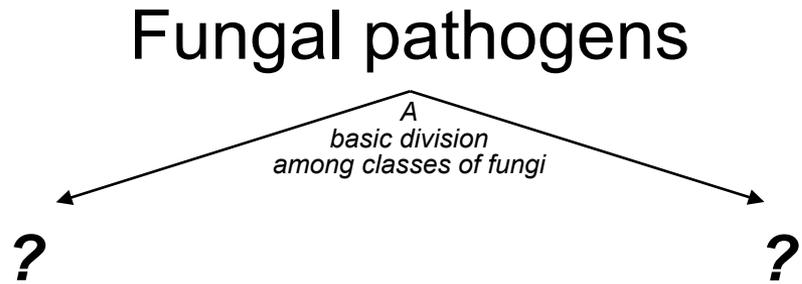
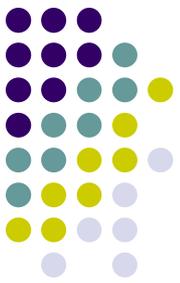
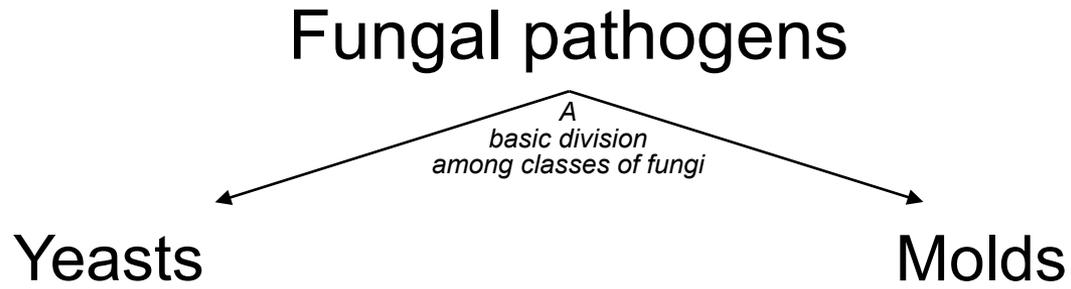


Common Ocular Fungal Pathogens



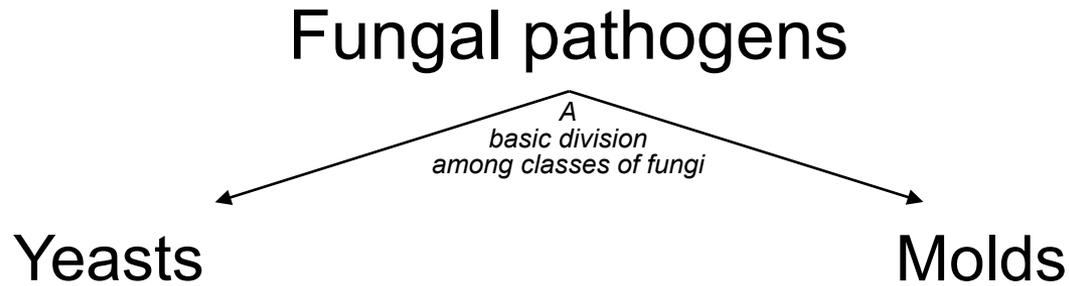
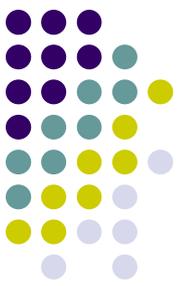
Fungal pathogens come in two very basic flavors—what are they?

Common Ocular Fungal Pathogens



Fungal pathogens come in two very basic flavors—what are they?

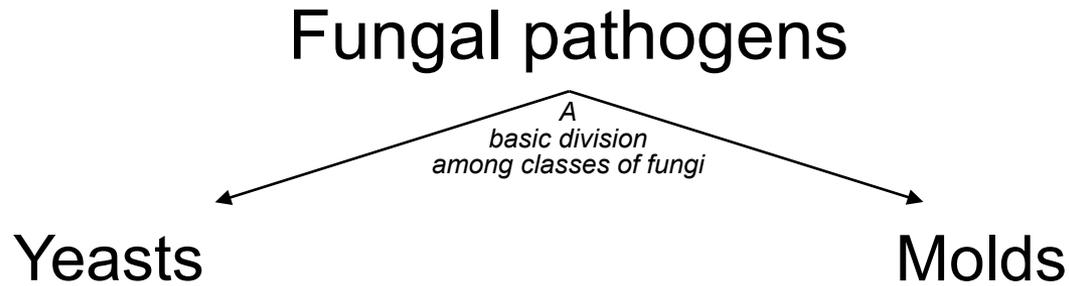
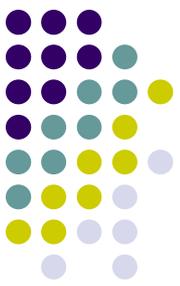
Common Ocular Fungal Pathogens



Fungal pathogens come in two very basic flavors—what are they?

What forms the basis for this distinction, ie, what characteristic of the organisms led us to divvy them up into these classes?

Common Ocular Fungal Pathogens

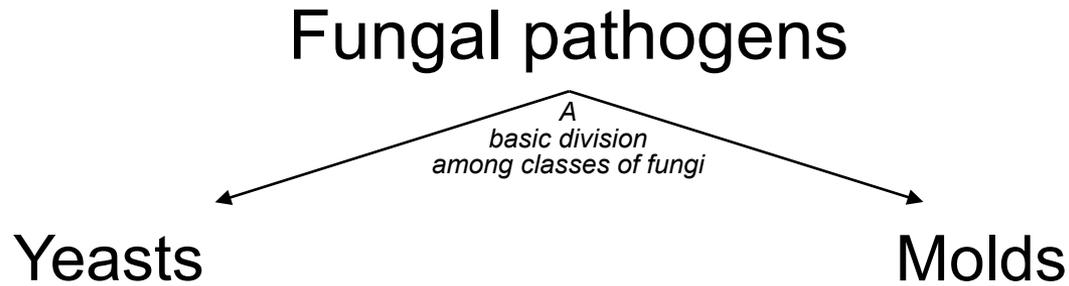


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Their appearance

Common Ocular Fungal Pathogens



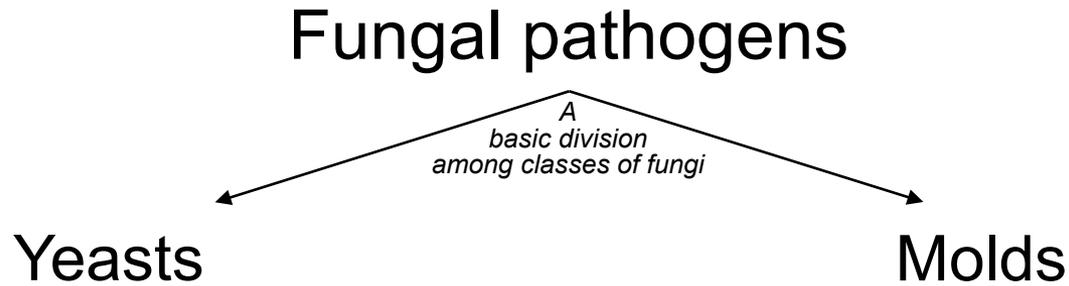
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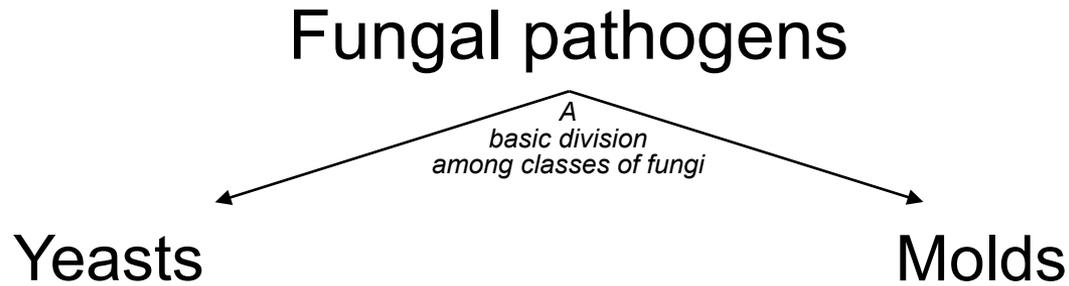
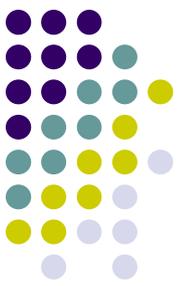
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What do yeasts look like?

Round, single-celled organisms

Common Ocular Fungal Pathogens



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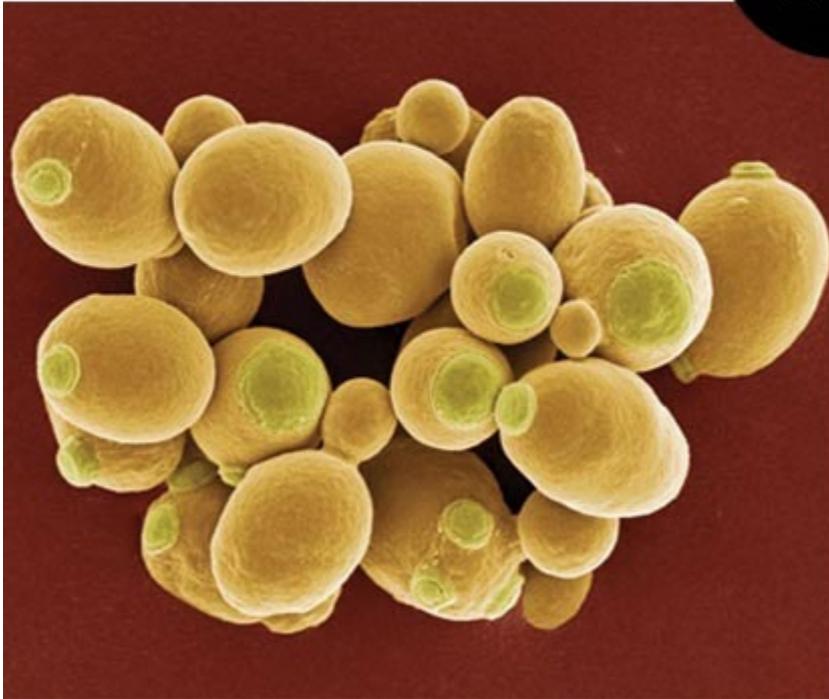
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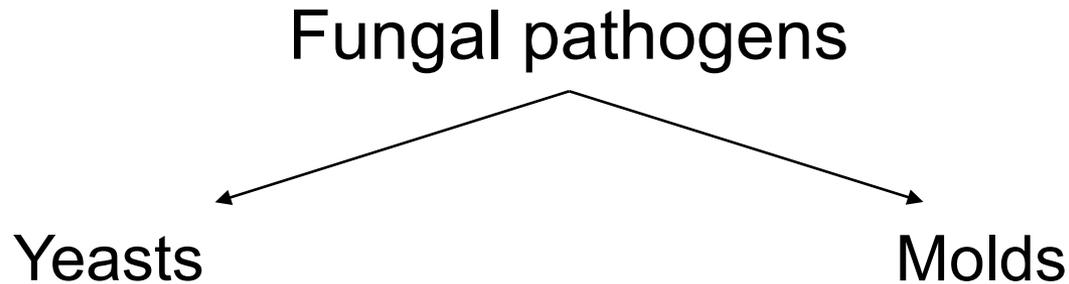
What do molds look like?



Yeasts **VS** Molds



Common Ocular Fungal Pathogens



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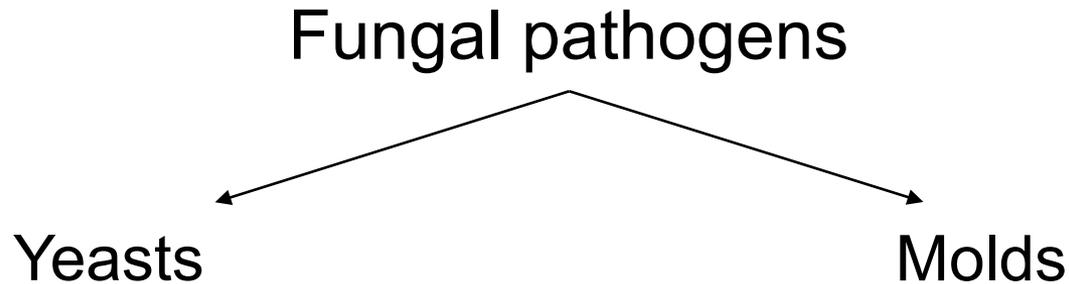
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What do molds look like?

Multicellular, **filamentous** organisms

What's the formal term for the filaments formed by molds?

Common Ocular Fungal Pathogens



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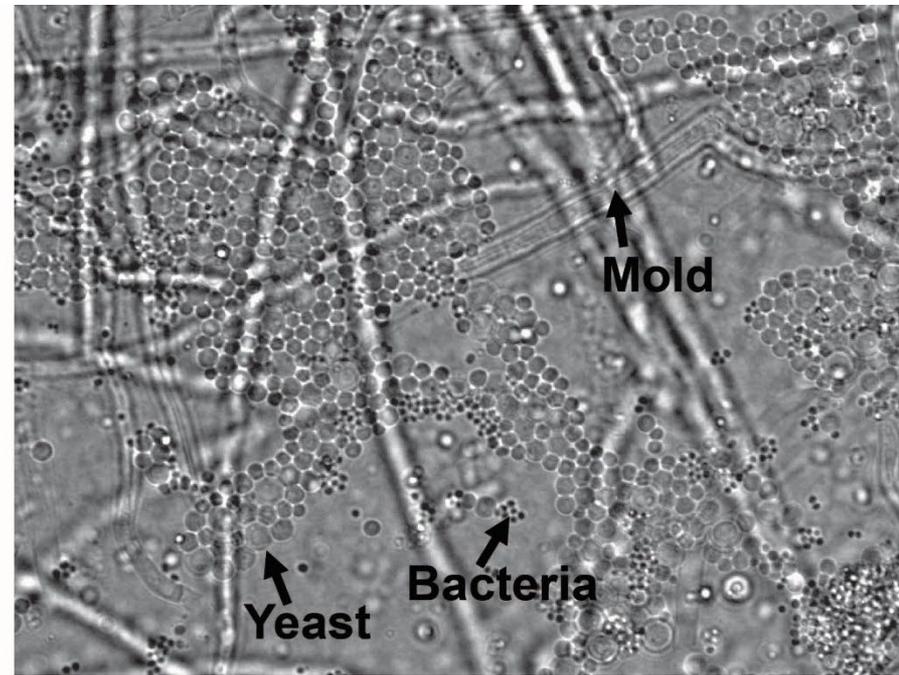
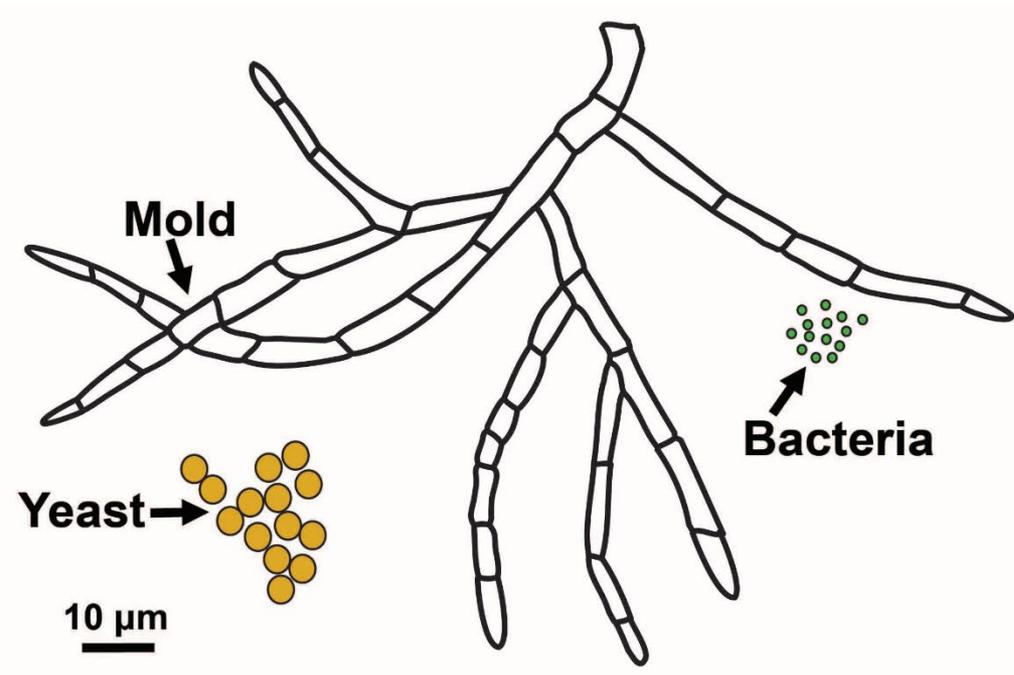
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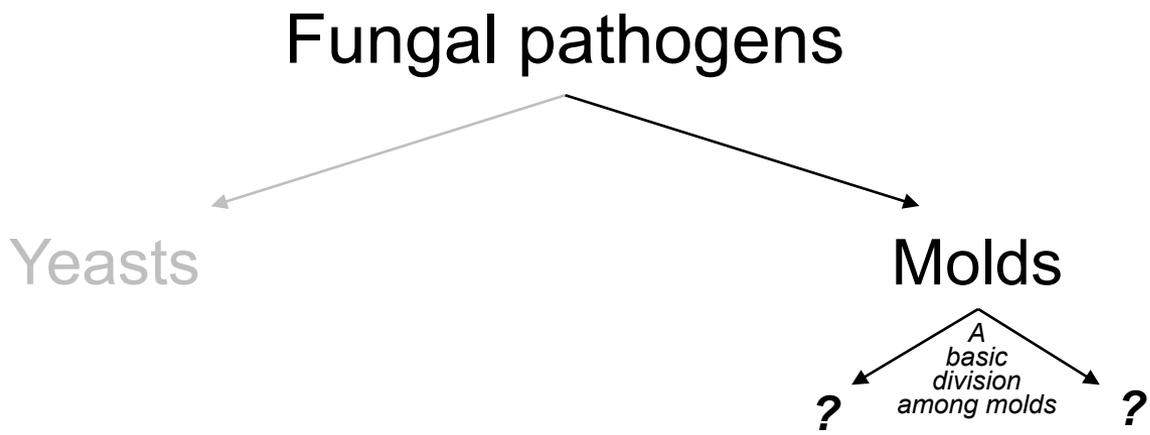
Hyphae

Common Ocular Fungal Pathogens



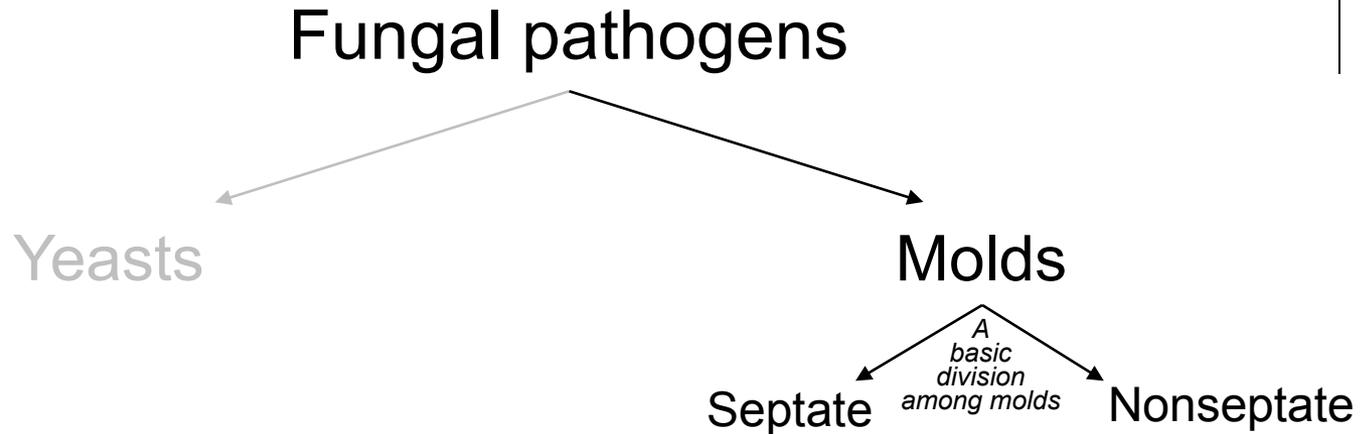
Yeast vs Molds (vs bacteria for scale)

Common Ocular Fungal Pathogens



Molds are further divided into two broad categories—what are they?

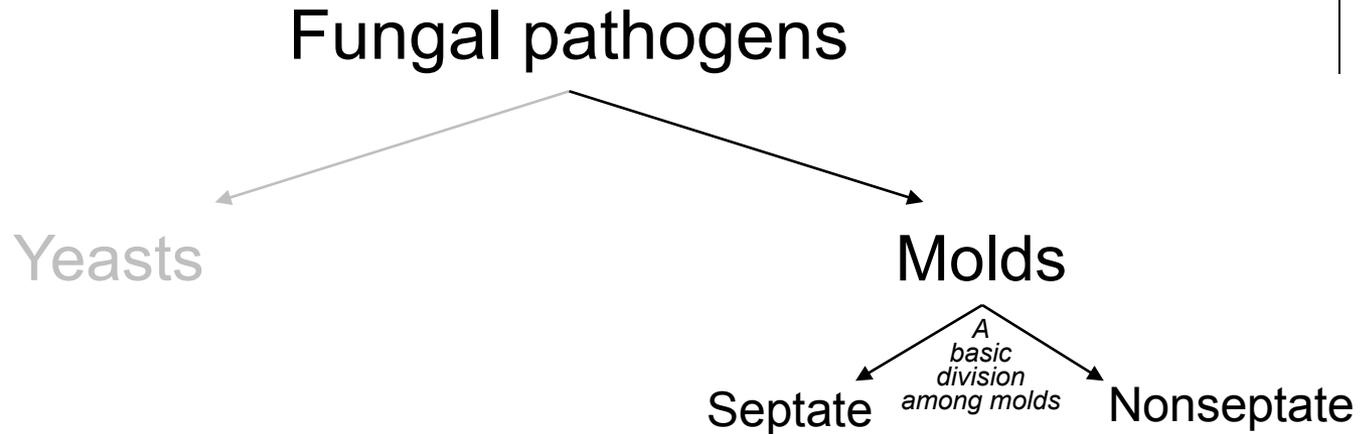
Common Ocular Fungal Pathogens



Molds are further divided into two broad categories—what are they?

Based on the appearance of their hyphae, they are classified as either **septated** or **nonseptated**

Common Ocular Fungal Pathogens

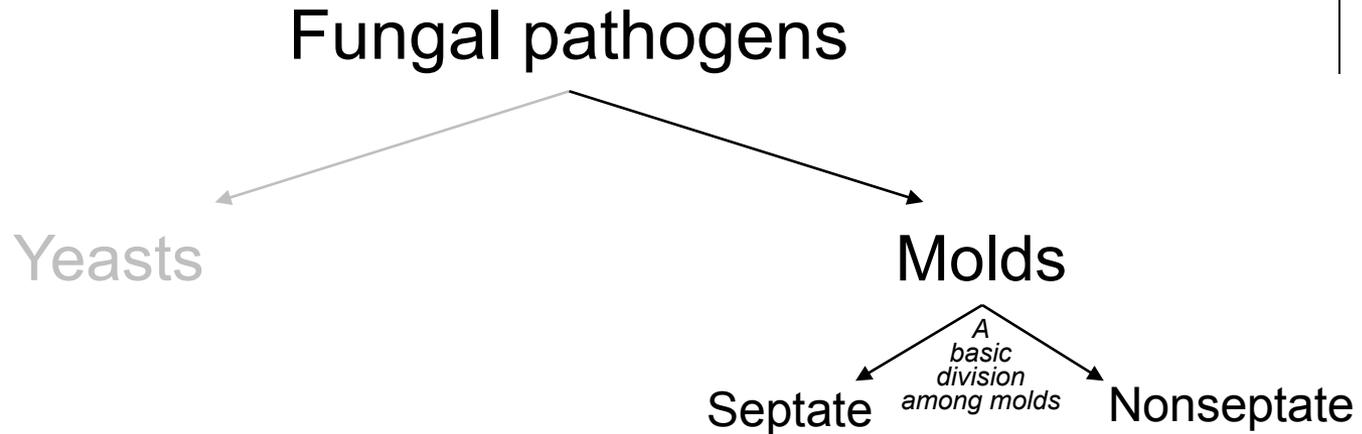


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What are septa?

Common Ocular Fungal Pathogens



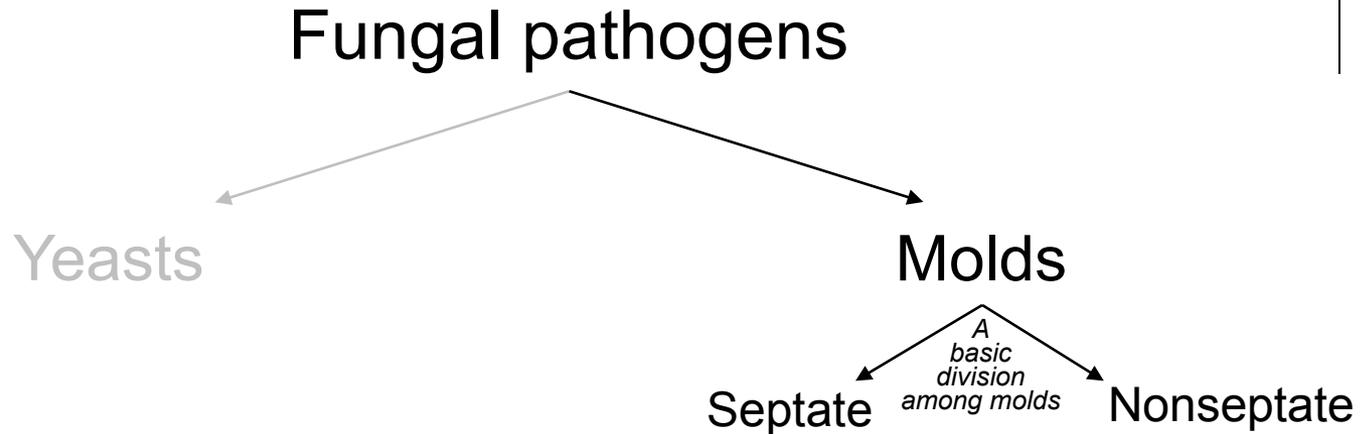
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What are septa?

Cross-walls within hyphae that subdivide them into a series of individual compartments.

Common Ocular Fungal Pathogens



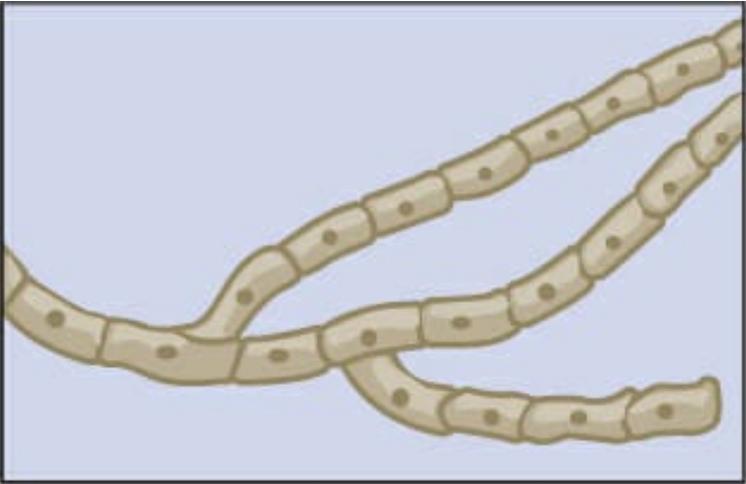
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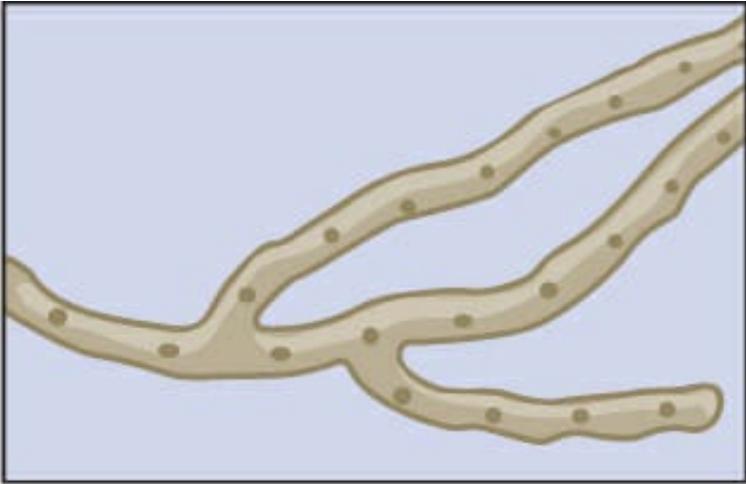
What are septa?

