Phacoantigenic

Gonioscopy reveals cortical material in the angle: Lens particle

Least likely to develop elevated IOP: Phacoantigenic

Is mediated by an *innate* immune response: Phacolytic

PAS development is not a concern: Phacolytic

Given that their cataracts can’t get much worse, what accounts for the fact that phacolytic glaucoma pts c/o an acute worsening of VA coinciding with the onset of their pain and ocular injection? The IOP spike smashes their corneal endothelium, resulting in corneal edema which renders bad VA even worse

Classic presentation: Elderly pt with hx longstanding poor vision in affected eye c/o new-onset redness/pain and worsening vision: Phacolytic
Phacolytic glaucoma: Corneal edema
aka *phacoanaphylactic glaucoma*: **Phacoantigenic**
- Usually unilateral: **All of them**
- Is mediated by an *adaptive* immune response: **Phacoantigenic**
- Associated with mature/hypermature cataract: **Phacolytic**
- Vitritis may be present: **Phacoantigenic**
- Gonioscopy reveals cortical material in the angle: **Lens particle**
- Least likely to develop elevated IOP: **Phacoantigenic**
- Is mediated by an *innate* immune response: **Phacolytic**
- PAS development is not a concern: **Phacolytic**
- Classic presentation: Elderly pt with hx longstanding poor vision in affected eye c/o new-onset redness/pain and worsening vision: **Phacolytic**
- Fellow eye may become involved:
For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer)

Phacolytic glaucoma       Phacoantigenic glaucoma    Lens-particle glaucoma

- aka phacoanaphylactic glaucoma: Phacoantigenic
- Usually unilateral: All of them
- Is mediated by an adaptive immune response: Phacoantigenic
- Associated with mature/hypermature cataract: Phacolytic
- Vitritis may be present: Phacoantigenic
- Gonioscopy reveals cortical material in the angle: Lens particle
- Least likely to develop elevated IOP: Phacoantigenic
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**Q**

For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

| Phacolytic glaucoma | Phacoantigenic glaucoma | Lens-particle glaucoma |

- It is the fellow eye can become involved in phacoantigenic glaucoma?
  - How is it the fellow eye can become involved in phacoantigenic glaucoma?
    - Classic presentation: Elderly pt with hx longstanding poor vision in affected eye c/o new-onset redness/pain and worsening vision: Phacolytic
    - **Fellow eye may become involved:** Phacoantigenic
aka *phacoanaphylactic glaucoma*: Phacoantigenic

- Usually unilateral: All of them
- Is mediated by an *adaptive* immune response: Phacoantigenic
- Associated with mature/hypermature cataract: Phacolytic
- Vitritis may be present: Phacoantigenic

Gonioscopy reveals cortical material in the angle: Lens-particle

Most likely to develop elevated IOP: Phacoantigenic

Is mediated by an *innate* immune response: Phacolytic

PAS development is not a concern: Phacolytic

Classic presentation: Elderly pt with hx longstanding poor vision in affected eye c/o new-onset redness/pain and worsening vision: Phacolytic

Fellow eye may become involved: Phacoantigenic

**How is it the fellow eye can become involved in phacoantigenic glaucoma?**

Recall that it is normal for minute amounts of lens protein to be found in the AC of a phakic eye.
For each statement, identify the lens-related secondary OAG with which it is associated (some have more than one answer)

Phacolytic glaucoma  Phacoantigenic glaucoma  Lens-particle glaucoma

- aka phacoanaphylactic glaucoma: Phacoantigenic
- Usually unilateral: All of them
- **Is mediated by an adaptive immune response:** Phacoantigenic
- Associated with mature/hypermature cataract: Phacolytic
- Vitritis may be present: Phacoantigenic
- Gonioscopy reveals cortical material in the angle: Lens-particle
- Least likely to develop elevated IOP: Phacoantigenic
- **Is mediated by an innate immune response:** Phacolytic
- PAS development is not a concern: Phacolytic
- Classic presentation: Elderly pt with hx longstanding poor vision in affected eye c/o new-onset redness/pain and worsening vision: Phacolytic
- **Fellow eye may become involved:** Phacoantigenic

**How is it the fellow eye can become involved in phacoantigenic glaucoma?**

Recall that it is normal for minute amounts of lens protein to be found in the AC of a phakic eye. Recall further that phacoantigenic glaucoma involves an adaptive response in which the immune system becomes sensitized to normal lens proteins.
A

For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer)

| Phacolytic glaucoma | Phacoantigenic glaucoma | Lens-particle glaucoma |

- aka *phacoanaphylactic glaucoma*: Phacoantigenic
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- Vitritis may be present: Phacoantigenic

Gonioscopy reveals cortical material in the angle: Lens-particle glaucoma

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**How is it the fellow eye can become involved in phacoantigenic glaucoma?**

Recall that it is normal for minute amounts of lens protein to be found in the AC of a phakic eye. Recall further that phacoantigenic glaucoma involves an adaptive response in which the immune system becomes sensitized to normal lens proteins. If an immune system that has become sensitized to normal lens proteins encounters them in the AC of the fellow eye, it may kick off a uveitic process in that eye.

- Classic presentation: Elderly pt with hx longstanding poor vision in affected eye c/o new-onset redness/pain and worsening vision: Phacolytic
- **Fellow eye may become involved**: Phacoantigenic
For each statement, identify the **lens-related secondary OAG** with which it is associated (some have more than one answer):

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- Fellow eye may become involved: **Phacoantigenic**
- The *absence* of KP is a key clinical finding:
aka *phacoanaphylactic glaucoma*: **Phacoantigenic**

- Usually unilateral: **All of them**
- Is mediated by an *adaptive* immune response: **Phacoantigenic**
- Associated with mature/hypermature cataract: **Phacolytic**
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