Cross-walls within hyphae that subdivide them into a series of individual compartments. Septate molds have these cross-walls; nonseptate molds do not.

Common Ocular Fungal Pathogens



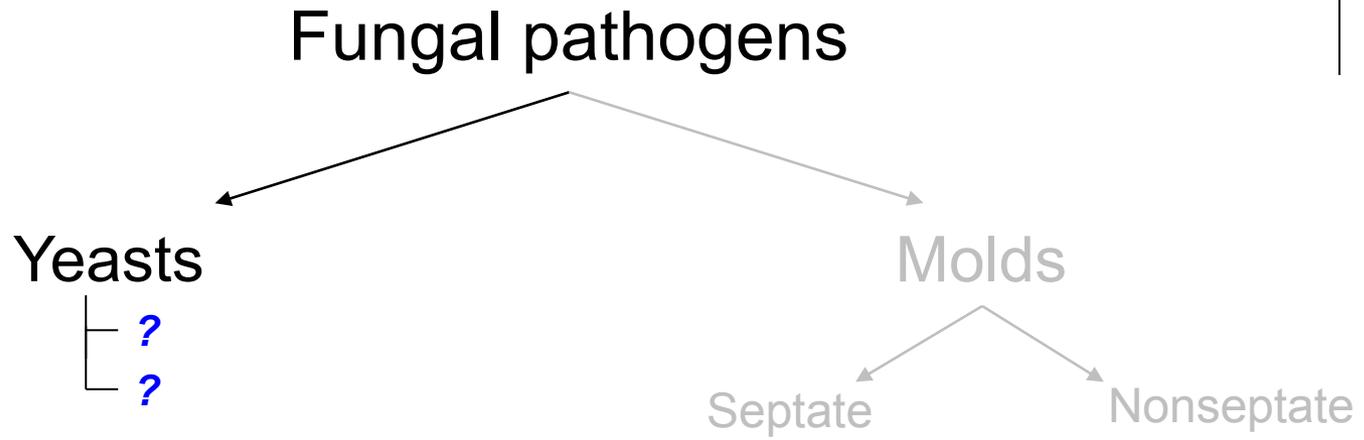
Septate



Nonseptate

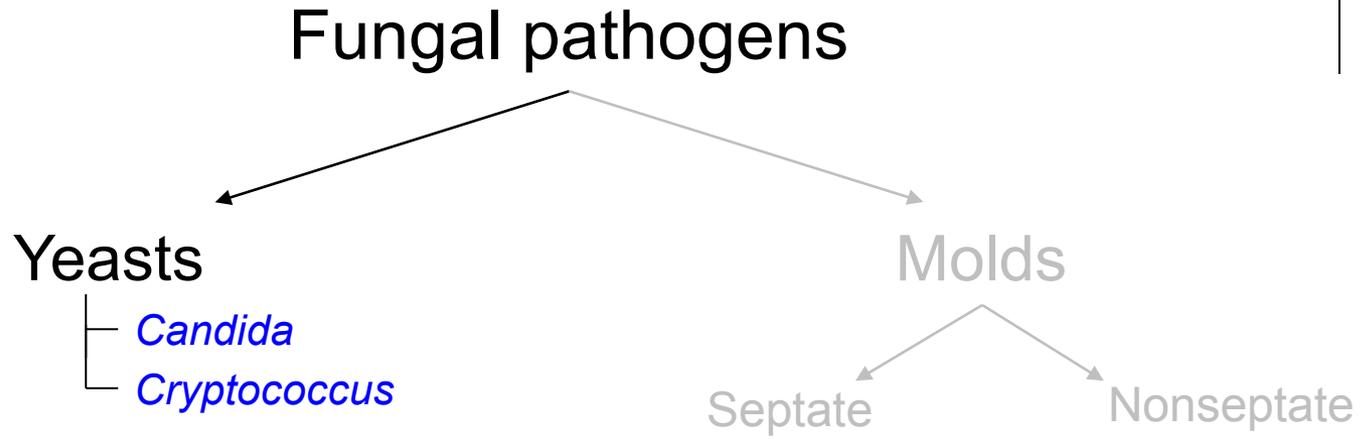
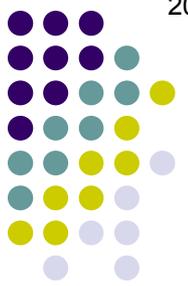
Molds

Common Ocular Fungal Pathogens



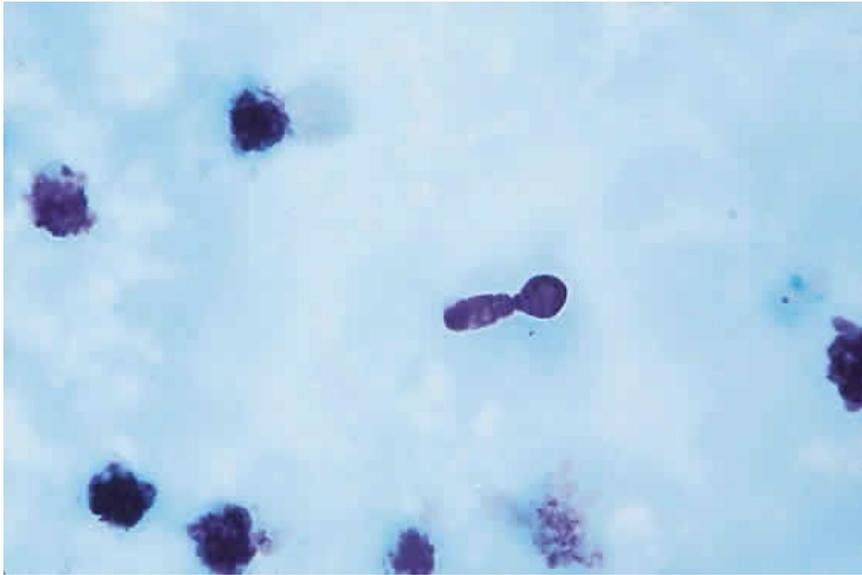
Two species account for the majority of yeast-mischief involving the eyes— what are they?

Common Ocular Fungal Pathogens

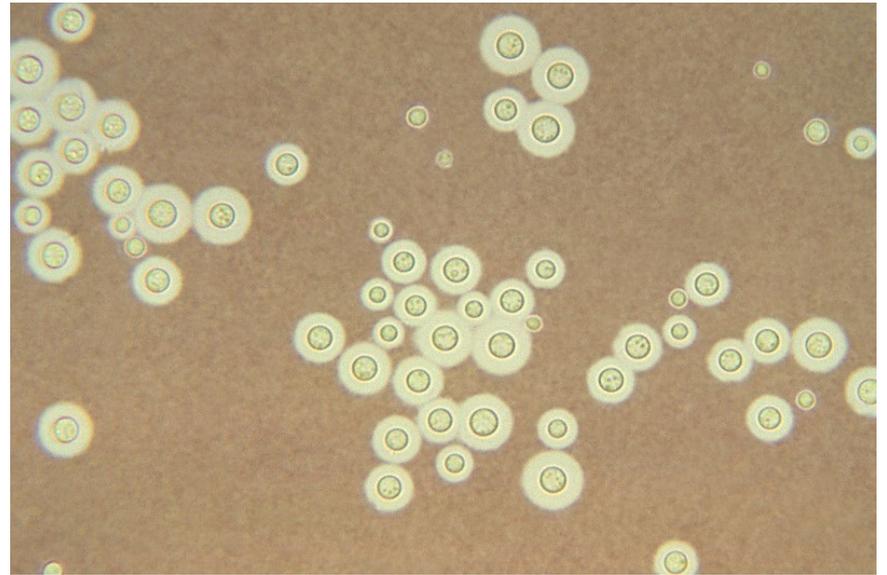


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Common Ocular Fungal Pathogens



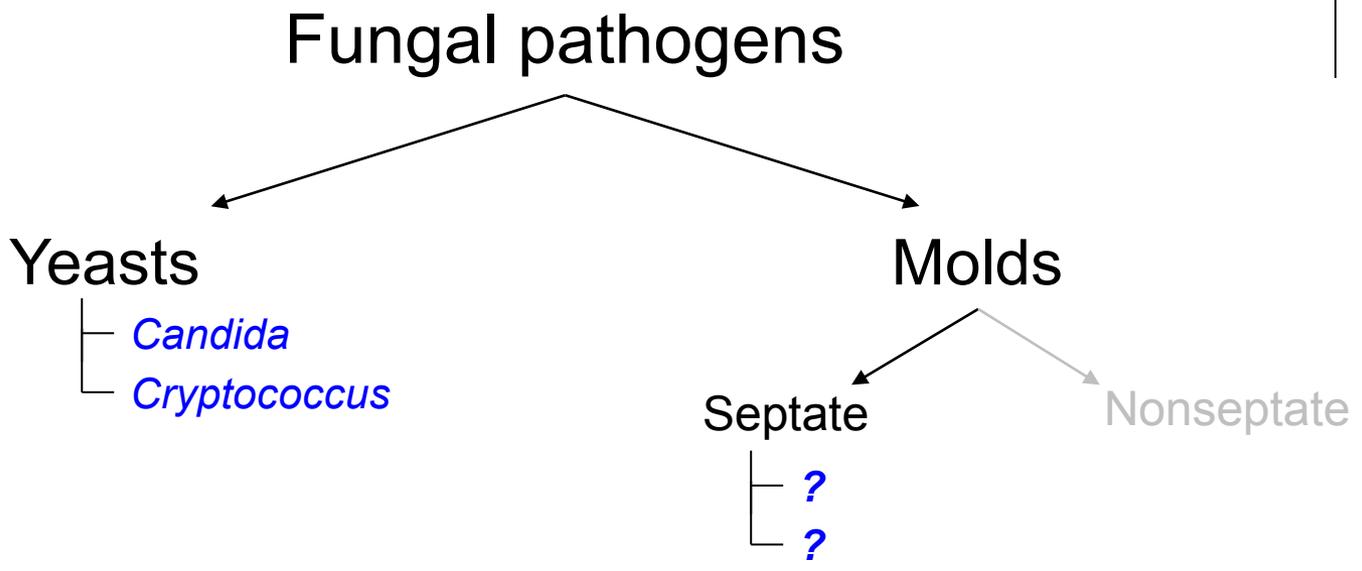
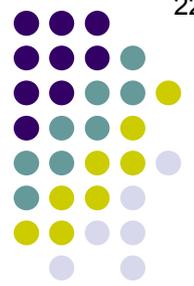
Candida. The 'budding' appearance is typical, and is a good field mark for the species



Cryptococcus. Note the 'India ink' look—this is a good way to identify this species

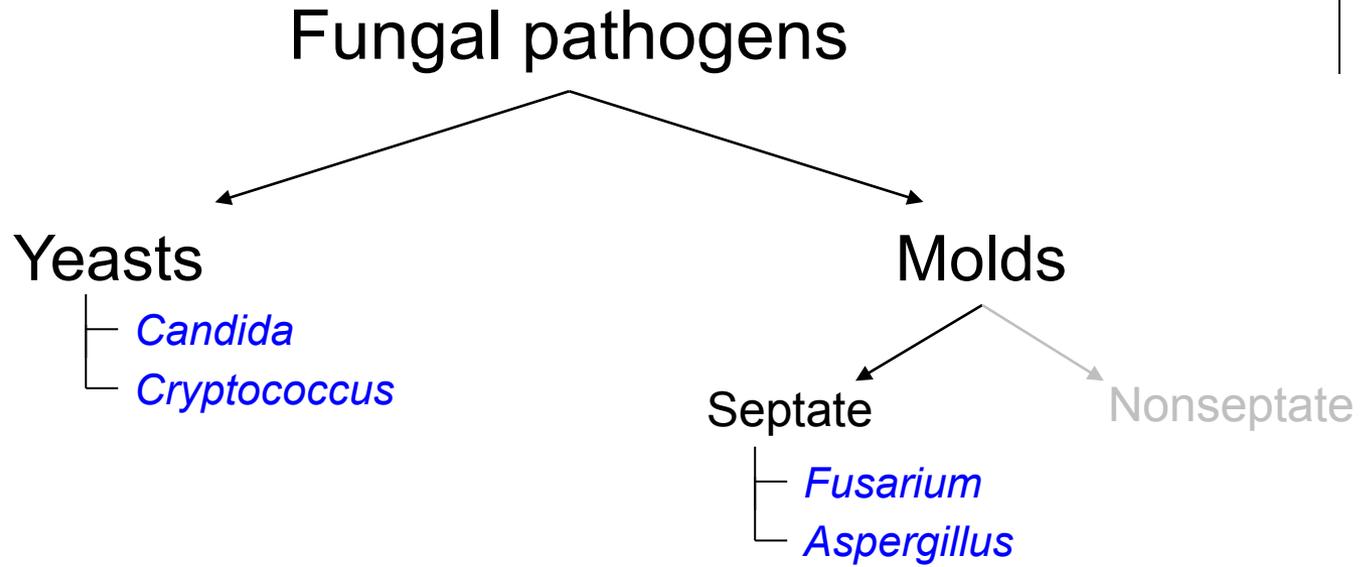
Yeasts

Common Ocular Fungal Pathogens



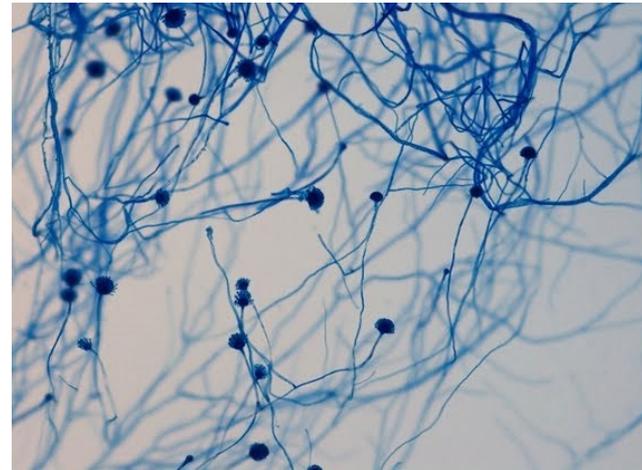
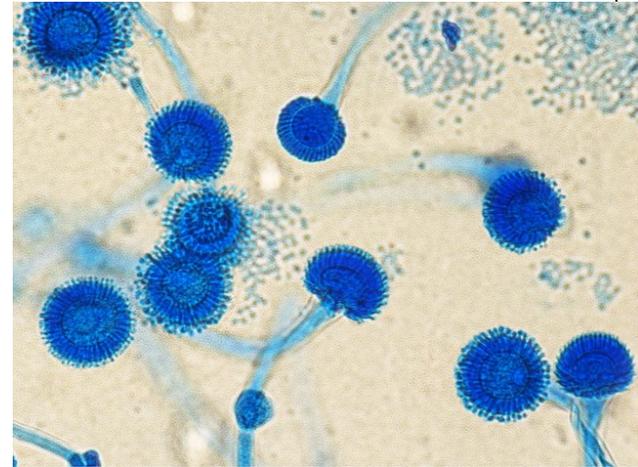
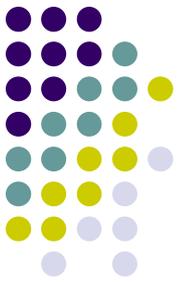
Two species account for the majority of septated-mold eye issues—what are they?

Common Ocular Fungal Pathogens



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Common Ocular Fungal Pathogens

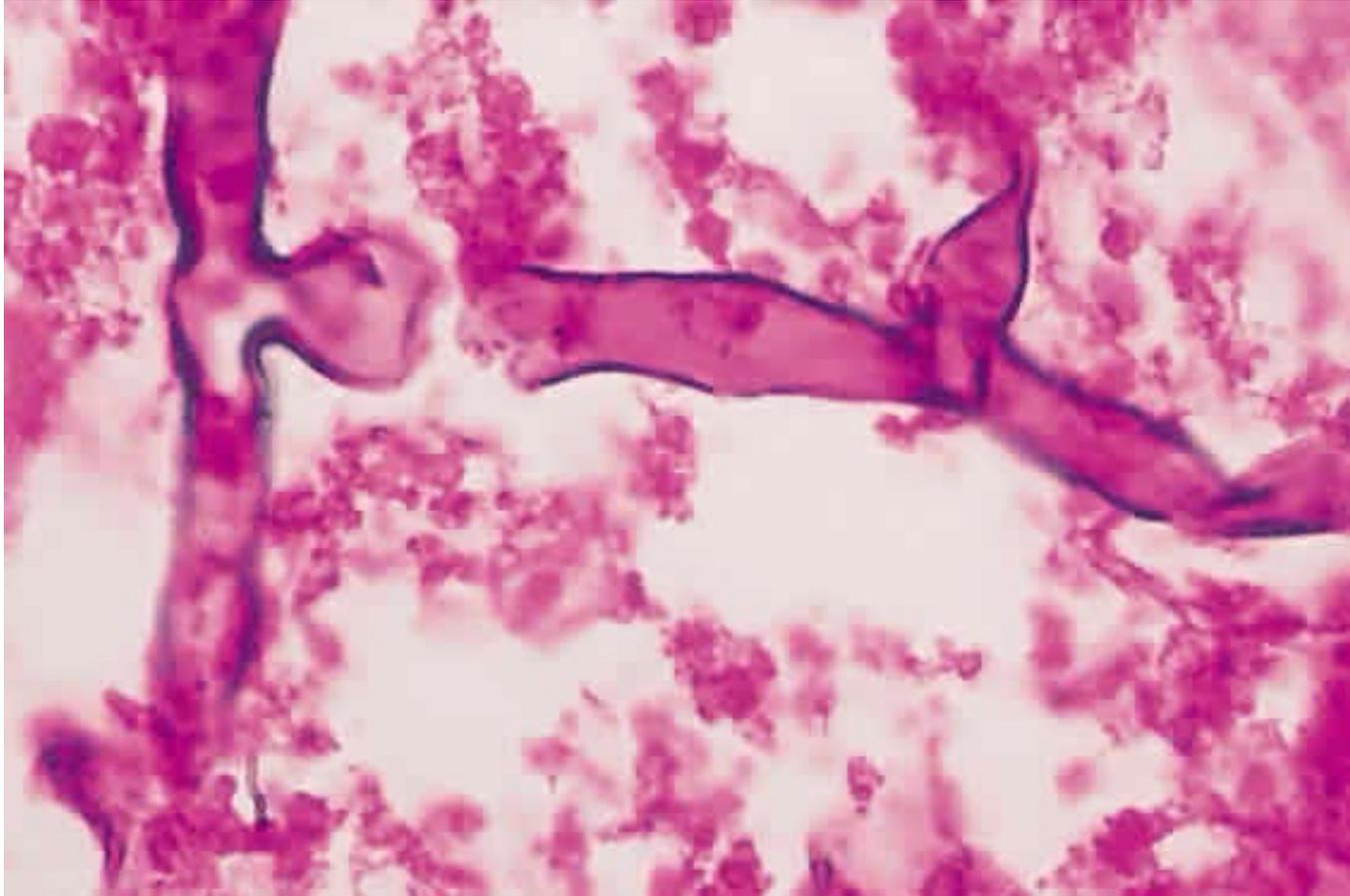


Fusarium

Aspergillus. Note the blue-bulb looking whatchamacallits

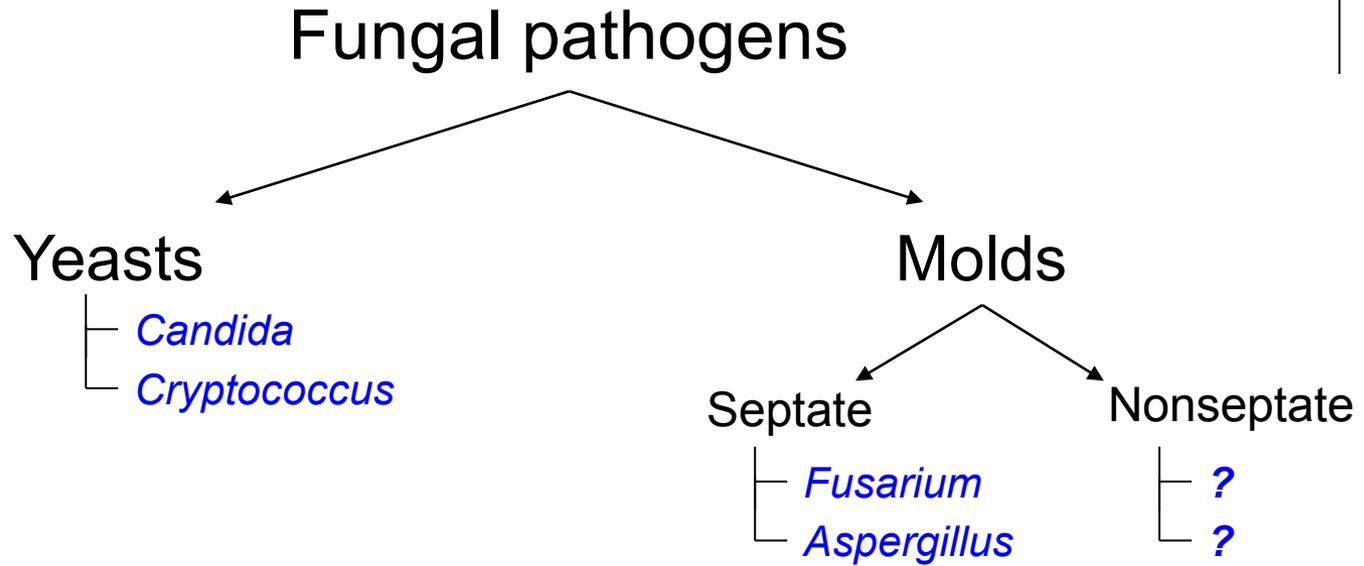
Seperated molds

Common Ocular Fungal Pathogens



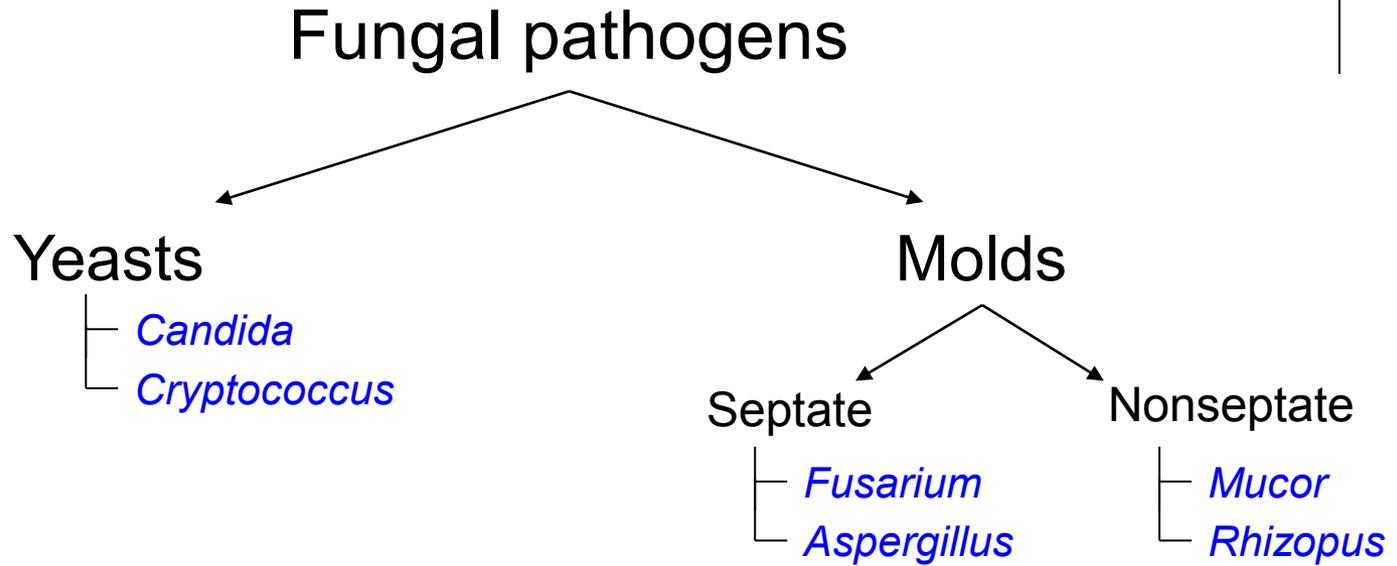
A high-mag *Aspergillus* photo may demonstrate 'broad hyphae,' a classic descriptor of the bug

Common Ocular Fungal Pathogens



Two species account for the majority of non-septated-mold eye issues—what are they?

Common Ocular Fungal Pathogens



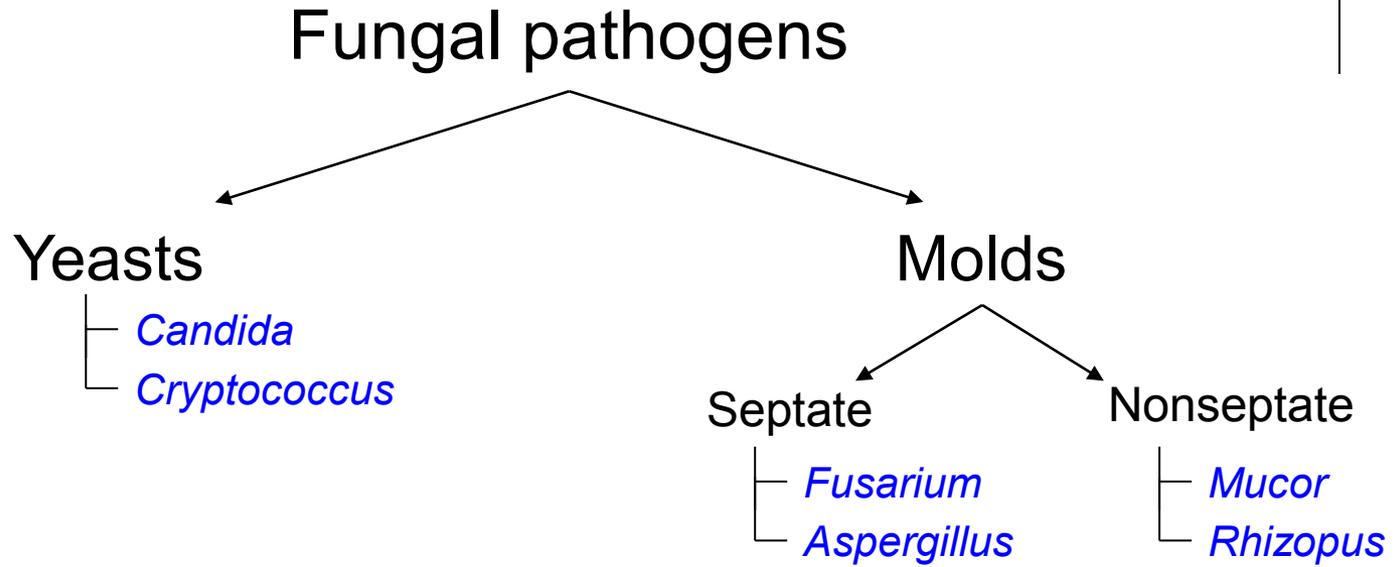
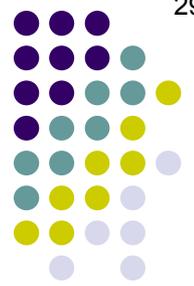
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Common Ocular Fungal Pathogens



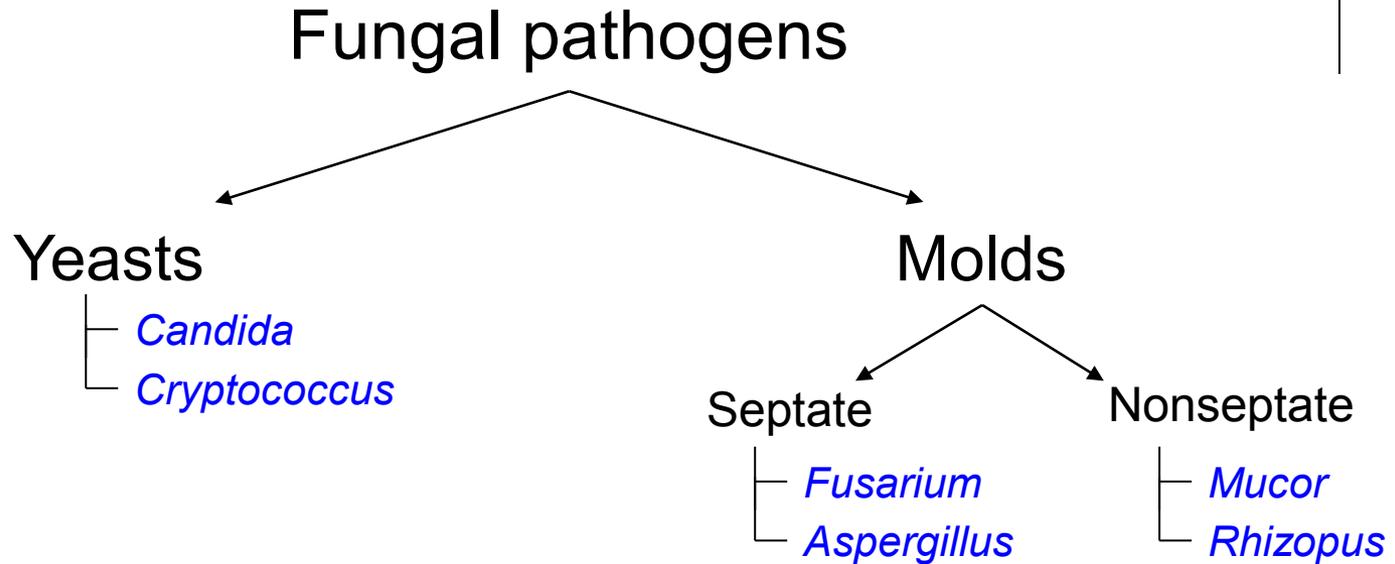
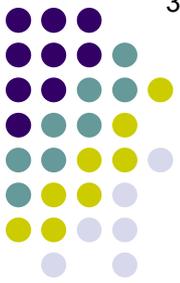
No pic of *Mucor/Rhizopus*, as I don't think you'll be asked to ID it. Caveat emptor.

Common Ocular Fungal Pathogens



What is the go-to stain for fungi?

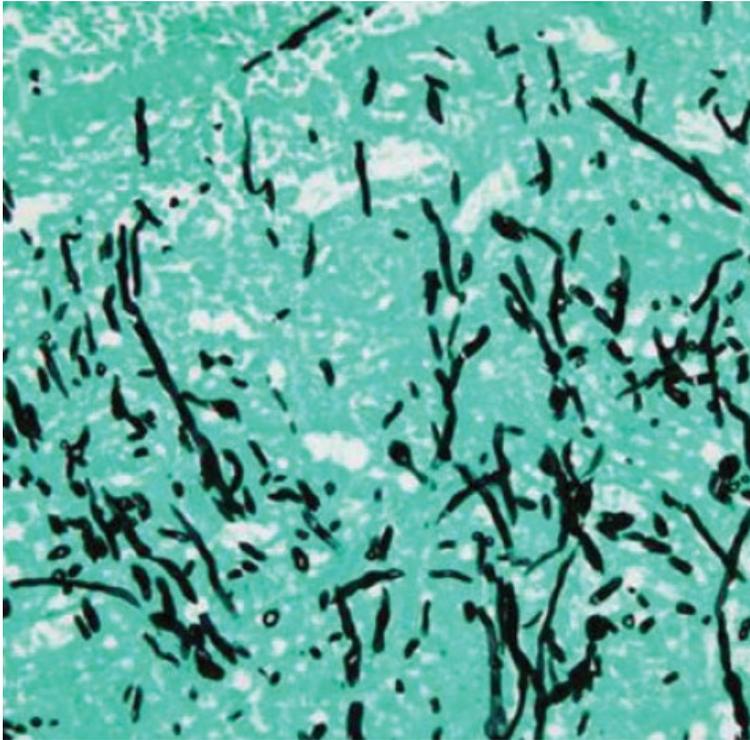
Common Ocular Fungal Pathogens



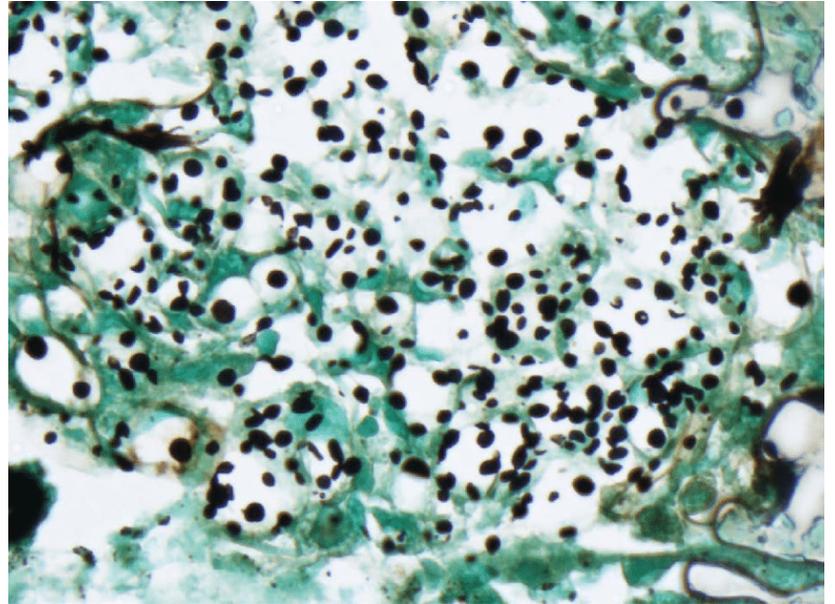
What is the go-to stain for fungi?

Gomori methenamine (many others work as well)

Common Ocular Fungal Pathogens



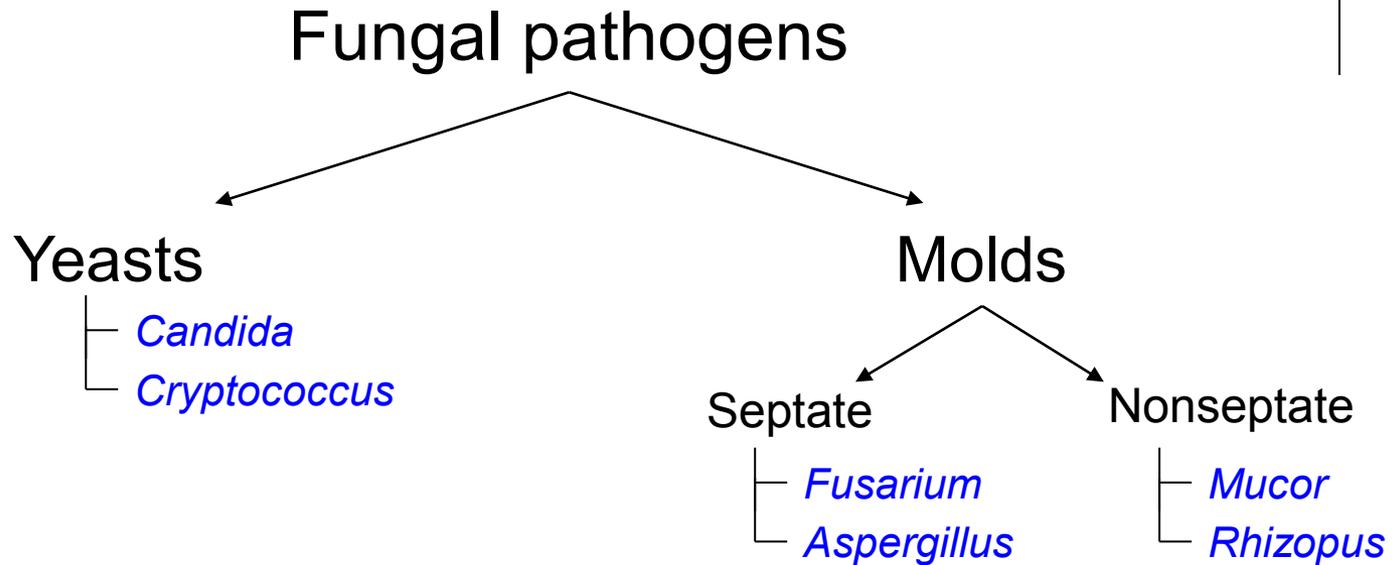
Aspergillus



Cryptococcus

Gomori methenamine stain

Common Ocular Fungal Pathogens

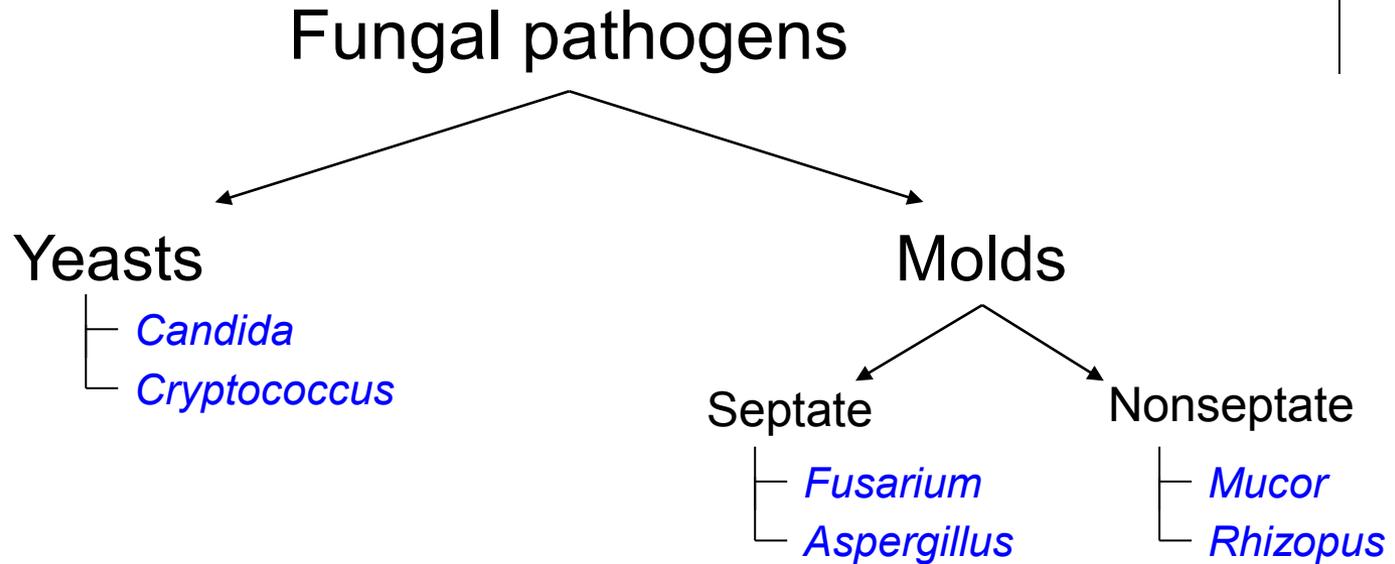


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Which is the only fungus that will take a Gram stain?

Common Ocular Fungal Pathogens



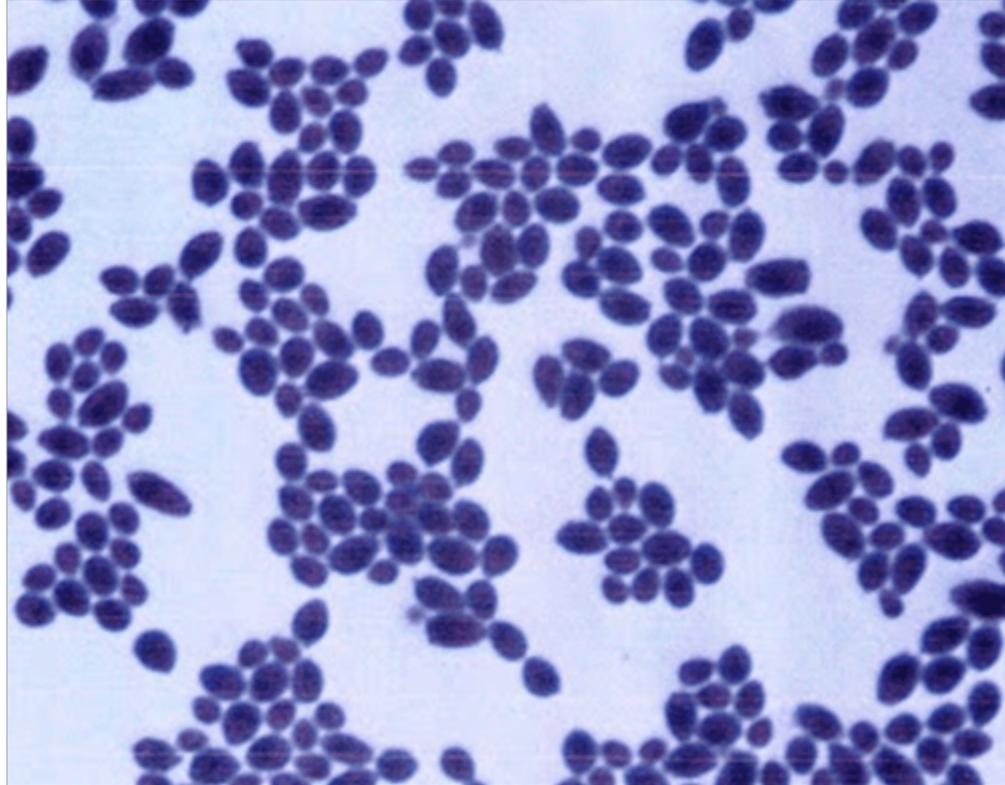
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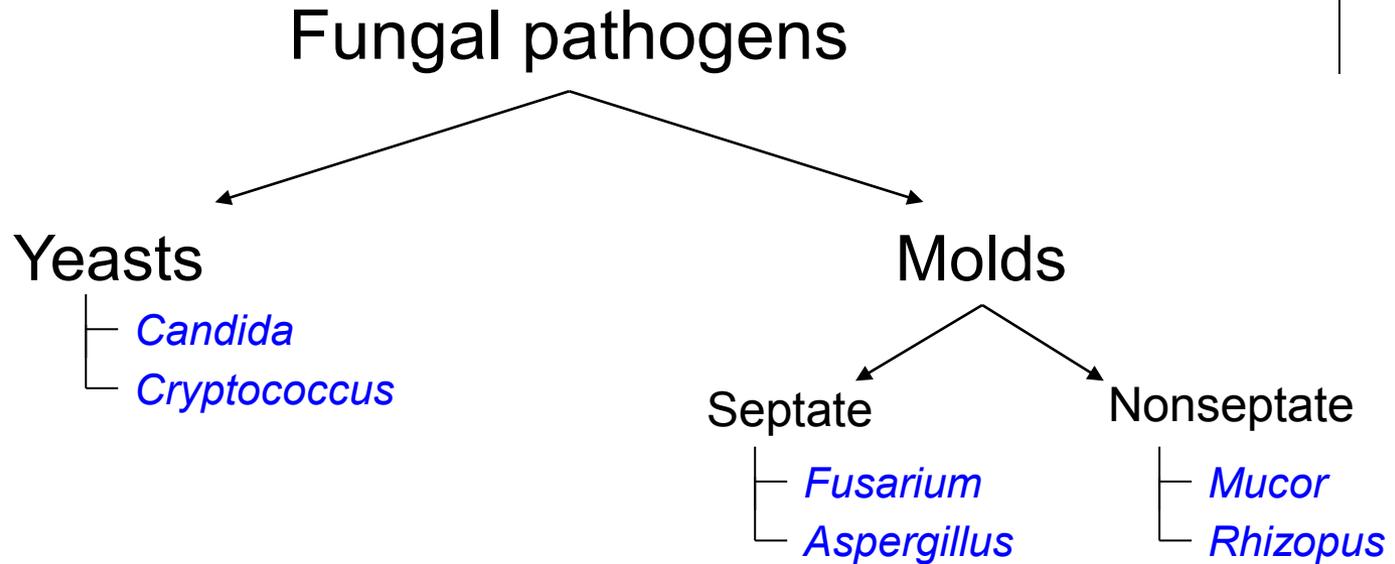
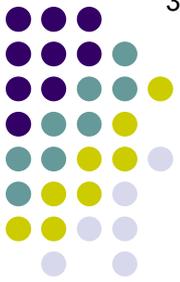
Candida

Common Ocular Fungal Pathogens



Candida: Gram stain

Common Ocular Fungal Pathogens

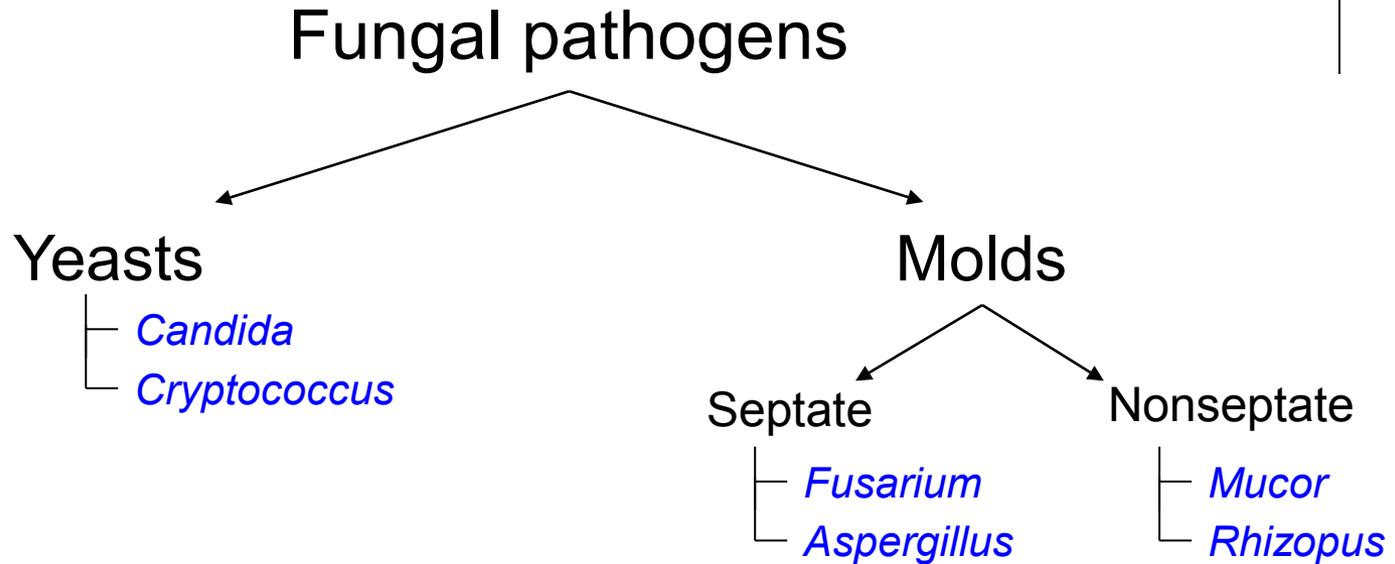
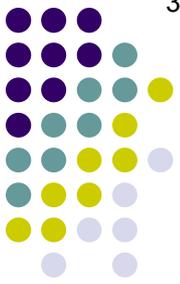


What is the go-to stain for fungi?

Gomori methenamine (many others work as well)

When working up a suspected fungal keratitis, what culture medium should you use?

Common Ocular Fungal Pathogens



What is the go-to stain for fungi?

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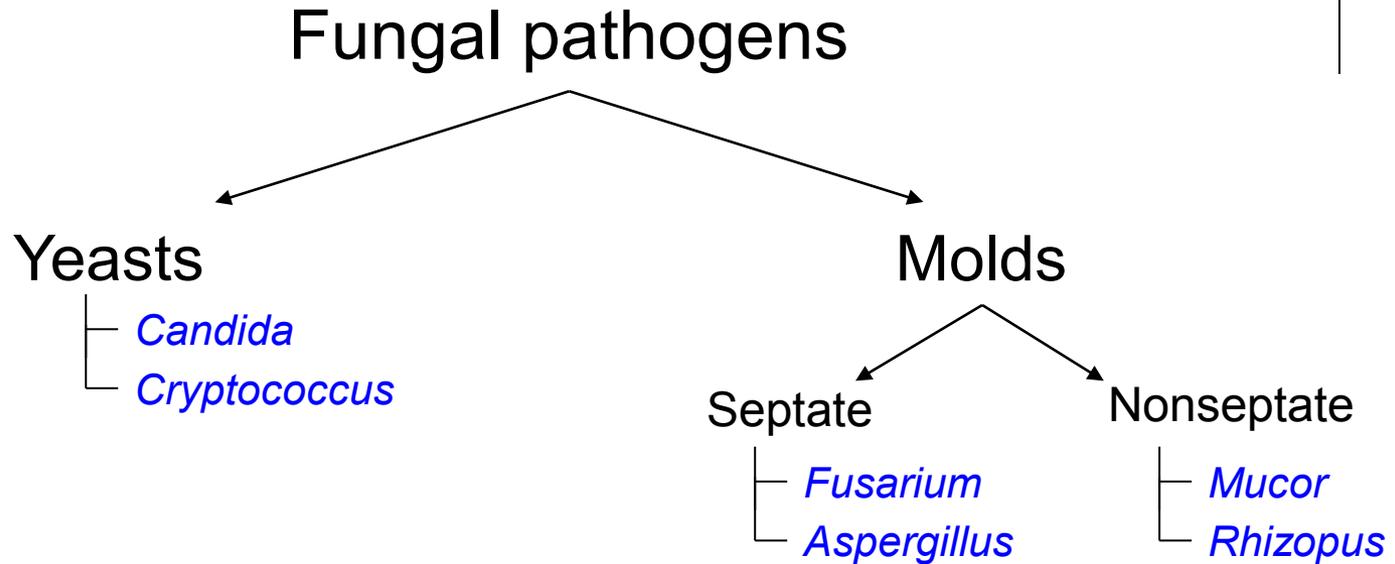
Sabouraud

Common Ocular Fungal Pathogens



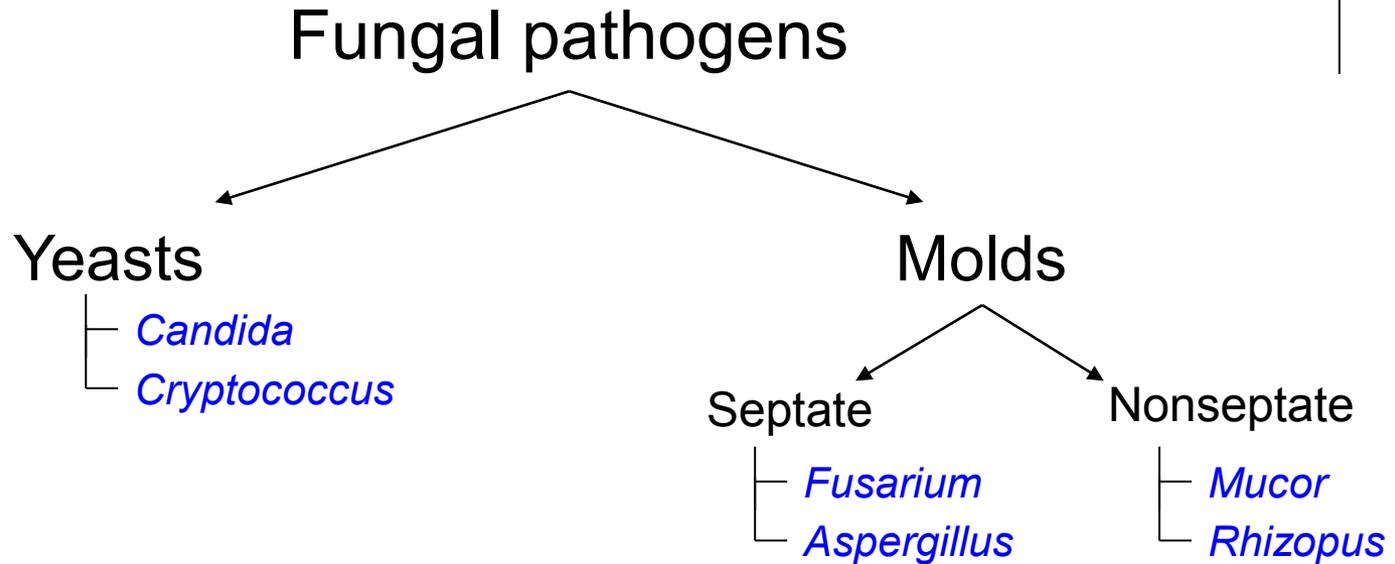
Candida growing on Sabouraud

Common Ocular Fungal Pathogens



Certain fungi have a strong association with particular climates.

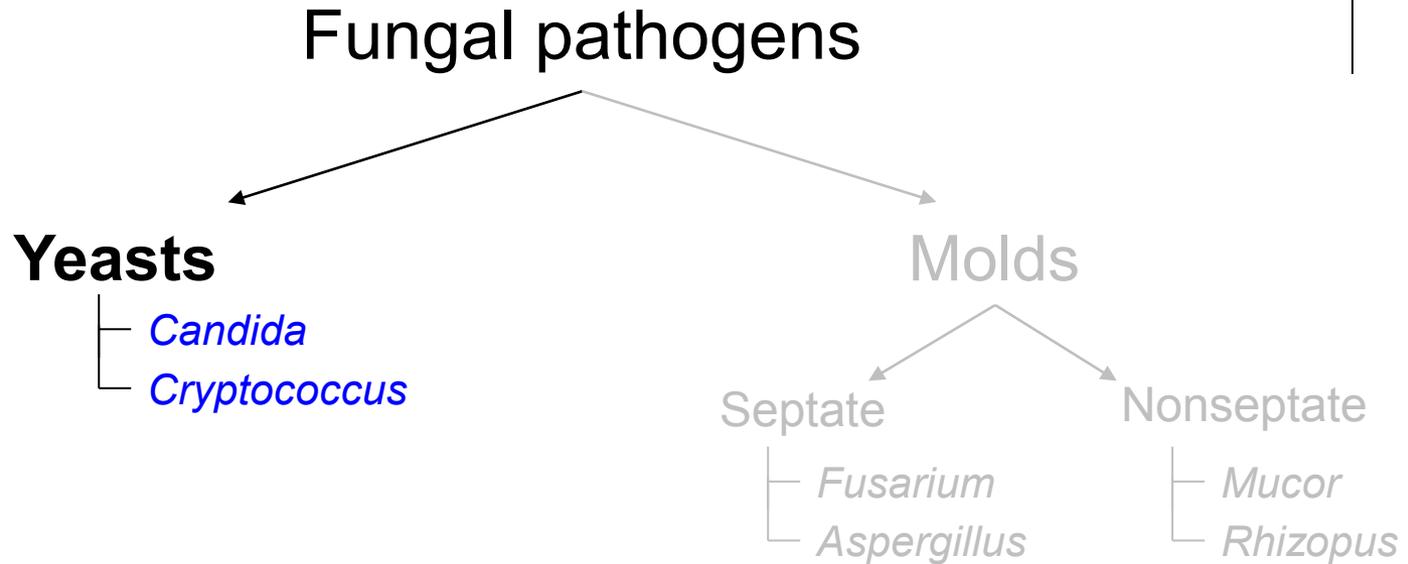
Common Ocular Fungal Pathogens



Certain fungi have a strong association with particular climates. When you hear the following climate descriptions, which fungi should come to mind?

Cool, northern climates:

Common Ocular Fungal Pathogens

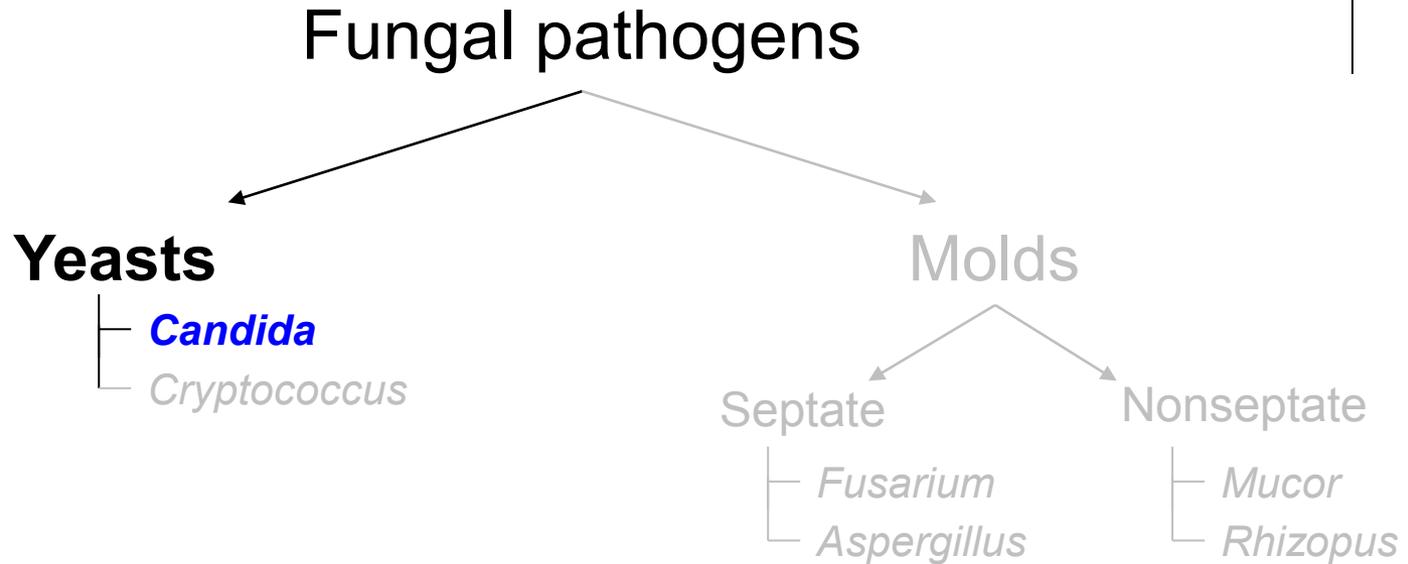


Certain fungi have a strong association with particular climates. When you hear the following climate descriptions, which fungi should come to mind?

Cool, northern climates: Yeasts, especially



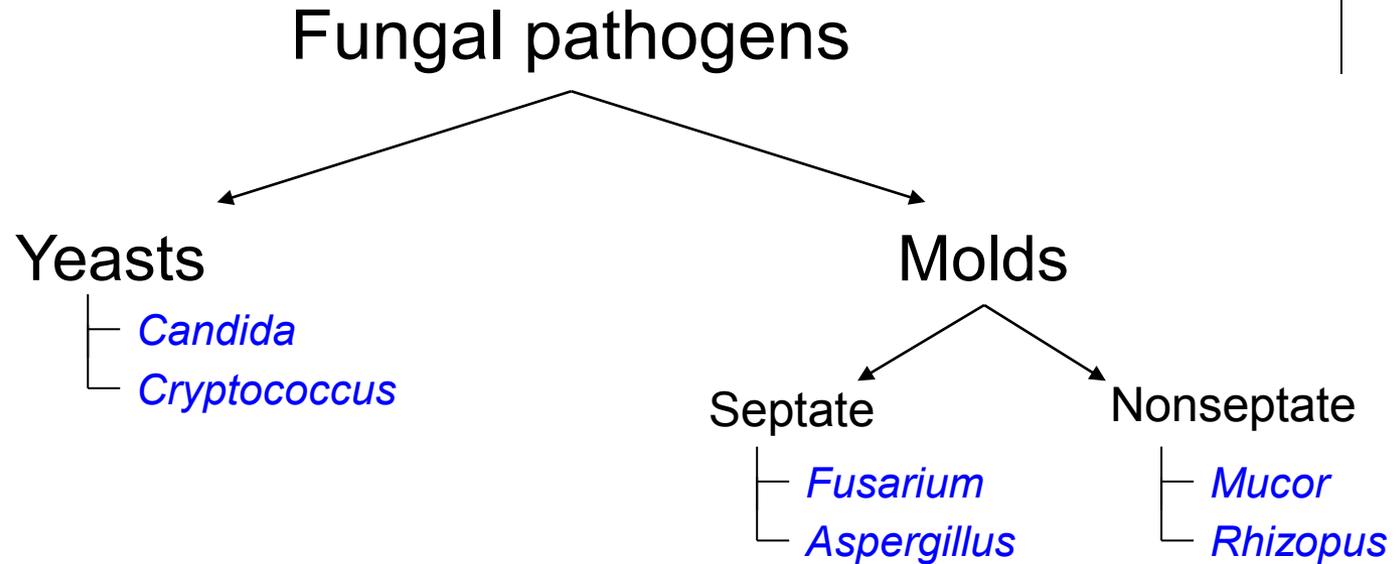
Common Ocular Fungal Pathogens



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Common Ocular Fungal Pathogens

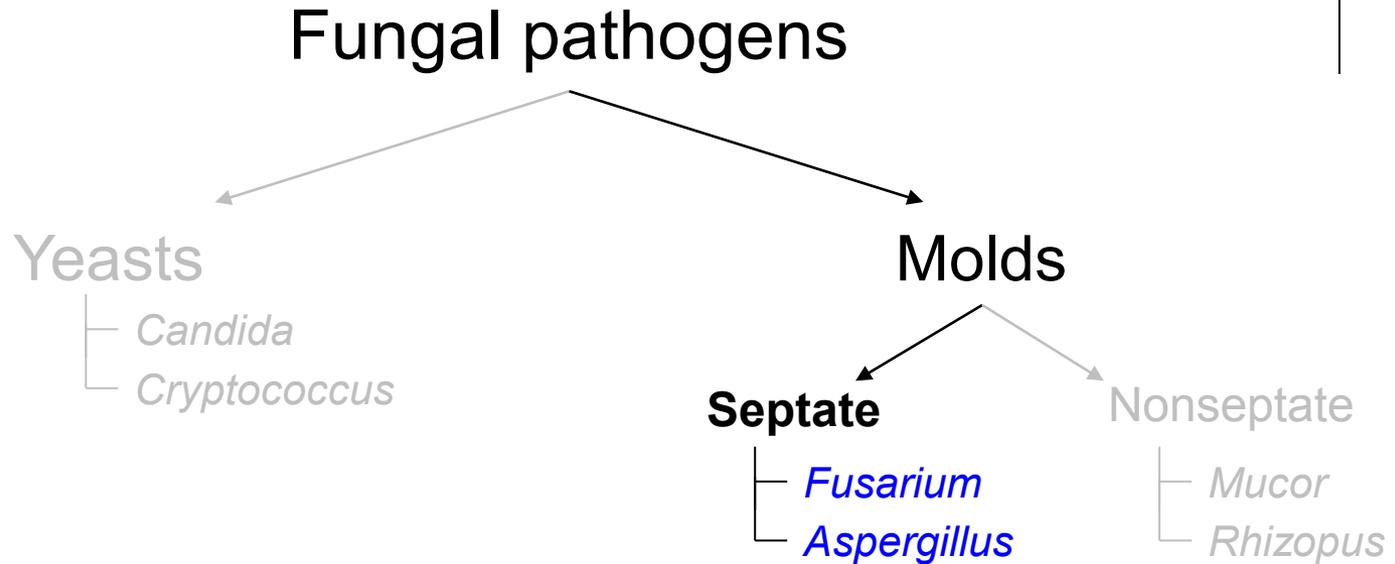


Certain fungi have a strong association with particular climates. When you hear the following climate descriptions, which fungi should come to mind?

*Cool, northern climates: Yeasts, especially *Candida**

Warm, humid climates:

Common Ocular Fungal Pathogens

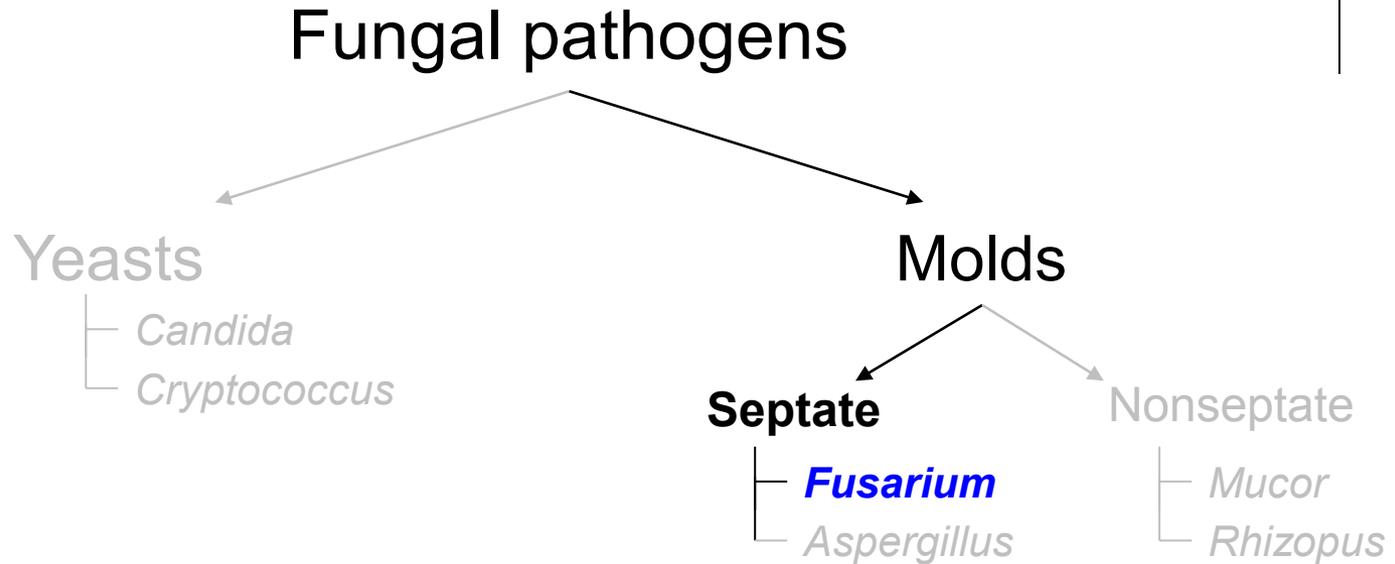


Certain fungi have a strong association with particular climates. When you hear the following climate descriptions, which fungi should come to mind?

*Cool, northern climates: Yeasts, especially **Candida***

Warm, humid climates: Septated molds, especially

Common Ocular Fungal Pathogens

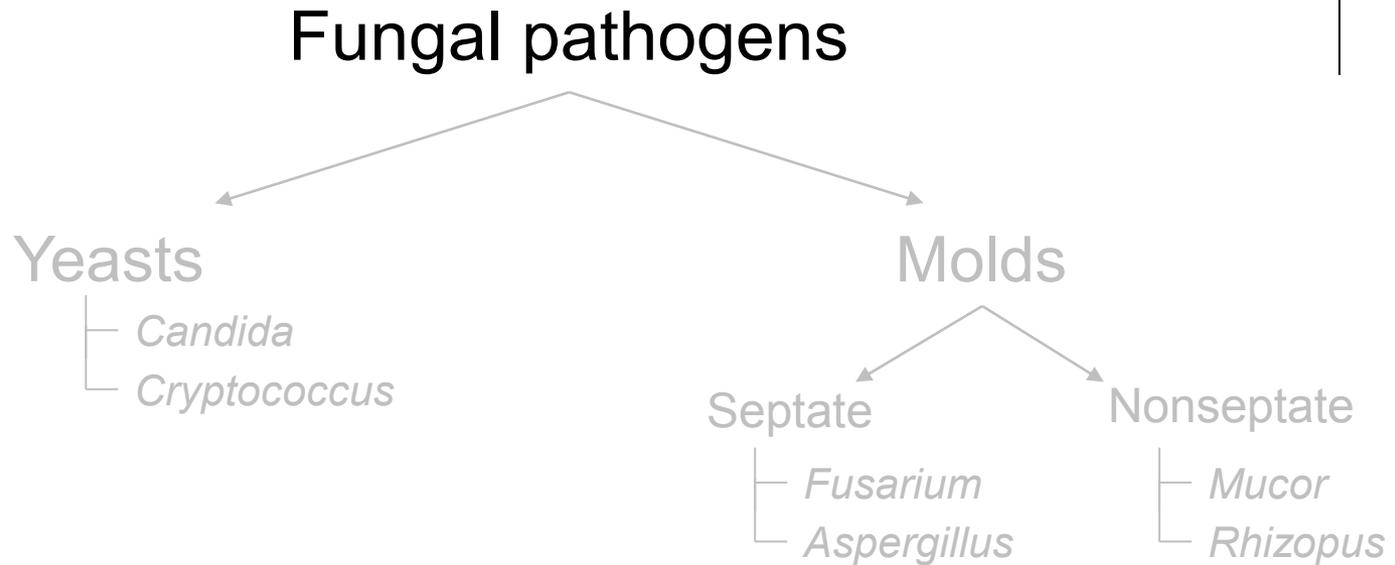


Certain fungi have a strong association with particular climates. When you hear the following climate descriptions, which fungi should come to mind?

Cool, northern climates: Yeasts, especially Candida

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Common Ocular Fungal Pathogens

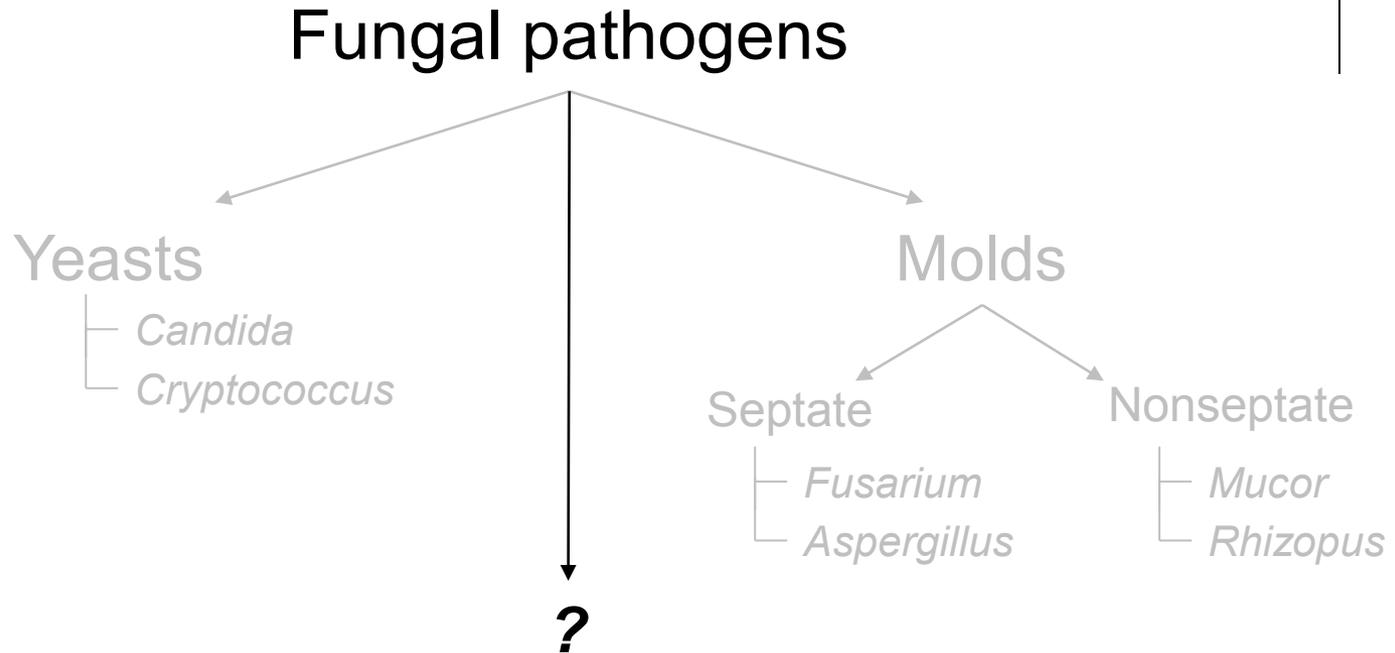


Certain **These are the associations to bear in mind** climates. When you hear **these** should come to mind?

Cool, northern climes ↔ **Candida**
Warm, humid climes ↔ **Fusarium**

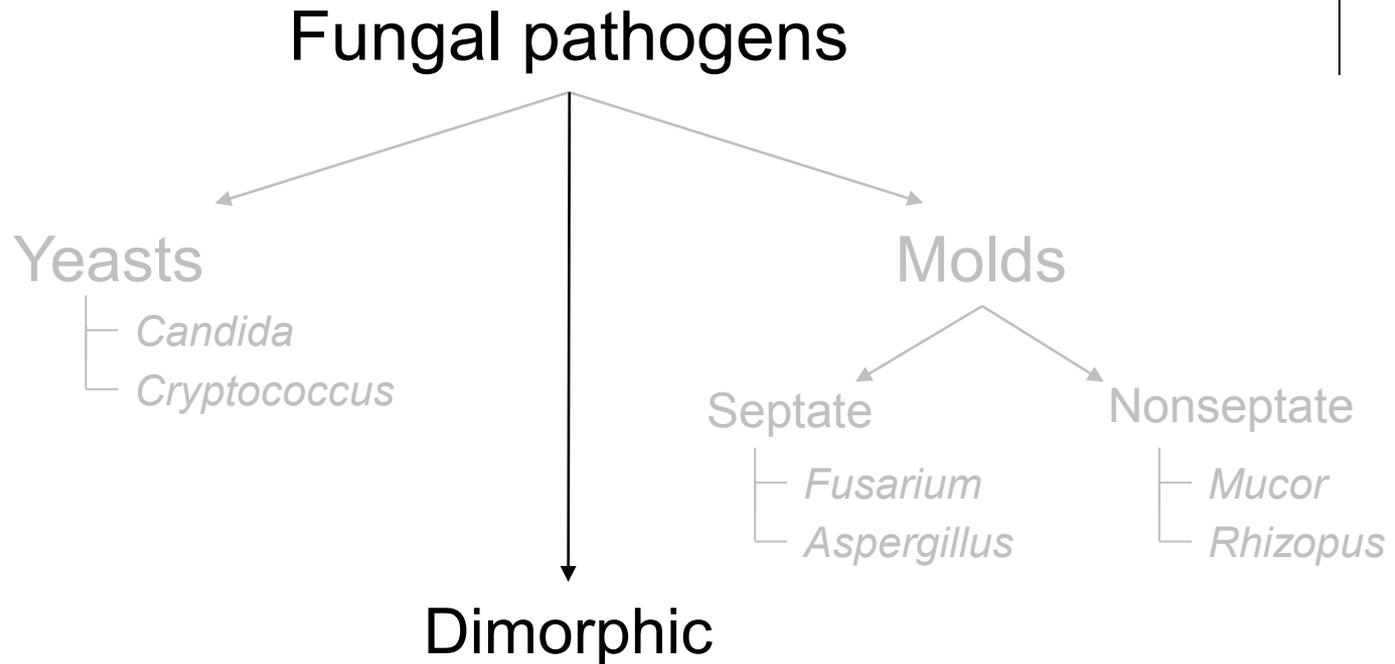
No question—proceed when ready

Common Ocular Fungal Pathogens



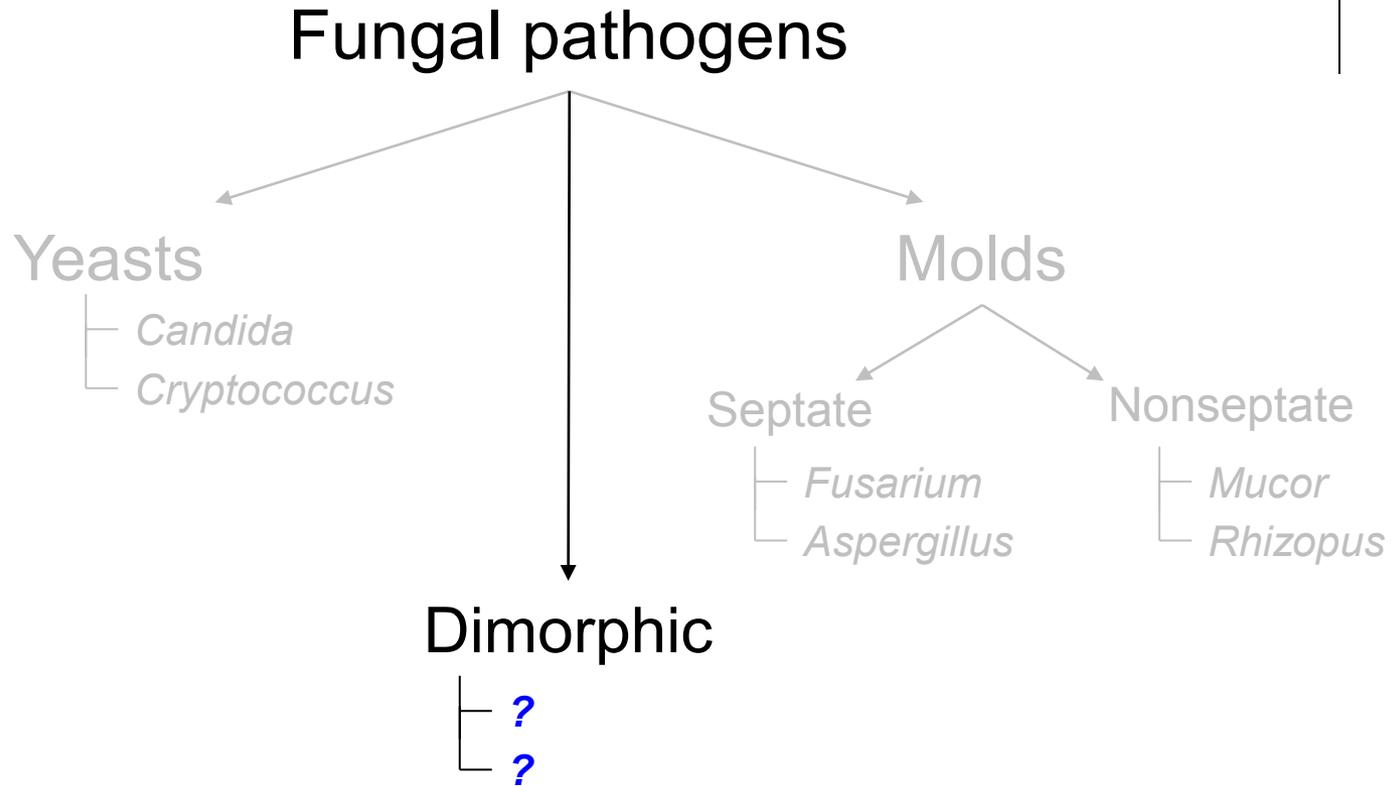
Final basic-science topic: Some fungi exist as yeast in the body, but as mold in the environment. What is the term for such fungi?

Common Ocular Fungal Pathogens



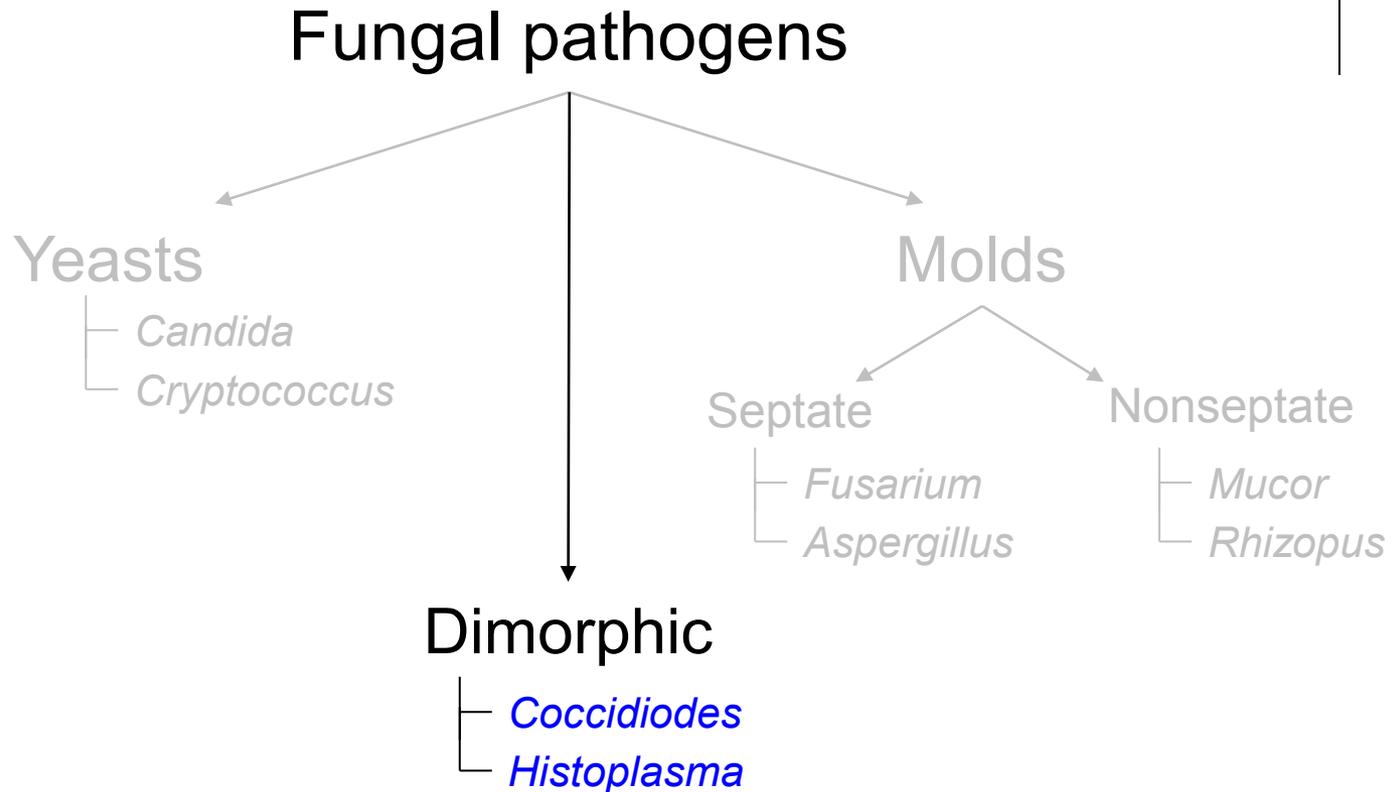
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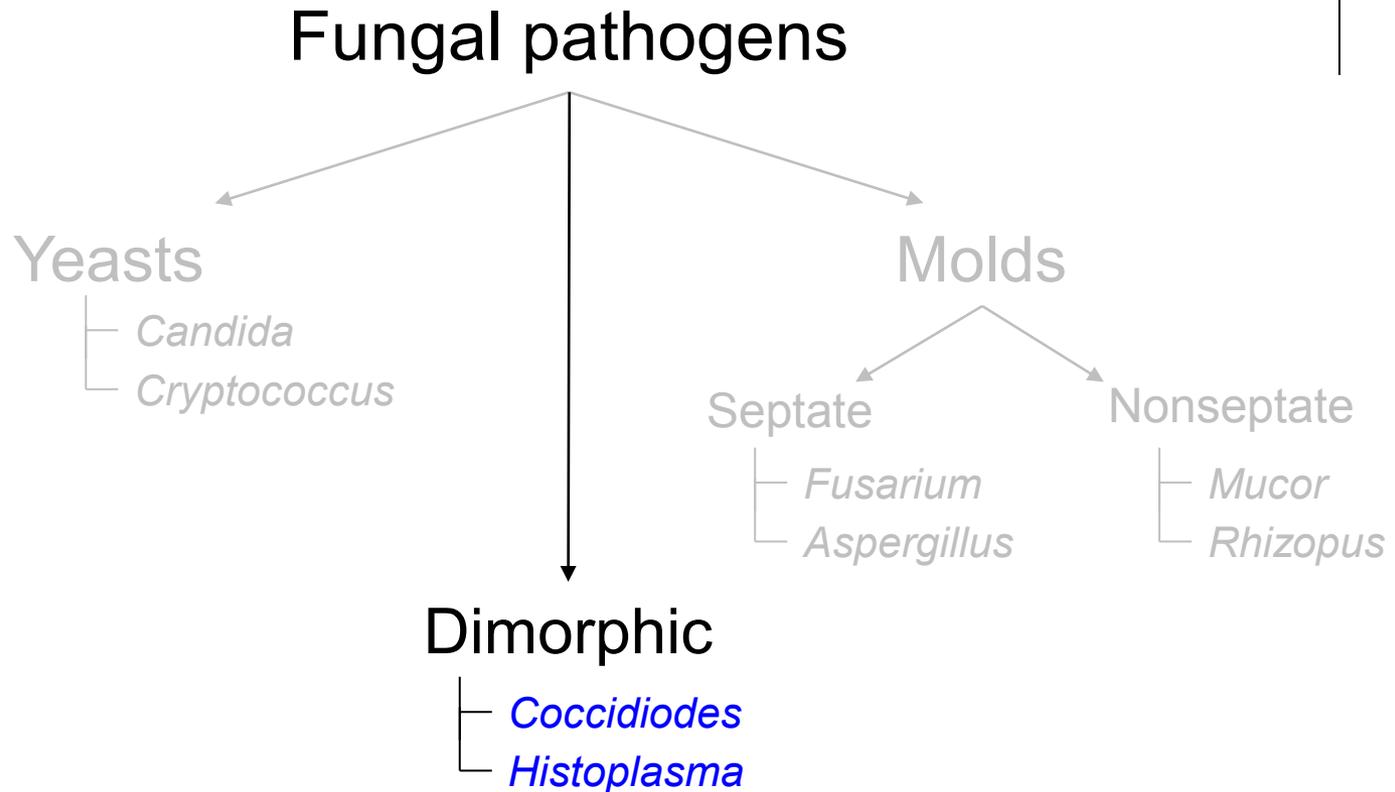
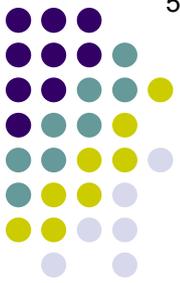
Two species account for the majority of dimorphic fungi issues—what are they?

Common Ocular Fungal Pathogens



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Common Ocular Fungal Pathogens

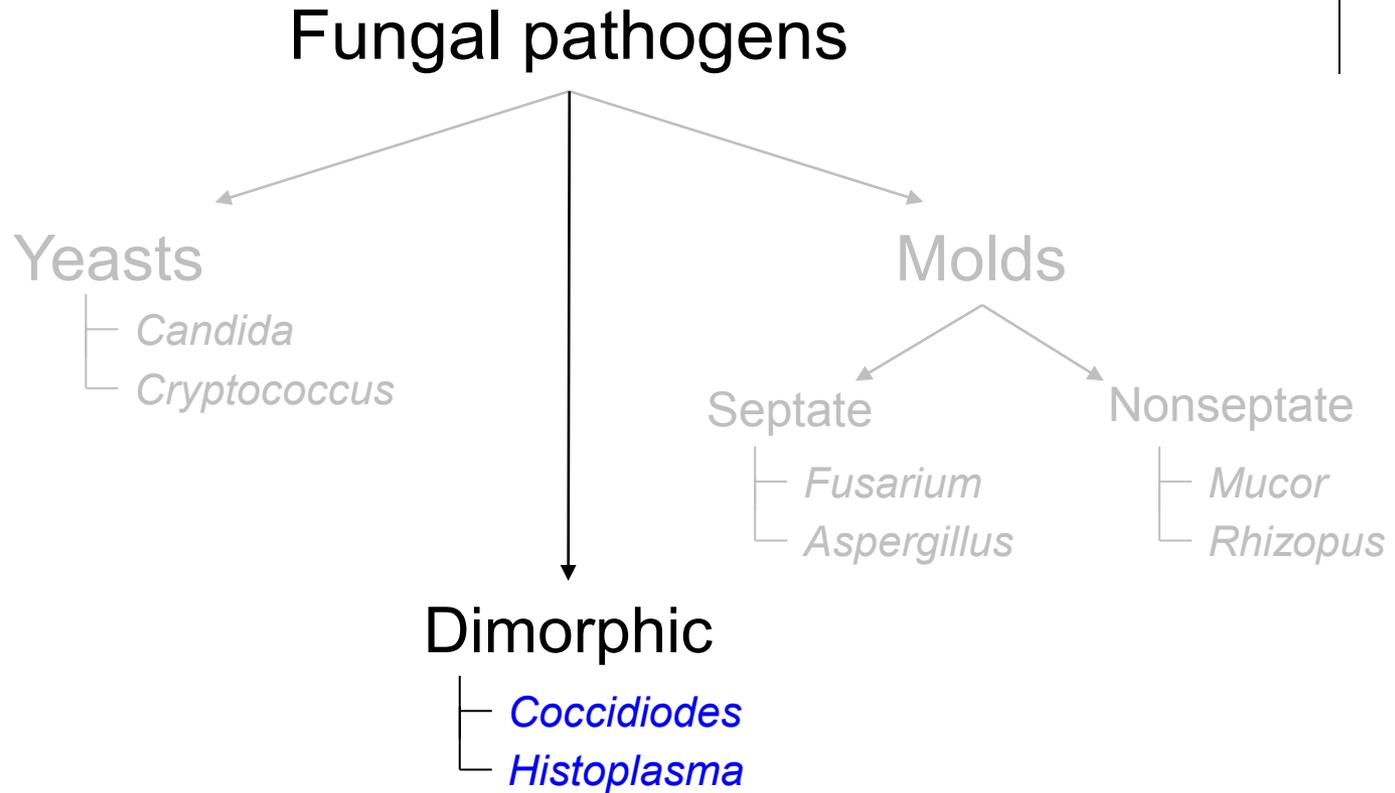


Coccidioides and Histoplasma have definite geographic preponderances in the United States. What are they?

Coccidioides: ?

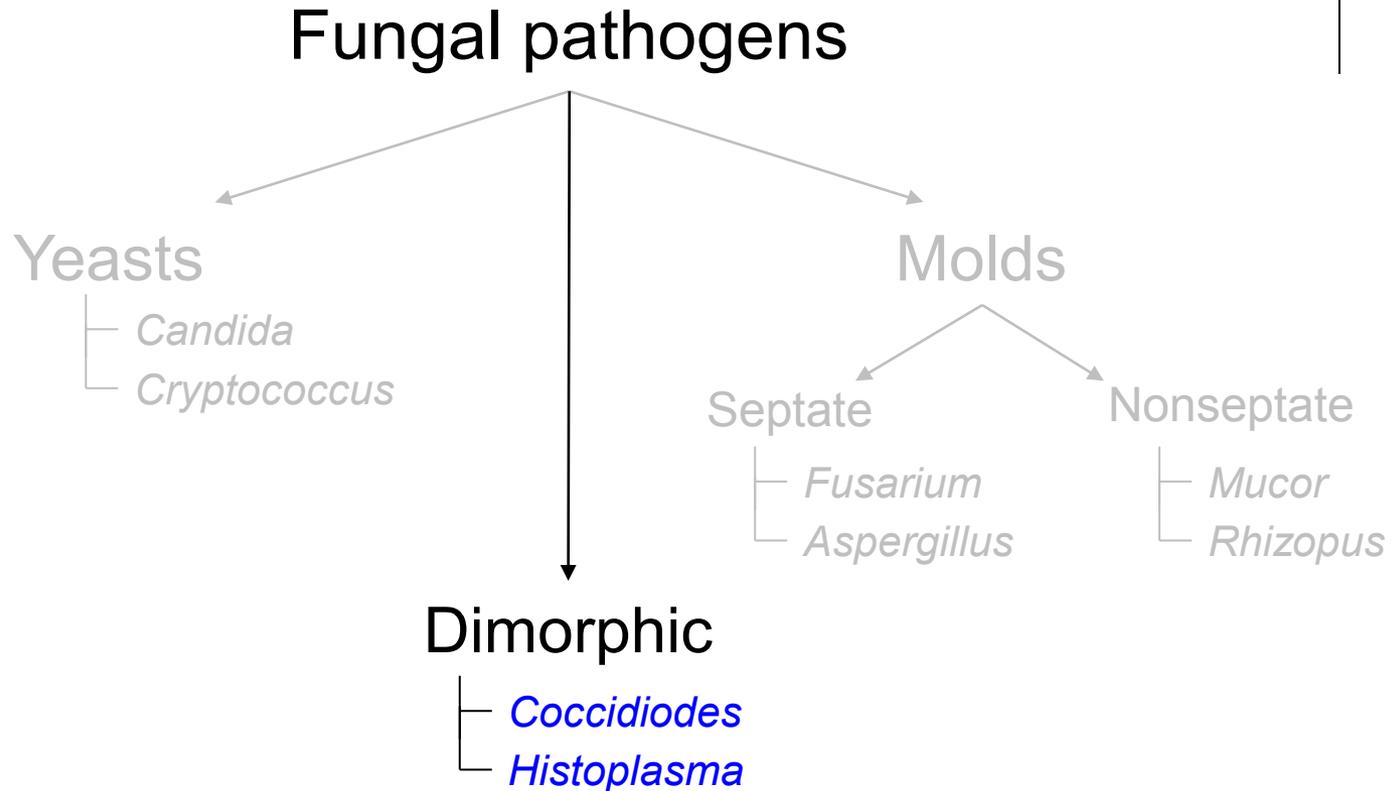
Histoplasma

Common Ocular Fungal Pathogens



Coccidioides and Histoplasma have definite geographic preponderances in the United States. What are they?
Coccidioides: The Southwest, particularly the two words Valley in Cali
Histoplasma

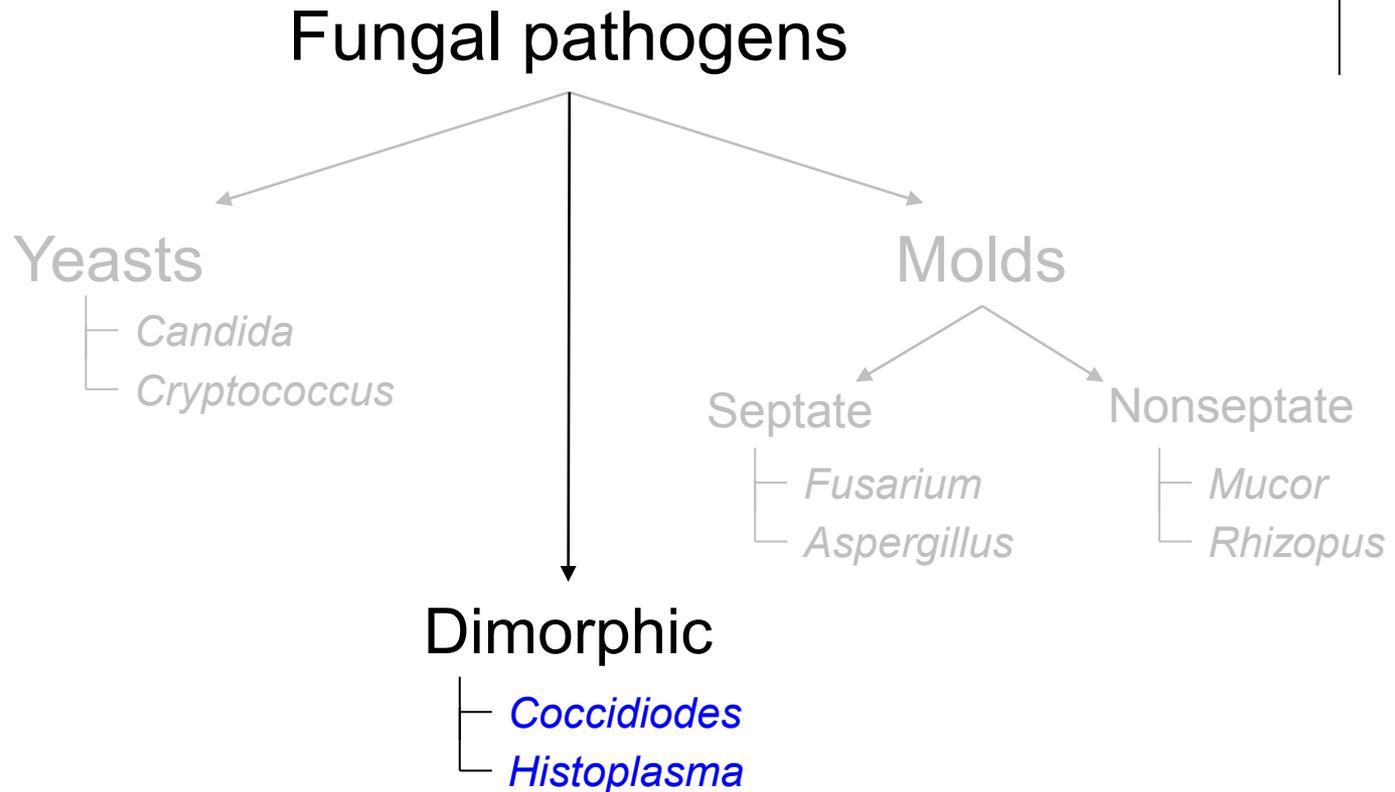
Common Ocular Fungal Pathogens



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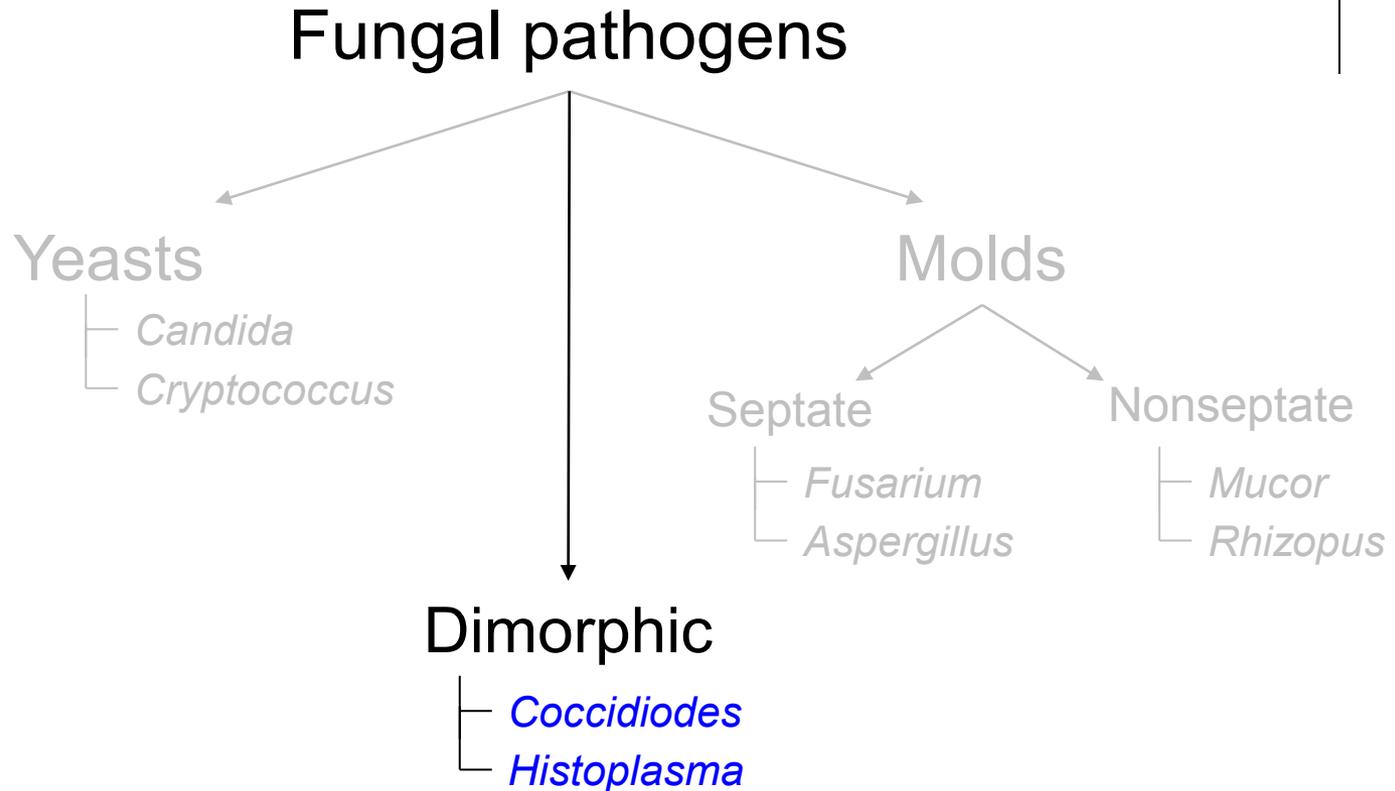


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Coccidioides: The Southwest, particularly the San Joaquin Valley in Cali

Histoplasma: ?

Common Ocular Fungal Pathogens

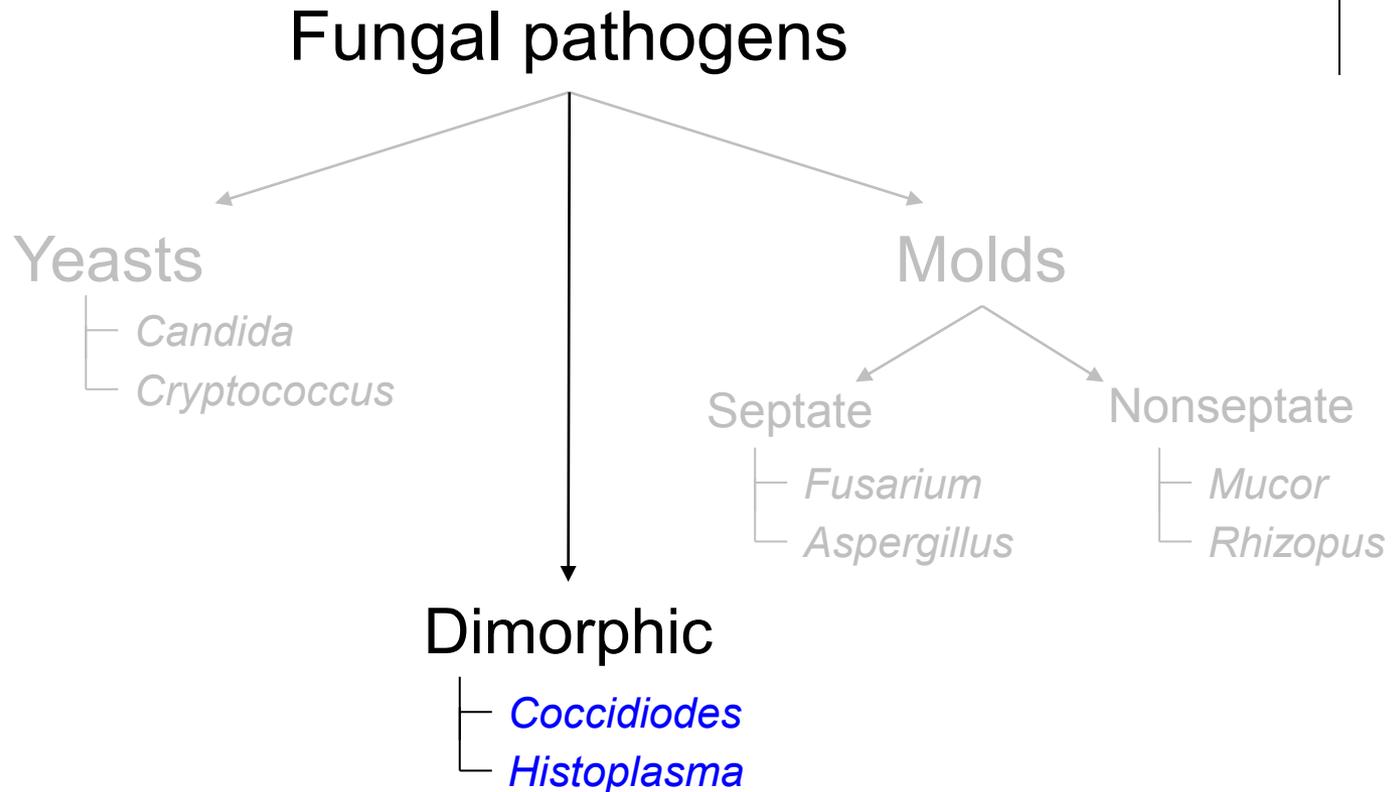


Coccidioides and Histoplasma have definite geographic preponderances in the United States. What are they?

Coccidioides: The Southwest, particularly the San Joaquin Valley in Cali

Histoplasma: The [redacted] and [redacted] River valleys

Common Ocular Fungal Pathogens

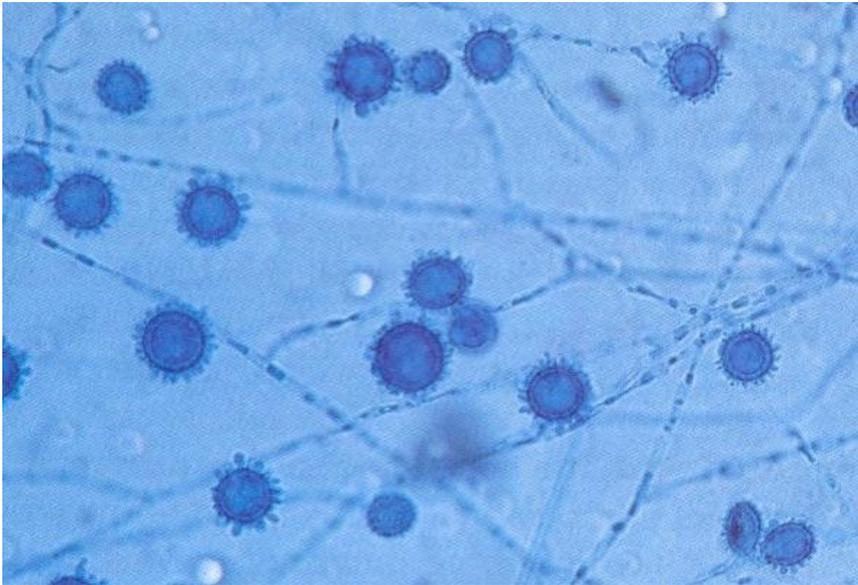


Coccidioides and Histoplasma have definite geographic preponderances in the United States. What are they?

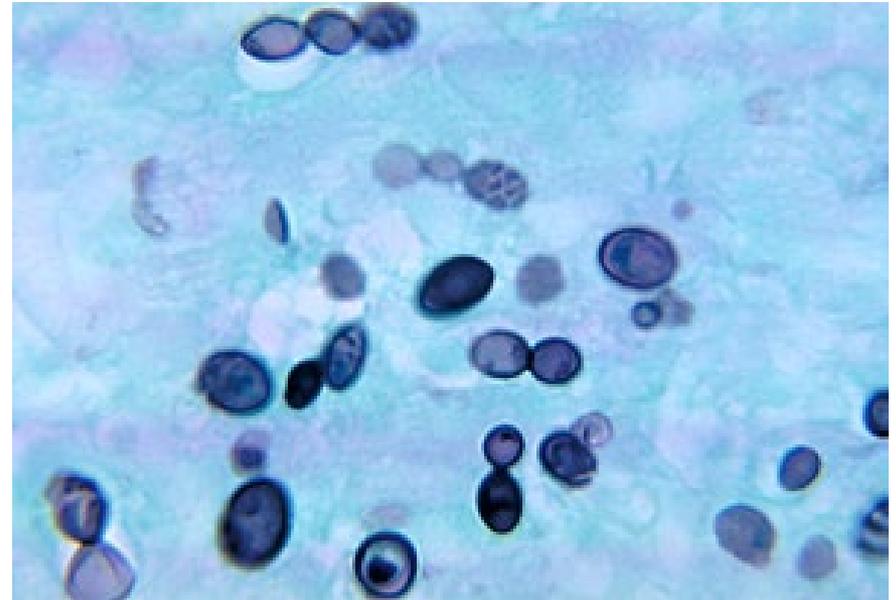
Coccidioides: The Southwest, particularly the San Joaquin Valley in Cali

Histoplasma: The Ohio and Mississippi River valleys

Common Ocular Fungal Pathogens

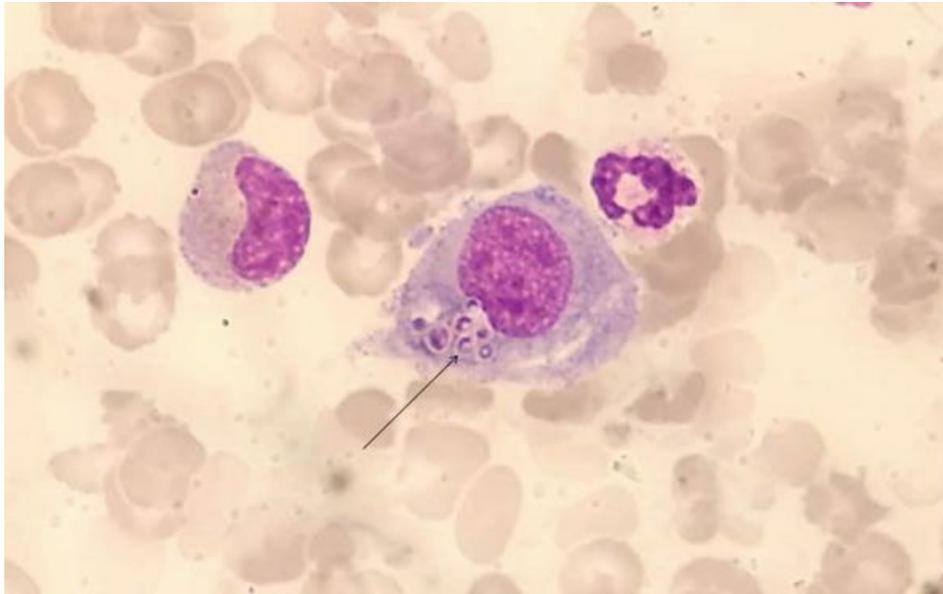
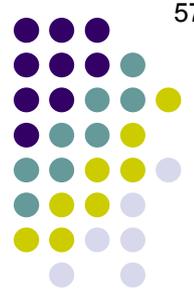


H capsulatum: Mold (filamentous) form



H capsulatum: Yeast form

Common Ocular Fungal Pathogens



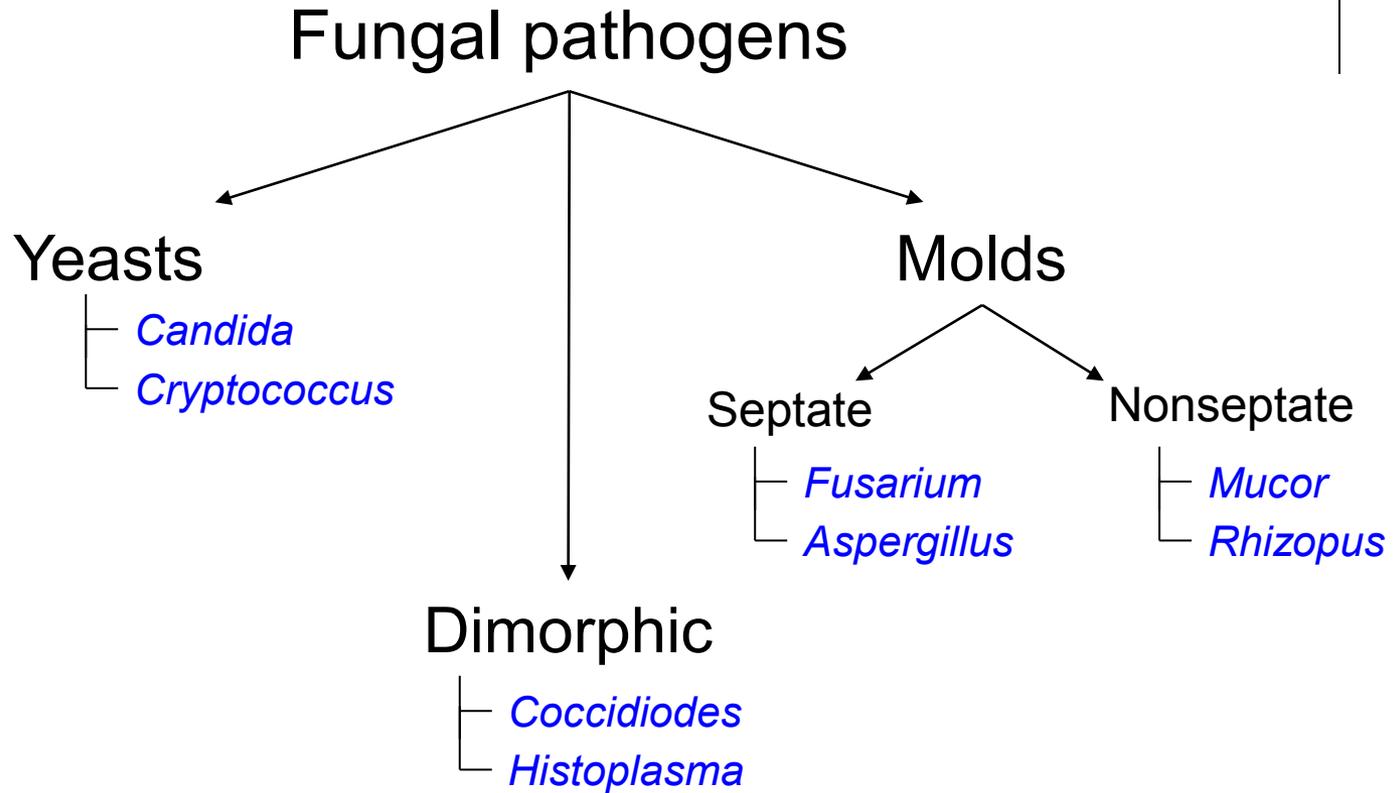
Histoplasma, yeast form, in a macrophage



Coccidioides: Note the 'spherule' shape

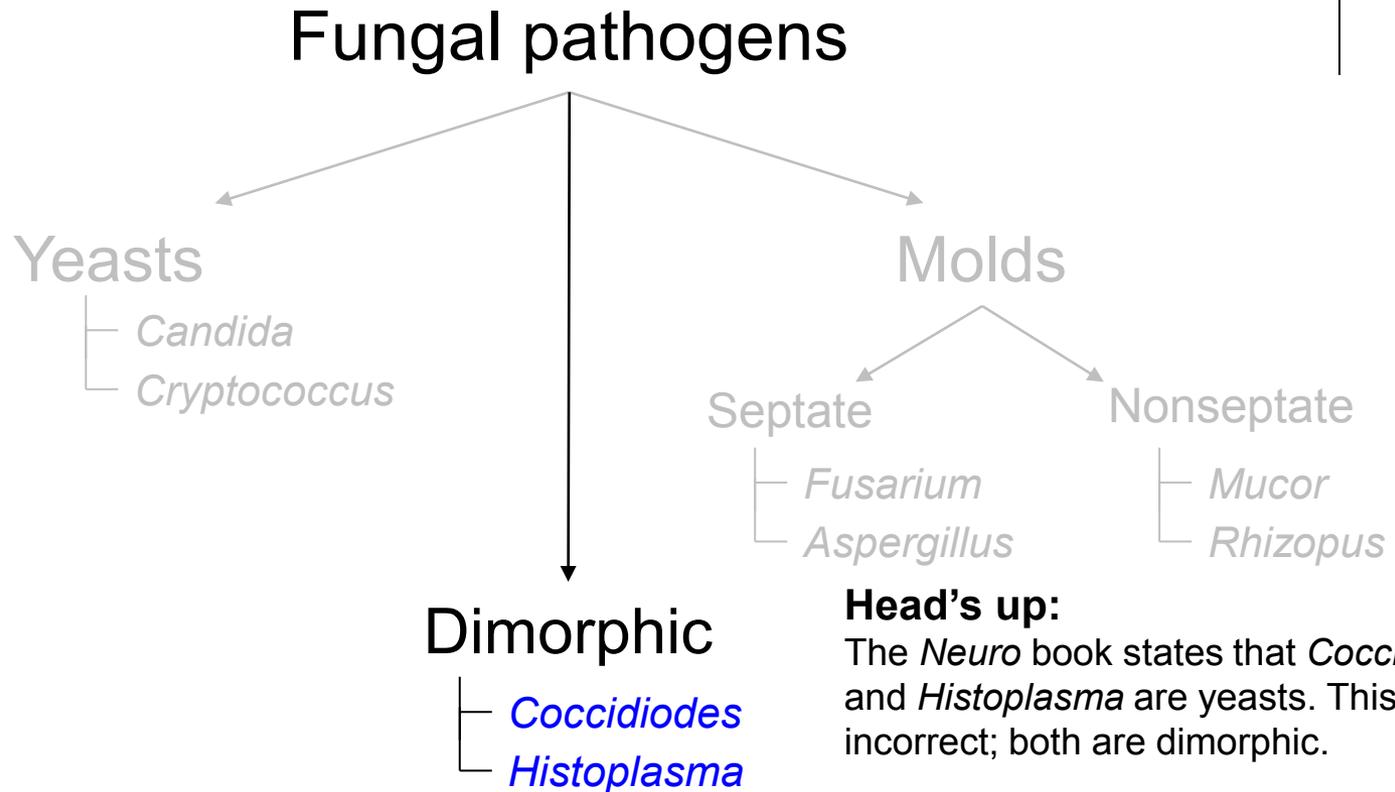
Dimorphic pathogens

Common Ocular Fungal Pathogens

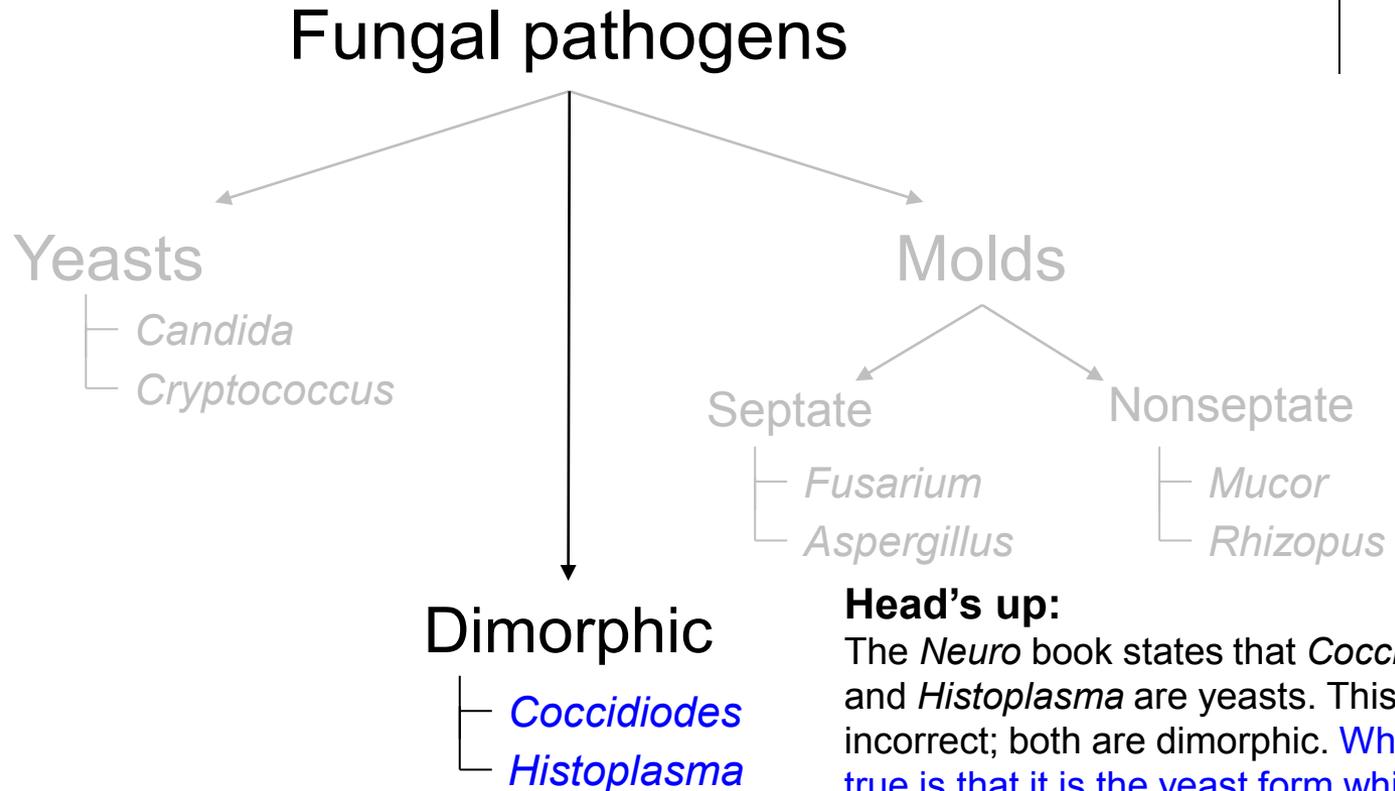


These eight species account for most of the fungal issues addressed in the BCSC

Common Ocular Fungal Pathogens



Common Ocular Fungal Pathogens



Common Ocular Fungal Pathogens



Fungal pathogens

Yeasts

- Candida*
- Cryptococcus*

Head's up part deux:
The *Neuro* book states that *Candida* is dimorphic. This is incorrect; it is a yeast.

Molds

Septate

- Fusarium*
- Aspergillus*

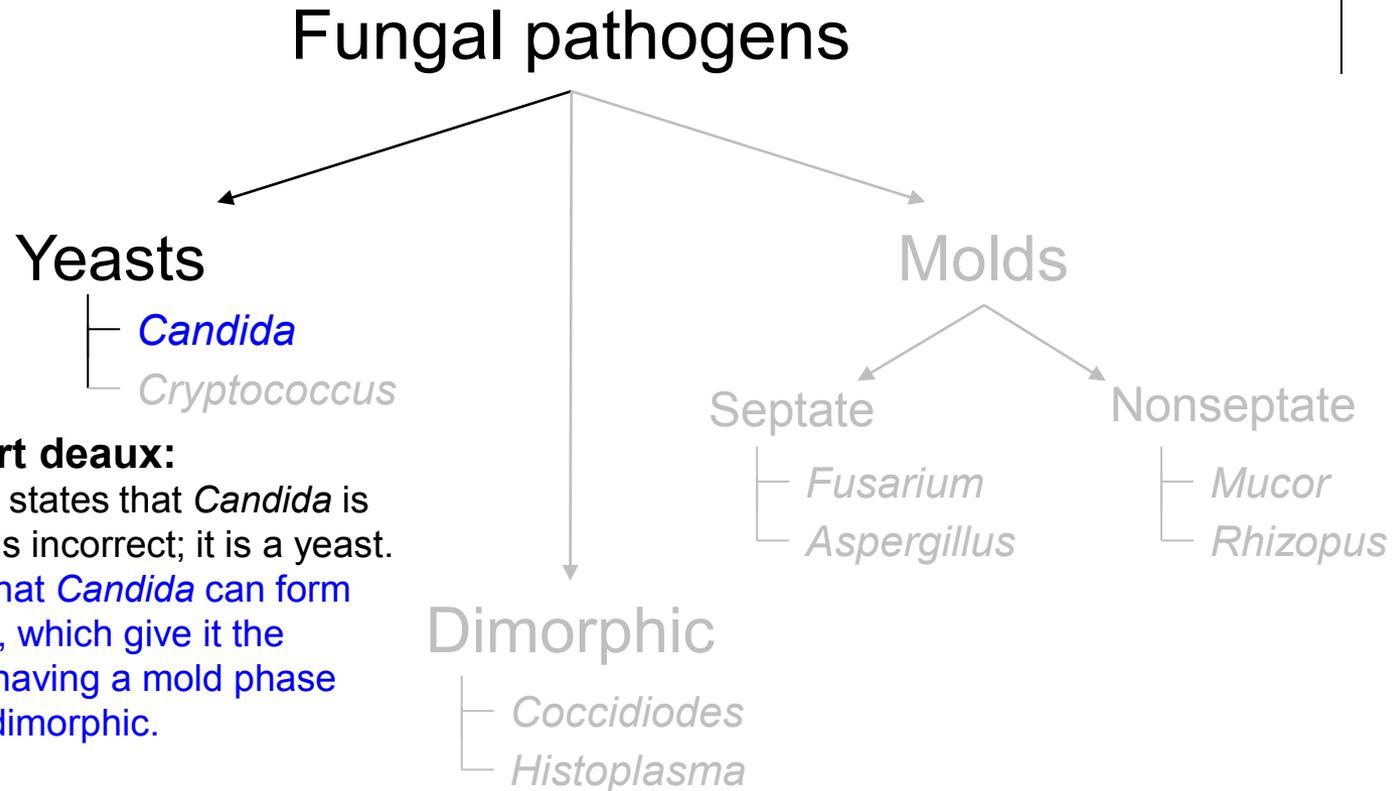
Nonseptate

- Mucor*
- Rhizopus*

Dimorphic

- Coccidioides*
- Histoplasma*

Common Ocular Fungal Pathogens

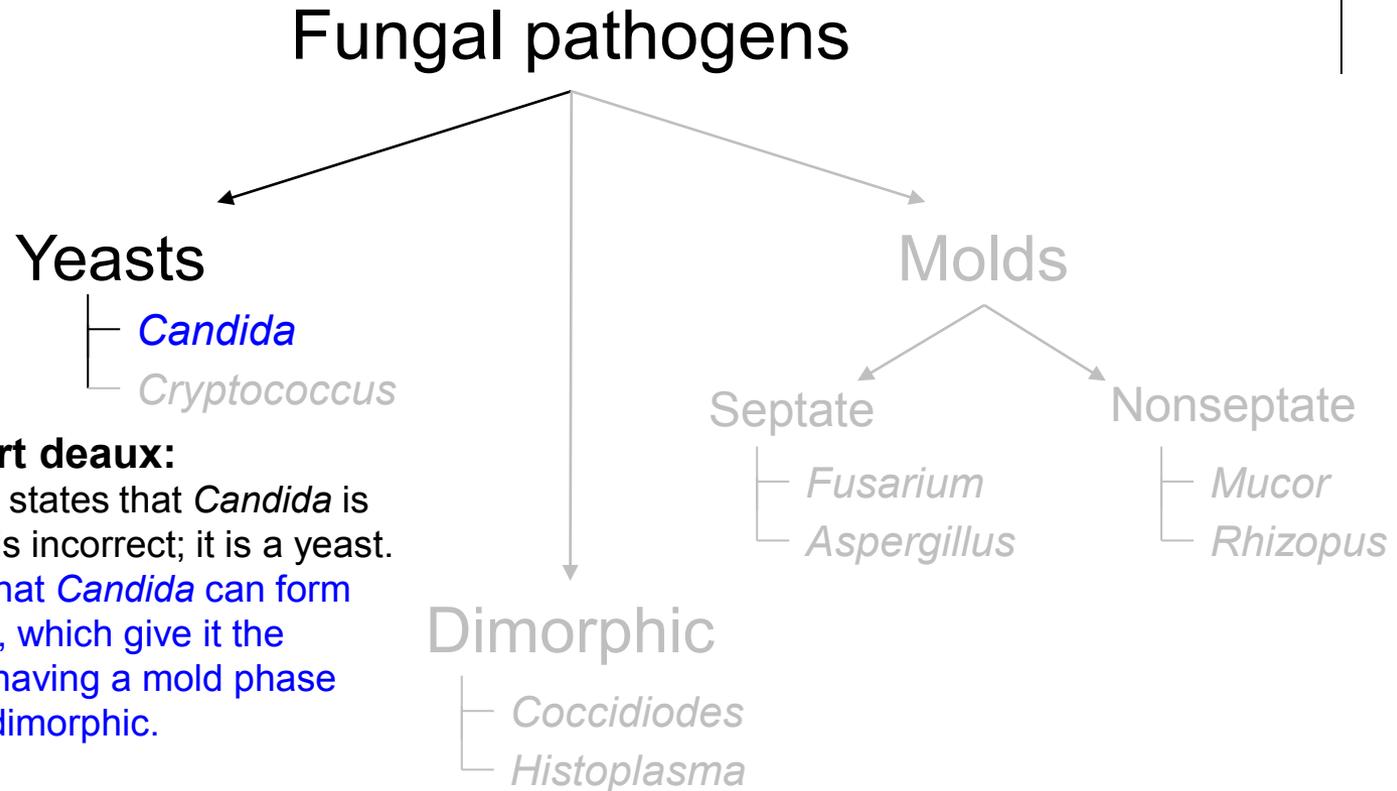


Head's up part deux:

The *Neuro* book states that *Candida* is dimorphic. This is incorrect; it is a yeast.

What is true is that *Candida* can form [redacted], which give it the **appearance** of having a mold phase and thus being dimorphic.

Common Ocular Fungal Pathogens

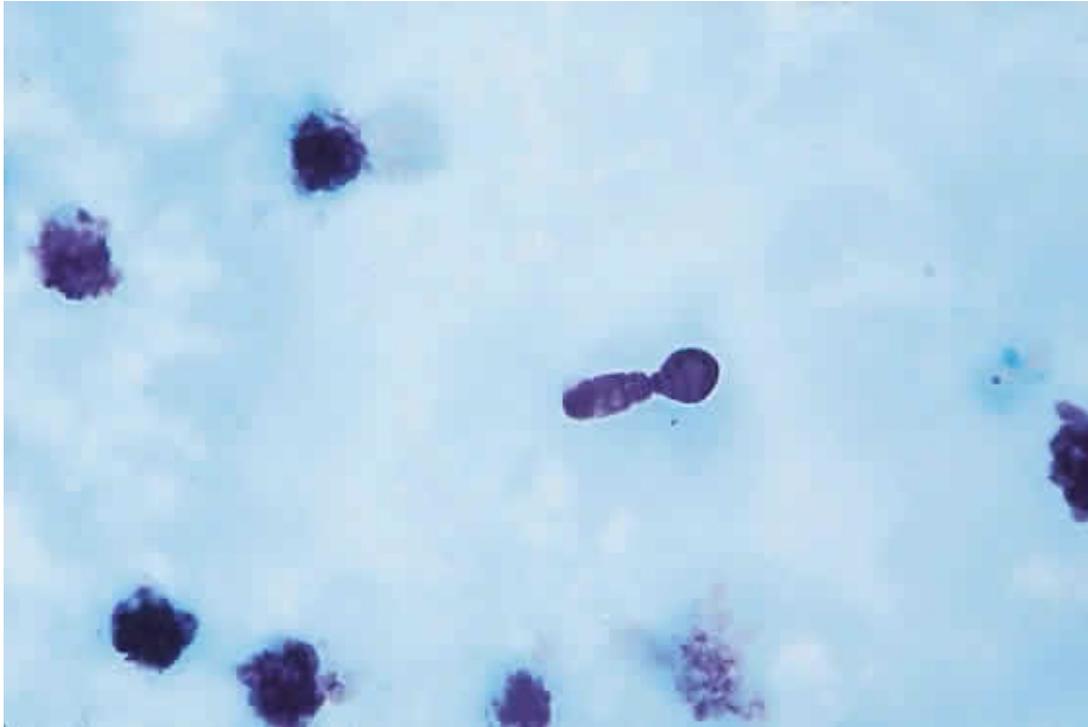


Head's up part deux:

The *Neuro* book states that *Candida* is dimorphic. This is incorrect; it is a yeast.

What **is** true is that *Candida* can form pseudohyphae, which give it the **appearance** of having a mold phase and thus being dimorphic.

Common Ocular Fungal Pathogens



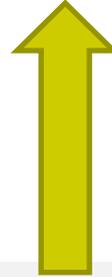
Candida. This pic was shown earlier in the set. The 'budding' structure that was remarked upon then is a pseudohyphae.

Candida

Common Ocular Fungal Pathogens



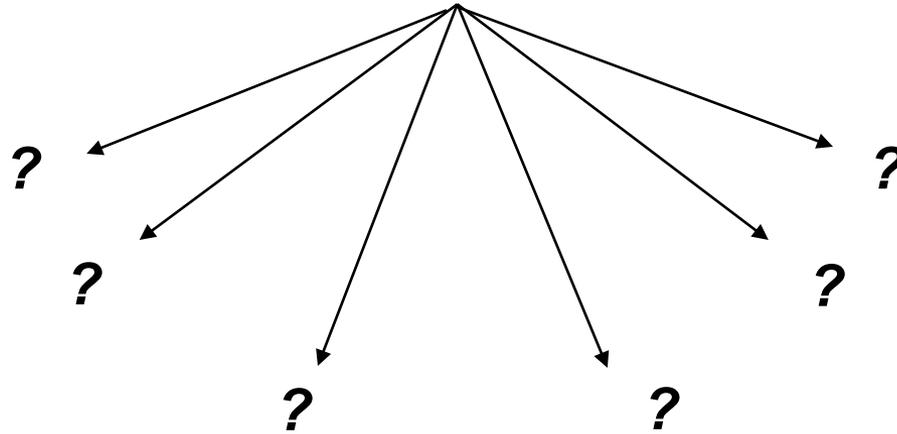
Fungal pathogenic **ic conditions**



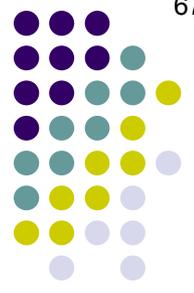
*Next we'll shift gears and talk about the **fungal conditions** you need to know in order to do well on the OKAP (oh sure, and to take care of pts too)*



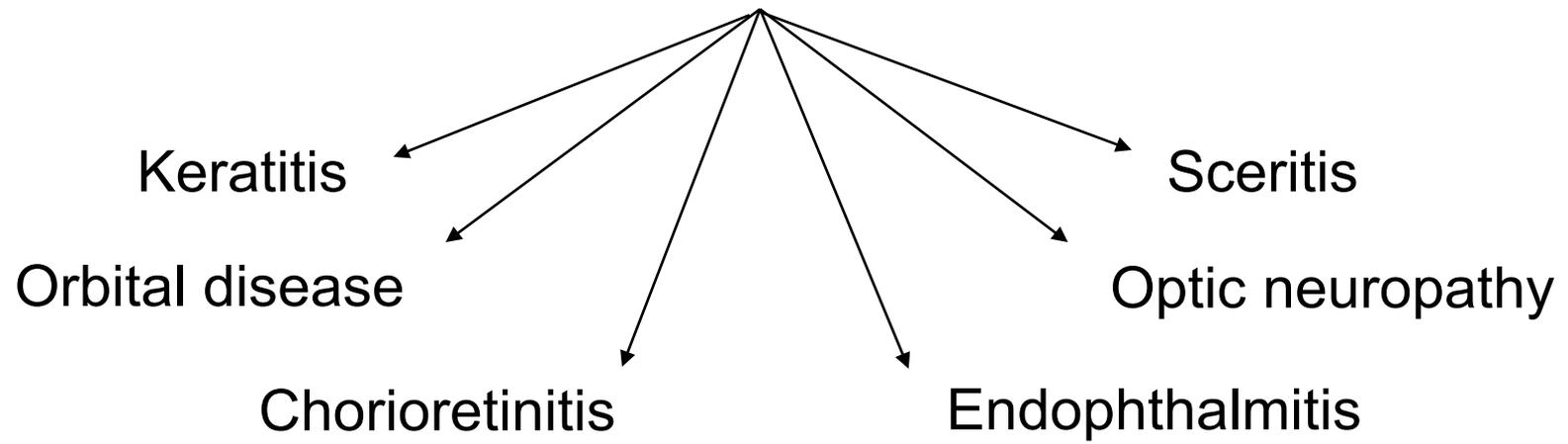
Fungal pathogenic **ic conditions**



Fungal pathogens cause six general conditions—what are they?



Fungal pathogenicic conditions

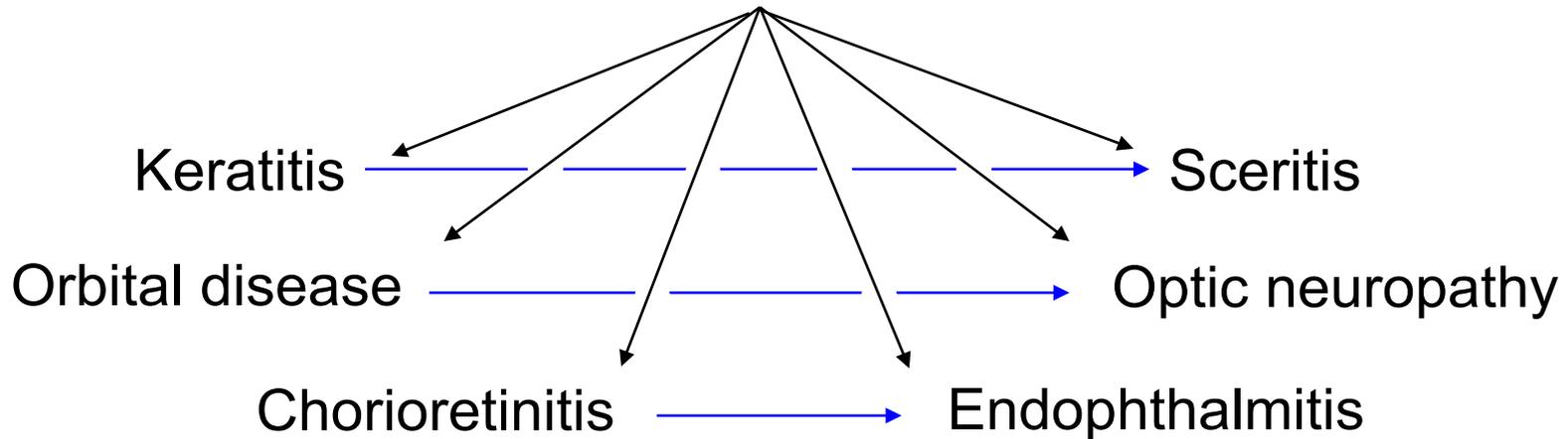


Fungal pathogens cause six general conditions—what are they?

Common Ocular Fungal Pathogens

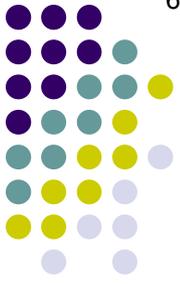


Fungal pathogenic conditions

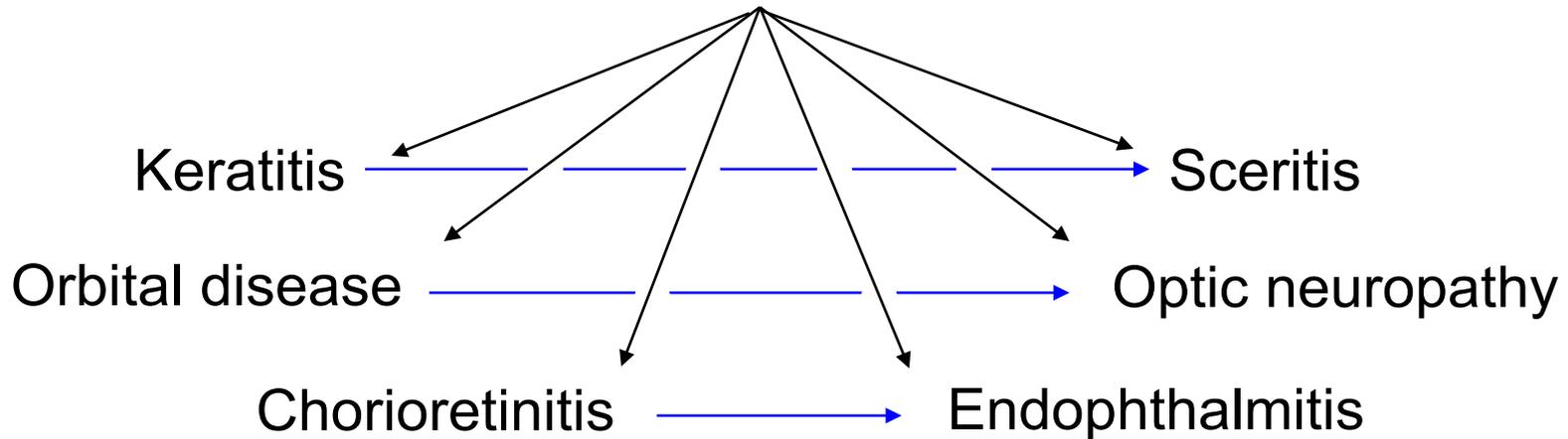


Important foreshadowing: These conditions are not thrown up here rando. As we will see, the conditions on the right are often (in some cases **always**) caused by the condition on the left.

Common Ocular Fungal Pathogens



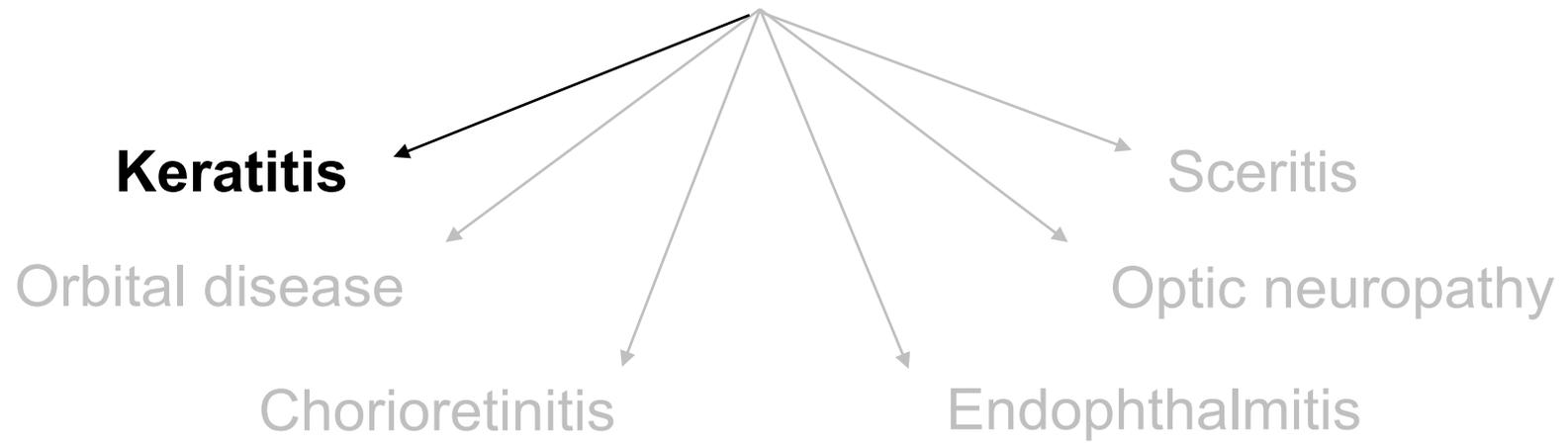
Fungal pathogenic conditions



Important foreshadowing: These conditions are not thrown up here rando. As we will see, the conditions on the right are often (in some cases **always**) caused by the condition on the left. **Committing the diagram to memory in the manner it's presented above will help you hang on to that key fact.**



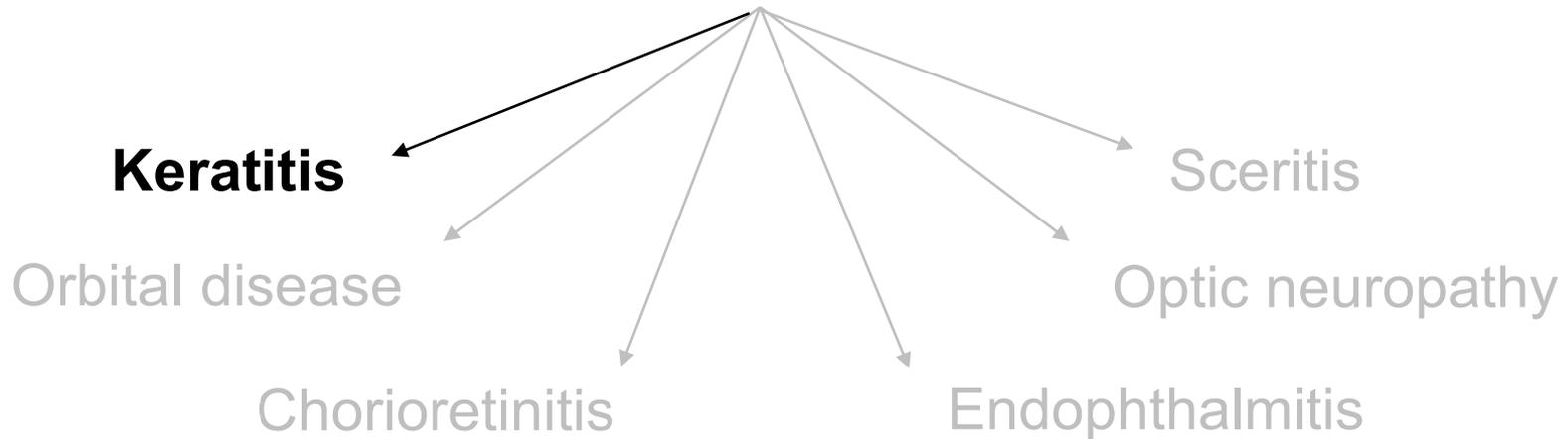
Fungal pathogenicic conditions



In terms of presentation, how does fungal keratitis differ from bacterial?

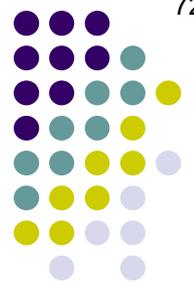


Fungal pathogenicic conditions

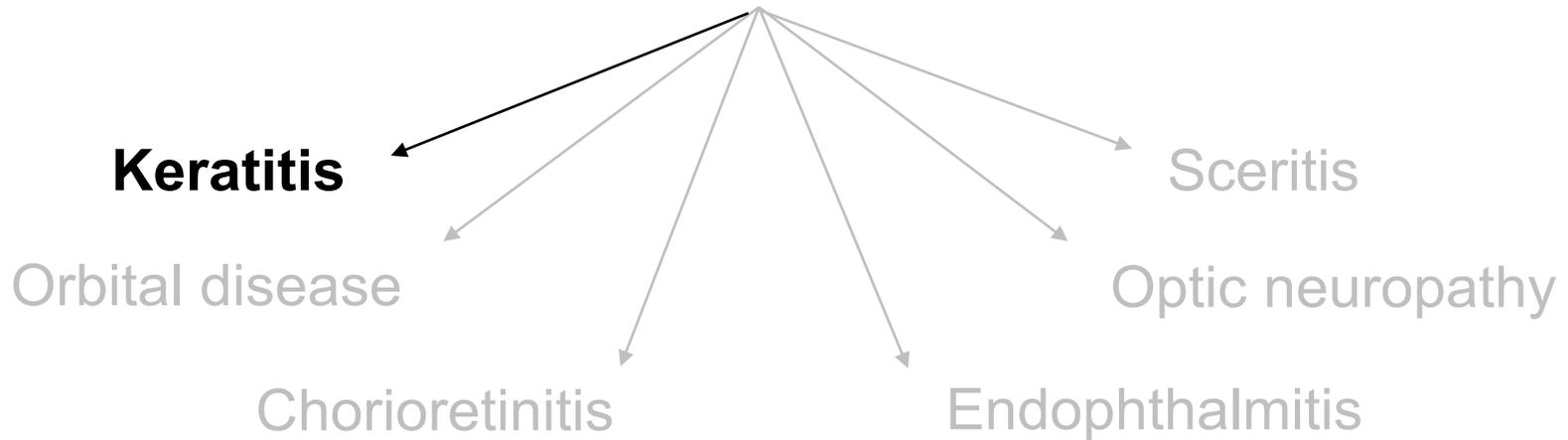


In terms of presentation, how does fungal keratitis differ from bacterial?

Bacterial tends to be , whereas fungal tends to be



Fungal pathogenicic conditions

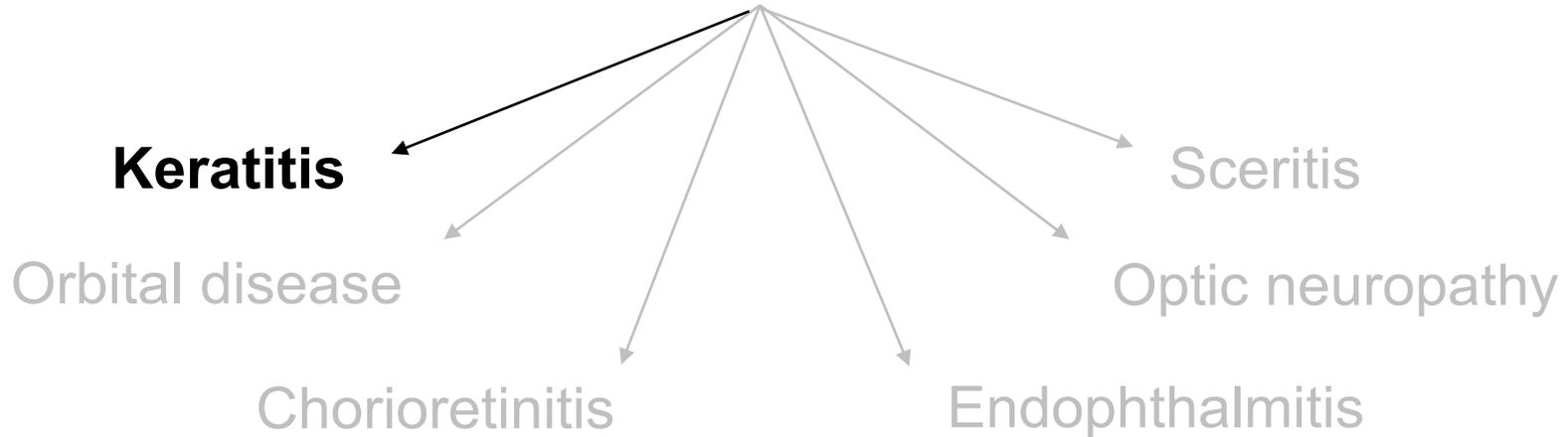


In terms of presentation, how does fungal keratitis differ from bacterial?
Bacterial tends to be fulminant , whereas fungal tends to be insidious

Common Ocular Fungal Pathogens



Fungal pathogenic conditions

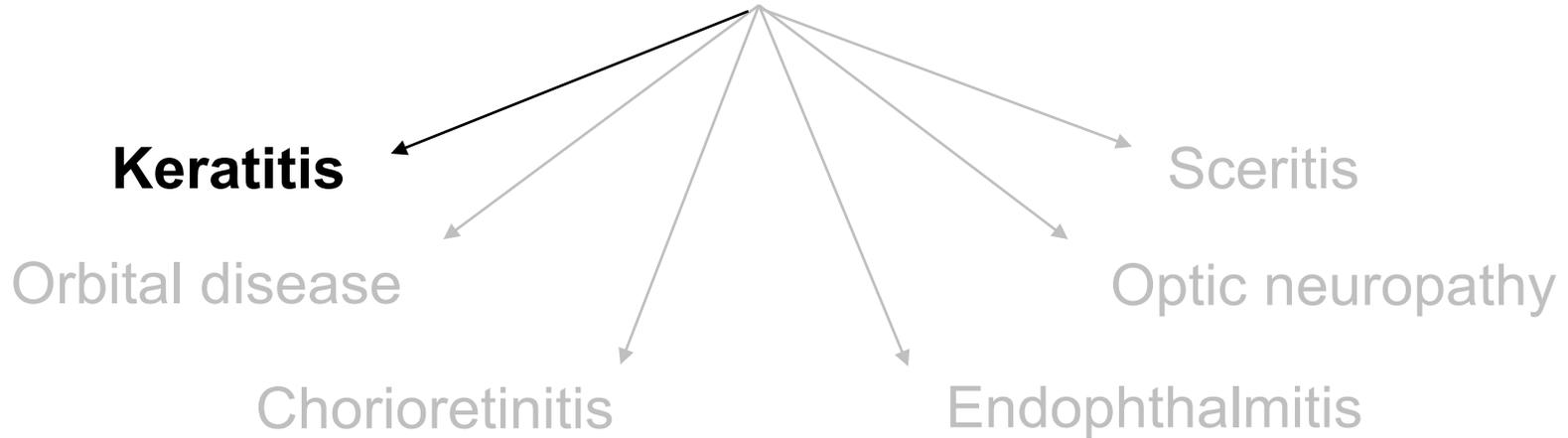


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With respect to keratitis, fungi have a capacity that renders them arguably more dangerous than bacteria—what is it?



Fungal pathogenicic conditions



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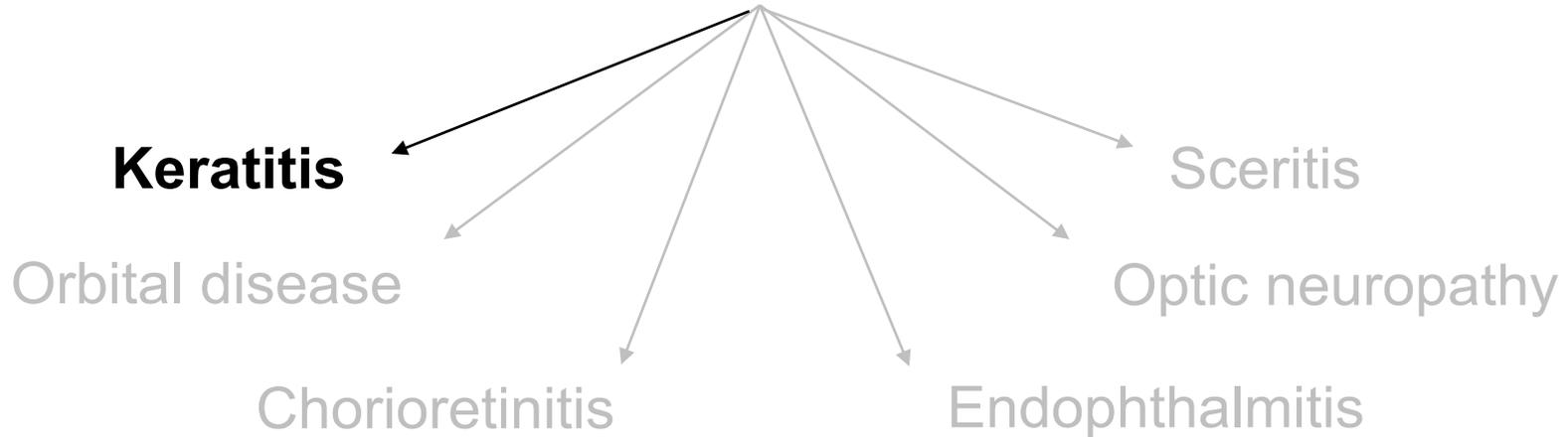
With respect to keratitis, fungi have a capacity that renders them arguably more dangerous than bacteria—what is it?

Unlike (most) bacteria, fungi can breach Descemet's to enter the AC

Common Ocular Fungal Pathogens



Fungal pathogenic conditions



*There are three main risk factors for fungal keratitis—
what are they?*

--?

--?

--?

How do fungal keratitis differ from bacterial?

Fungal keratitis tends to be insidious

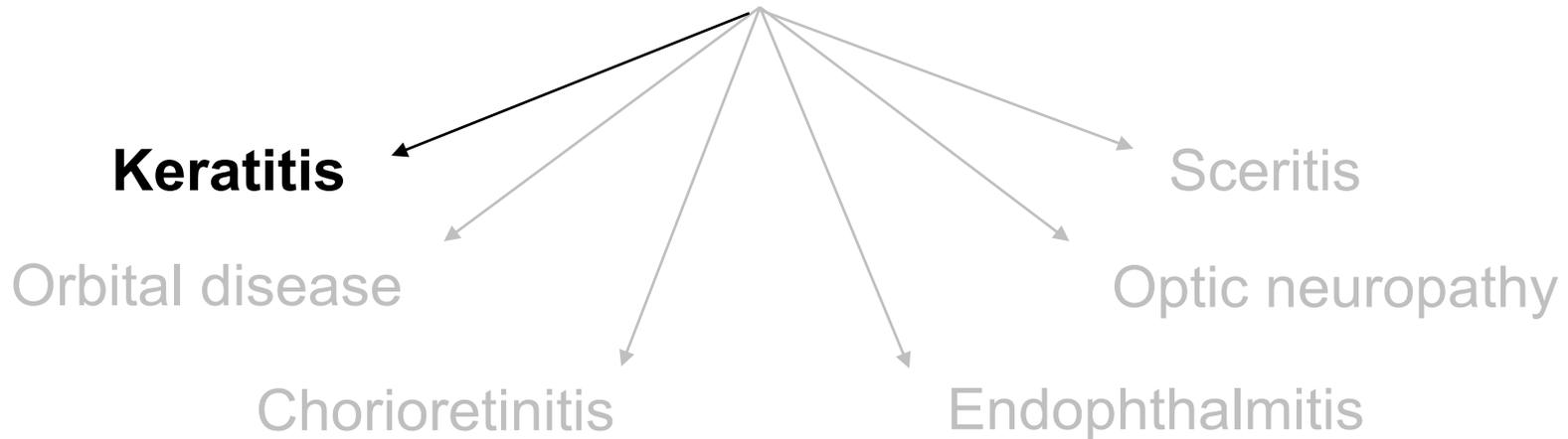
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Common Ocular Fungal Pathogens



Fungal pathogenic conditions



There are three main risk factors for fungal keratitis—what are they?

--Trauma, especially involving

two words

--?

--?

How do fungal keratitis differ from bacterial?

Fungal keratitis tends to be insidious

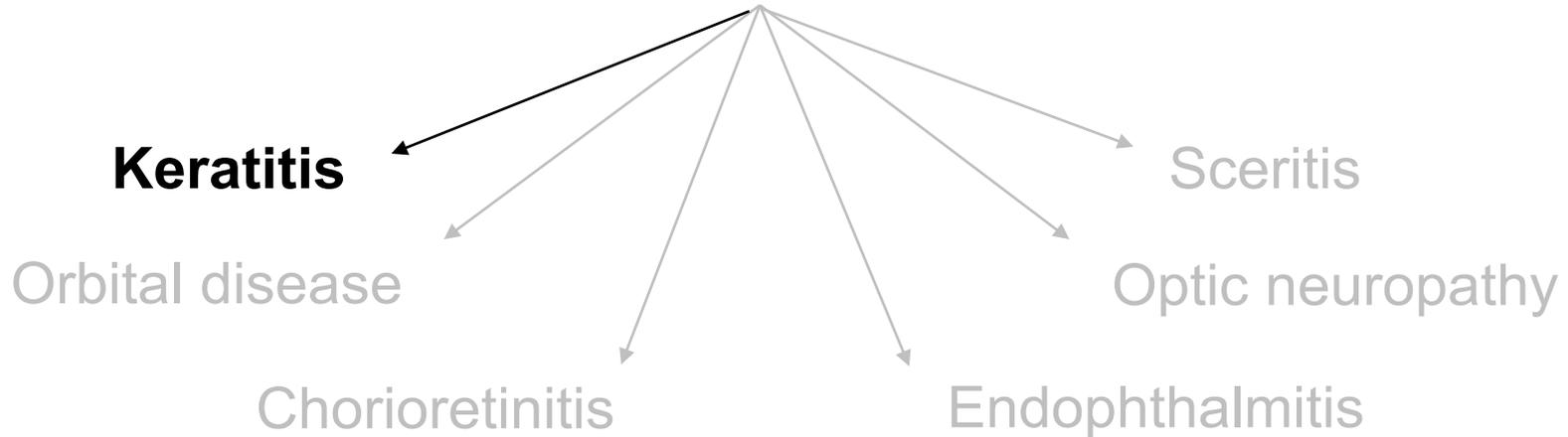
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Common Ocular Fungal Pathogens



Fungal pathogenic conditions



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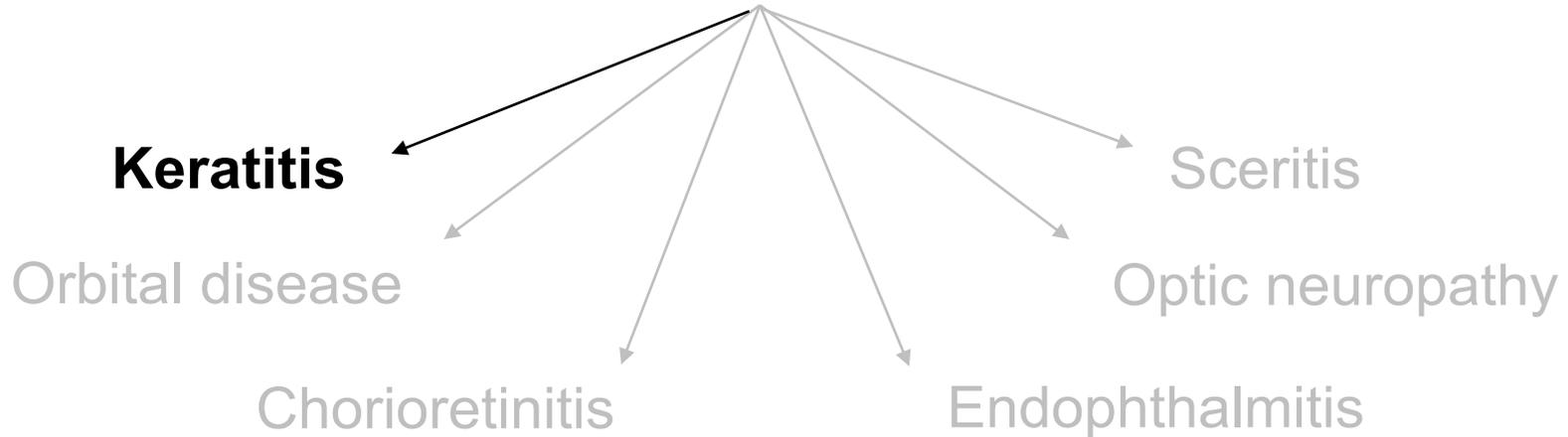
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Common Ocular Fungal Pathogens



Fungal pathogenic conditions



*There are three main risk factors for fungal keratitis—
what are they?*

--Trauma, especially involving vegetative matter

--Chronic eyedrop use

--?

How do fungal keratitis differ from bacterial?

Fungal tends to be insidious

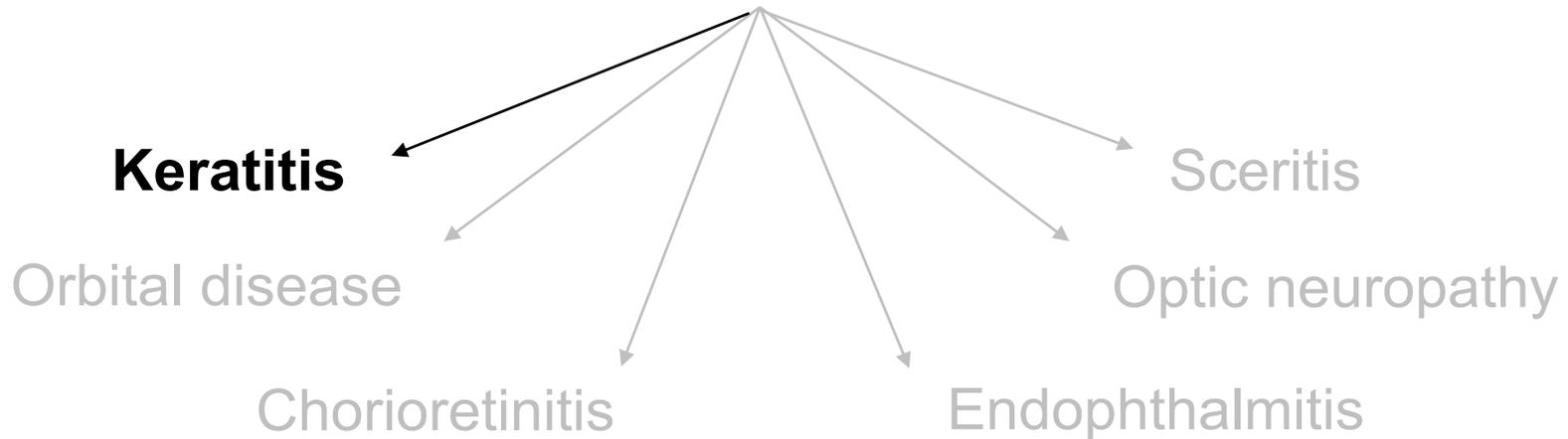
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Common Ocular Fungal Pathogens



Fungal pathogenic conditions



There are three main risk factors for fungal keratitis—what are they?

- Trauma, especially involving vegetative matter
- Chronic topical steroid use
- ?

How do fungal keratitis differ from bacterial?

Fungal tends to be insidious

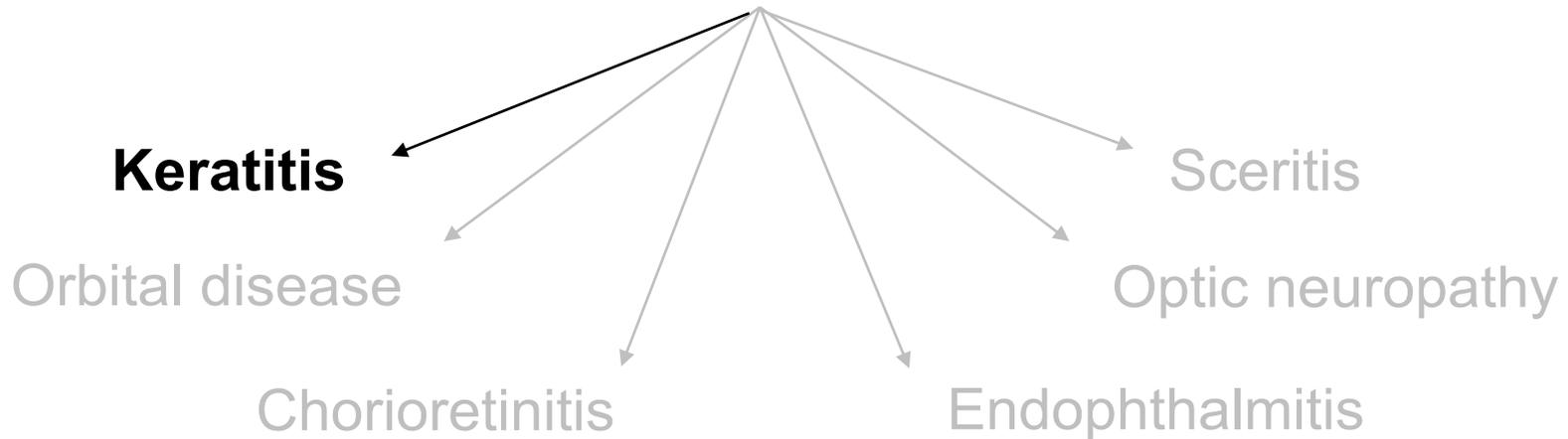
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Common Ocular Fungal Pathogens



Fungal pathogenic conditions



There are three main risk factors for fungal keratitis—what are they?

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Fungal tends to be insidious

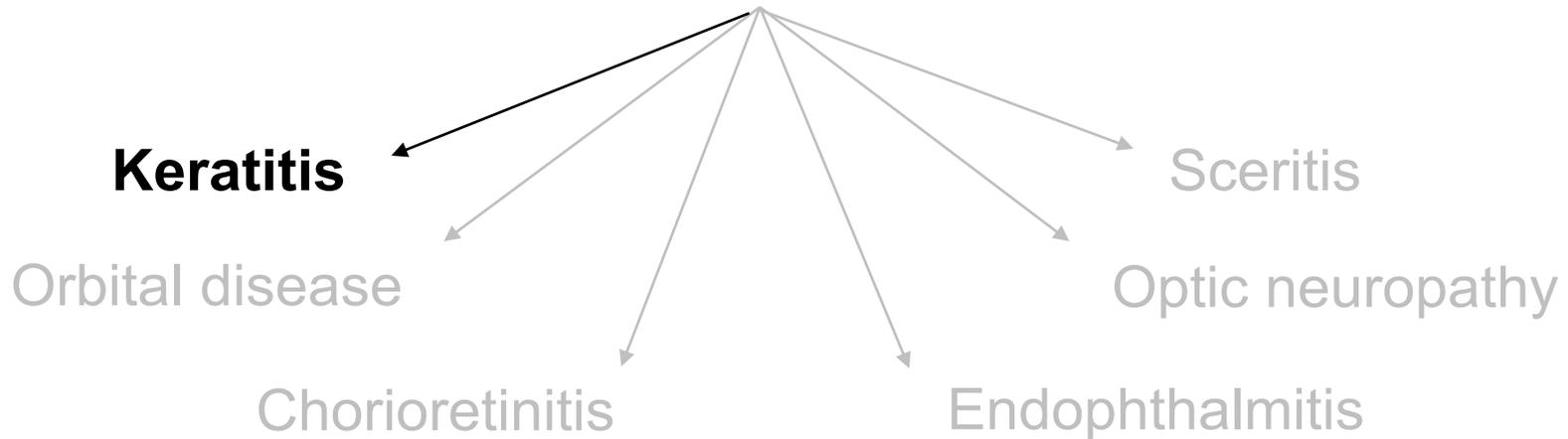
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Common Ocular Fungal Pathogens



Fungal pathogenic conditions



There are three main risk factors for fungal keratitis—what are they?

- Trauma, especially involving vegetative matter
- Chronic topical steroid use
- Contact lens wear

How do fungal keratitis differ from bacterial?

Fungal tends to be insidious

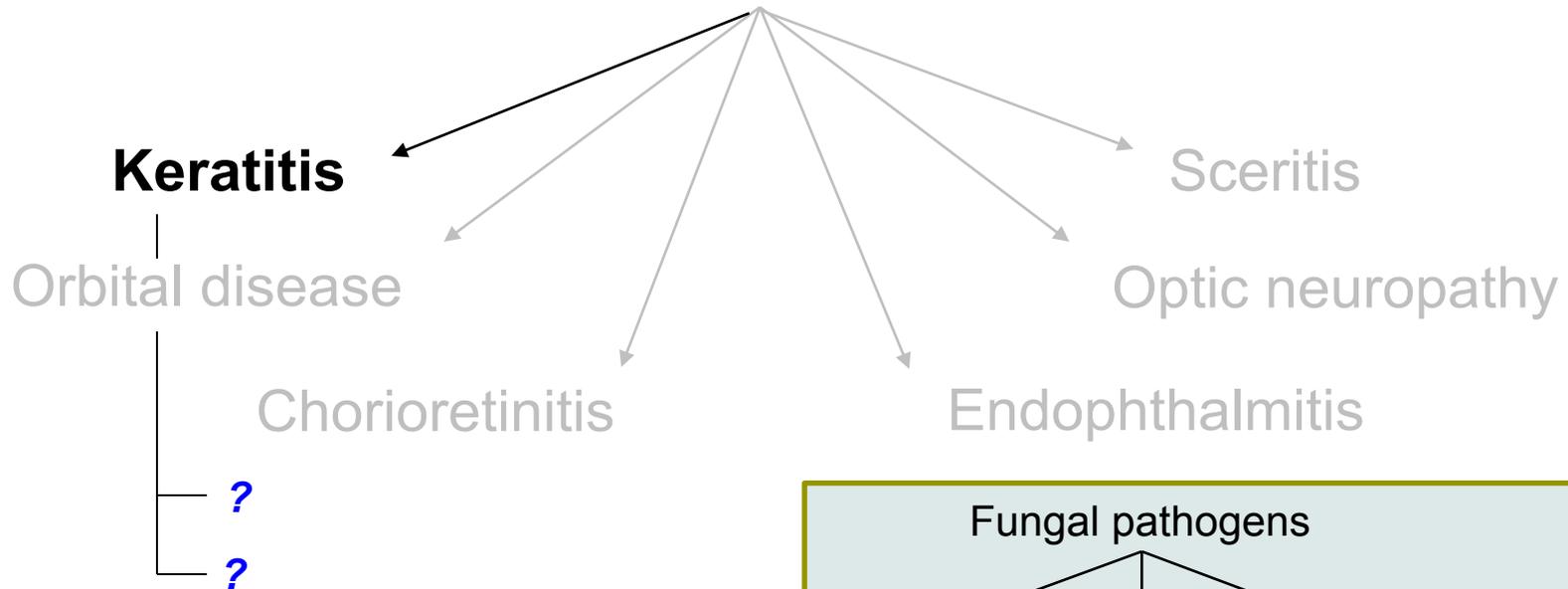
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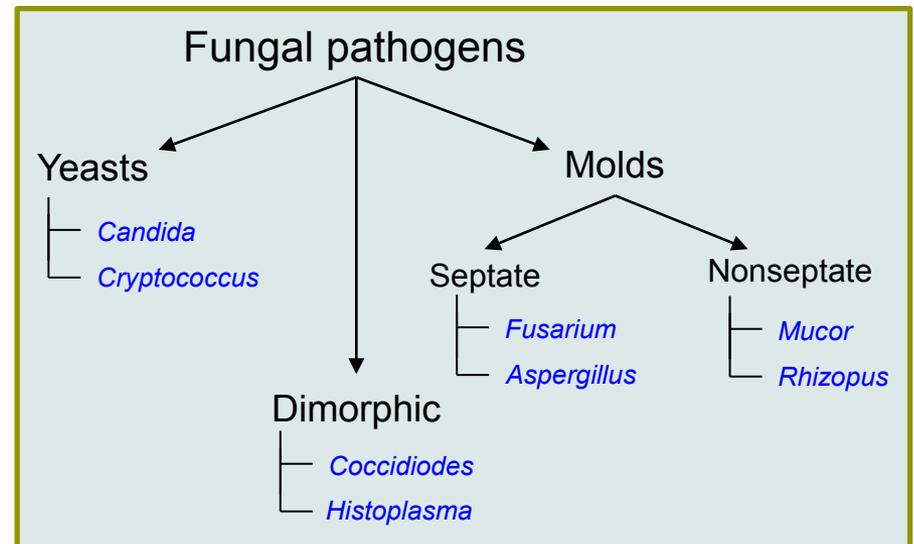
Common Ocular Fungal Pathogens



Fungal pathogenic conditions



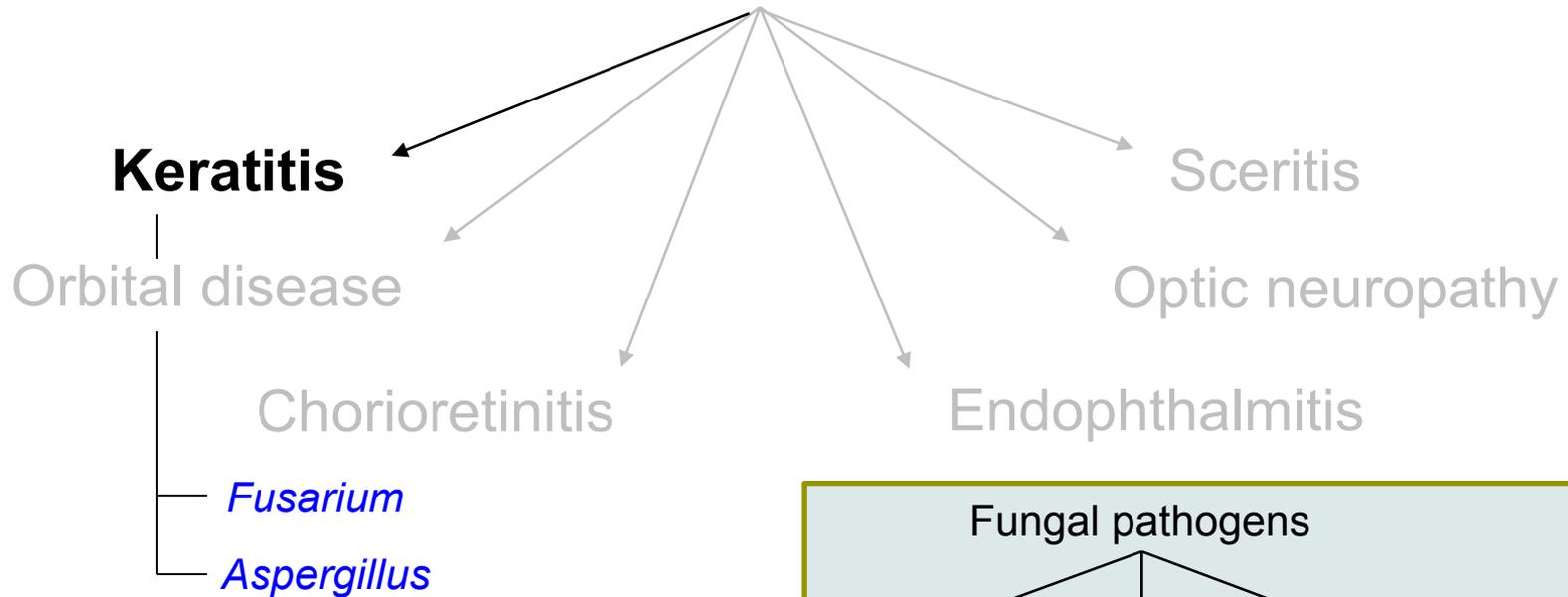
Which two species are responsible for the vast majority of fungal keratitis cases?



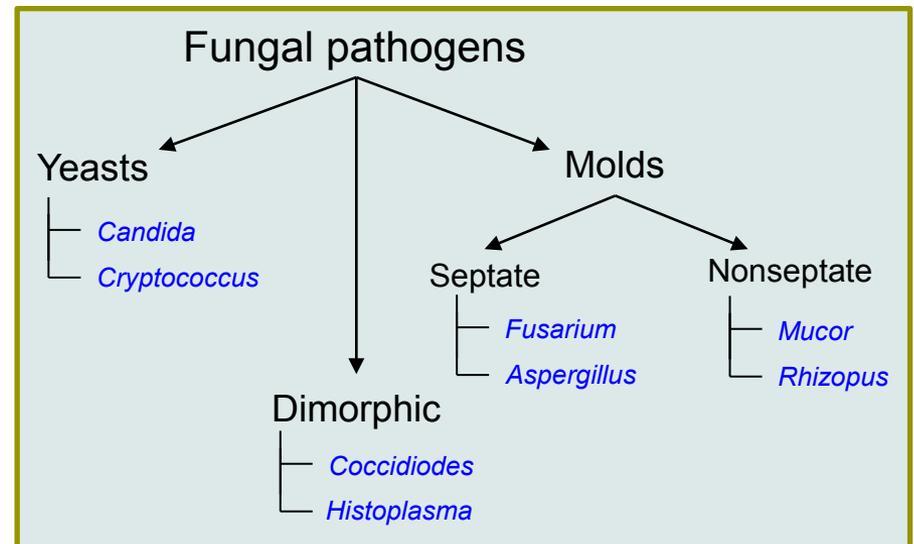
Common Ocular Fungal Pathogens



Fungal pathogenic conditions



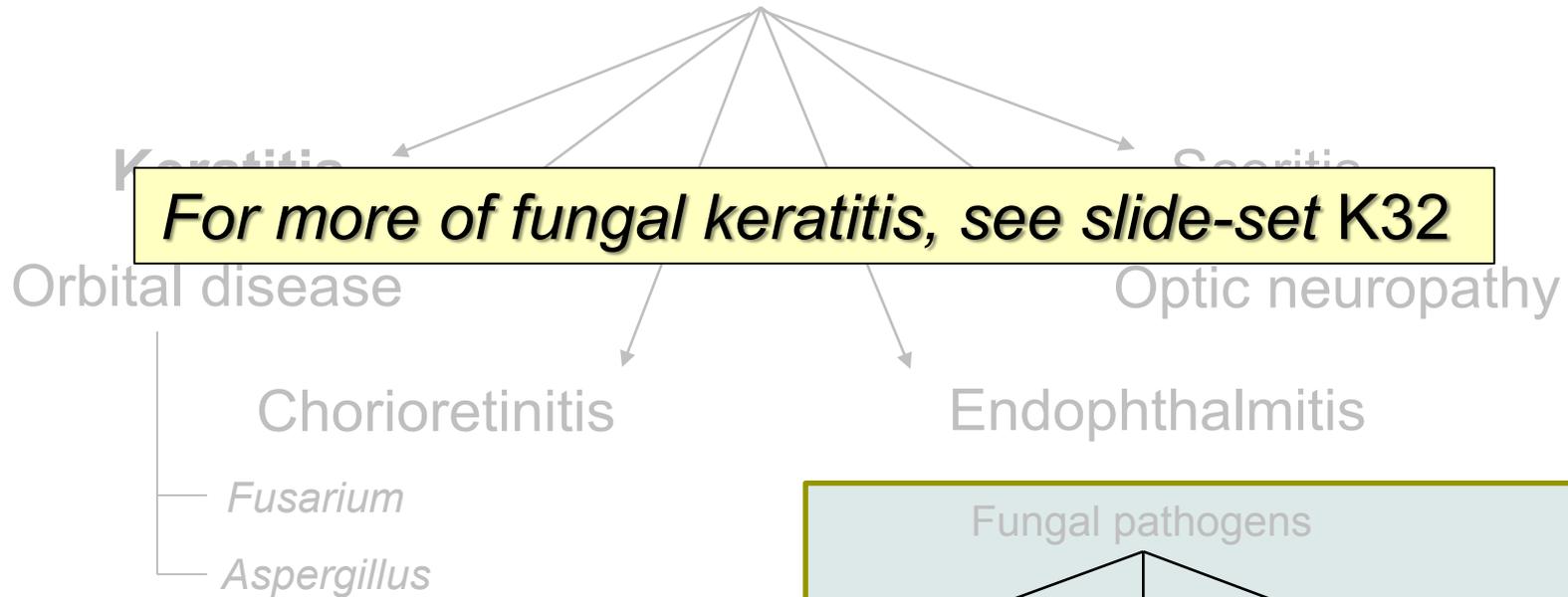
Which two species are responsible for the vast majority of fungal keratitis cases?
The septated molds—*Aspergillus* and (especially) *Fusarium*



Common Ocular Fungal Pathogens

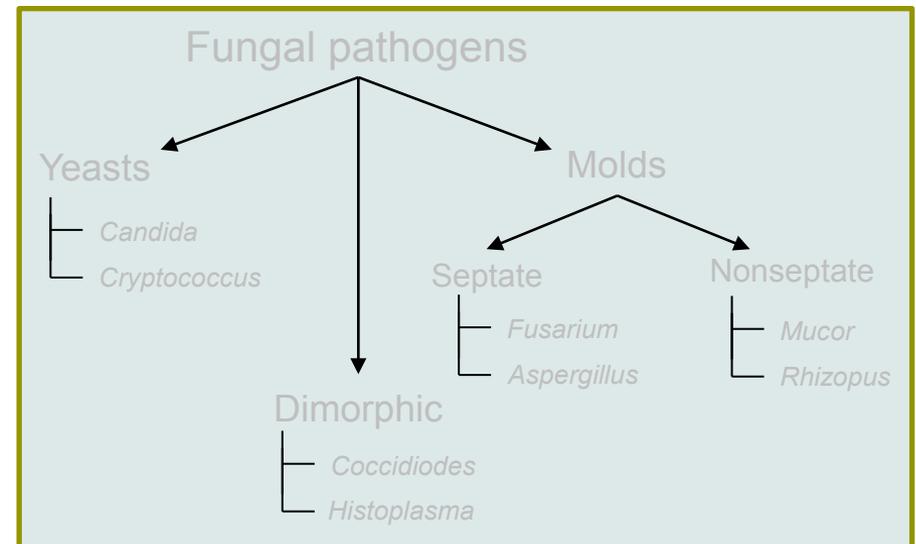


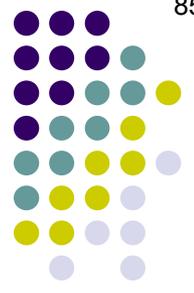
Fungal pathogenic conditions



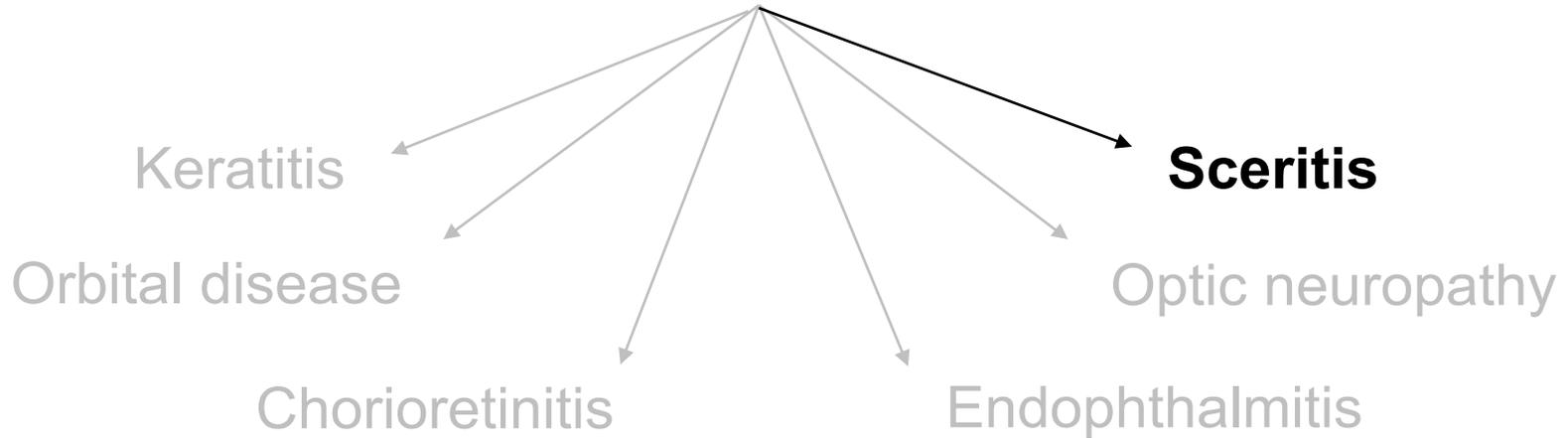
For more of fungal keratitis, see slide-set K32

Which two species are responsible for the vast majority of fungal keratitis cases?
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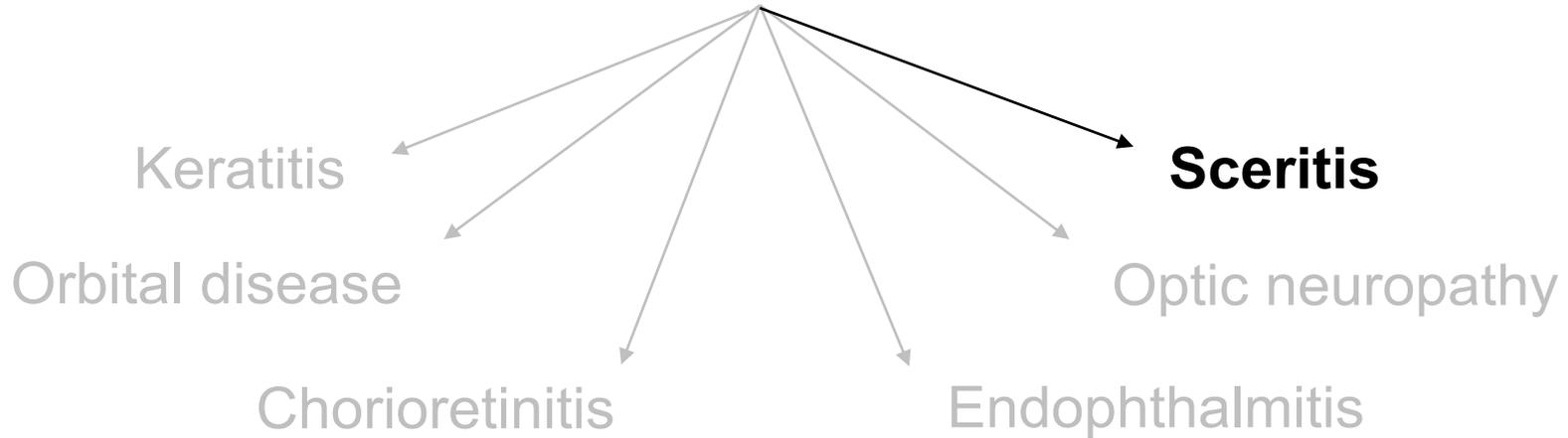
Fungal pathogenicic conditions



Is fungal scleritis common, or rare?



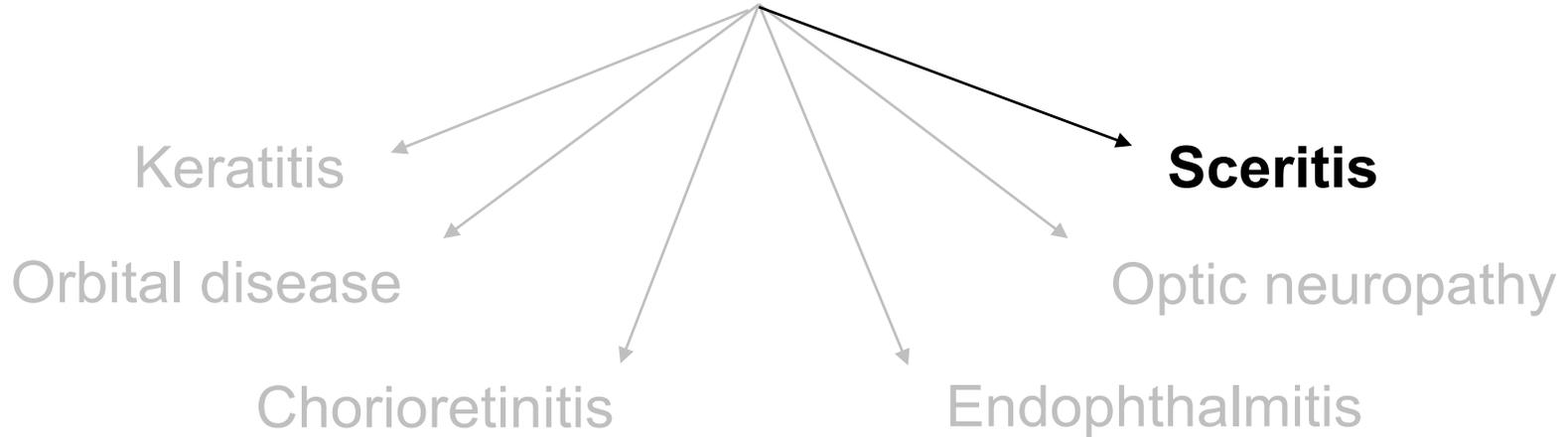
Fungal pathogenic **ic conditions**



Is fungal scleritis common, or rare?
It is very rare



Fungal pathogenic **ic conditions**

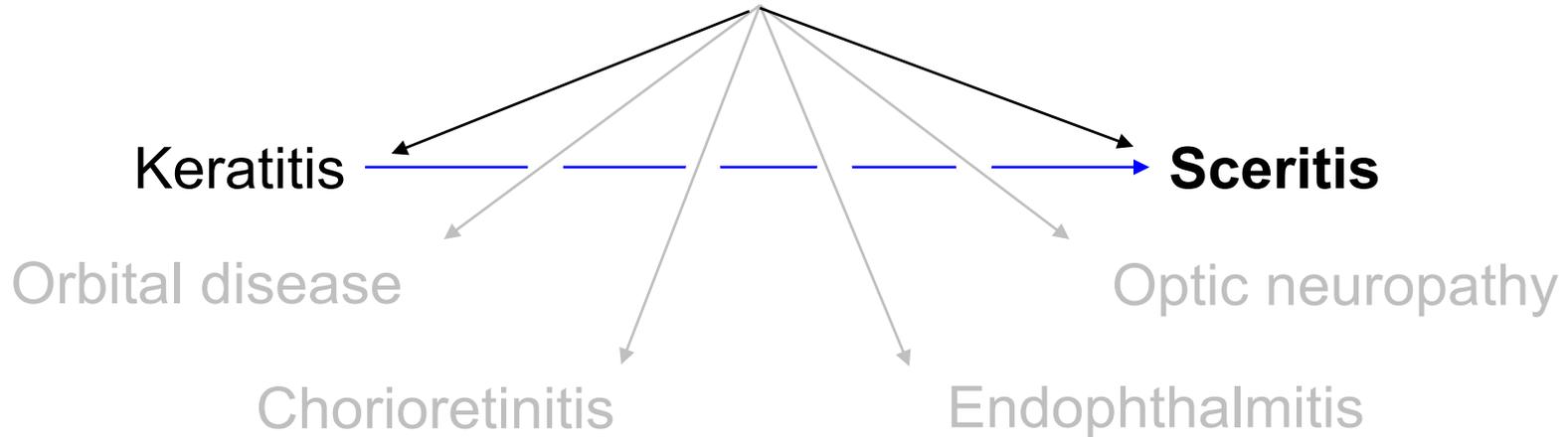


Is fungal scleritis common, or rare?
It is very rare

How do most cases of fungal scleritis start?



Fungal pathogenicic conditions



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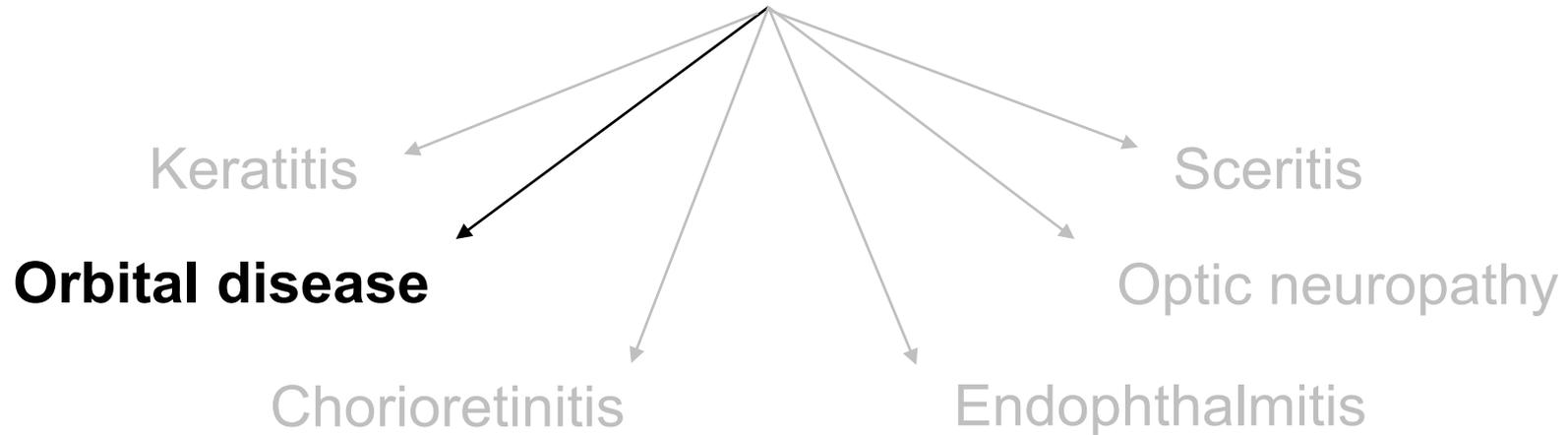
How do most cases of fungal scleritis start?

As a keratitis that crosses the limbus

Common Ocular Fungal Pathogens



Fungal pathogenic conditions

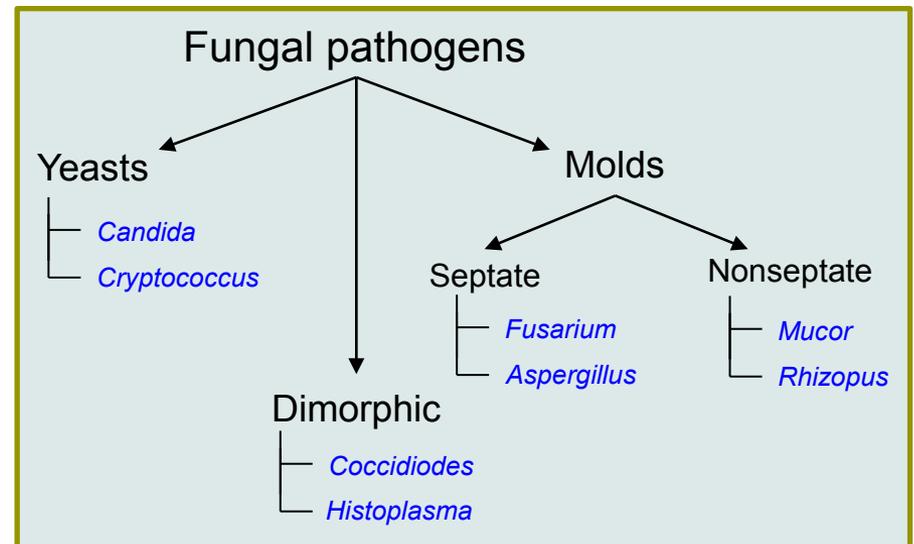


Three fungi cause orbital disease—
which ones?

--?

--?

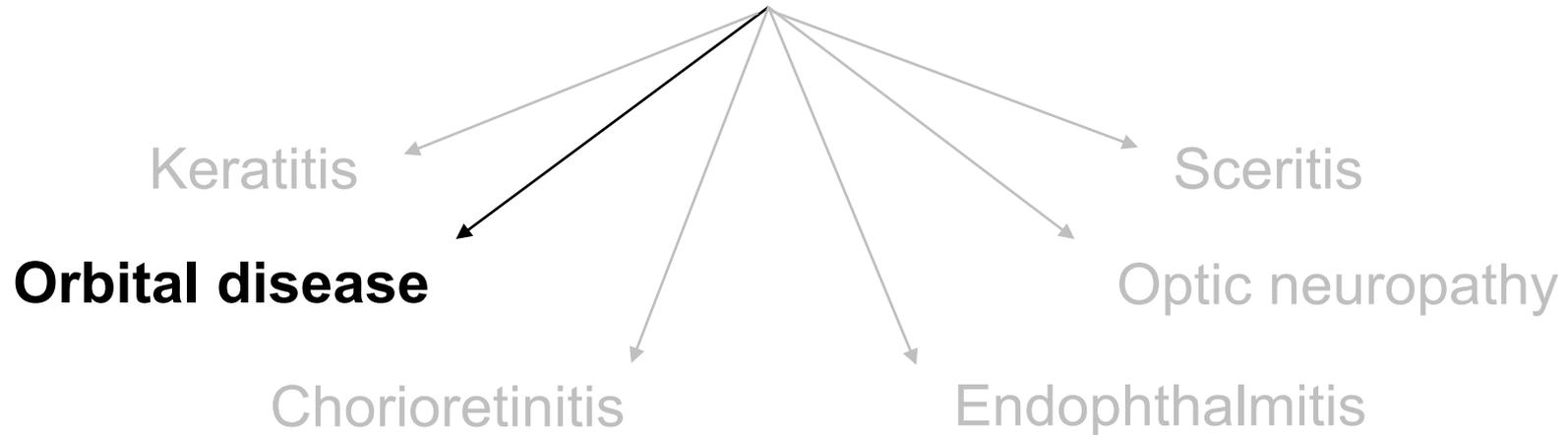
--?



Common Ocular Fungal Pathogens



Fungal pathogenic conditions

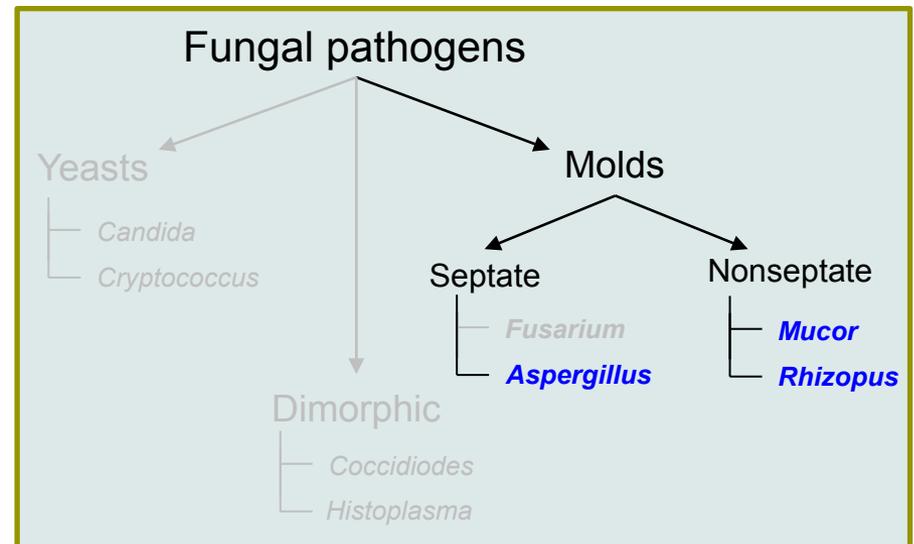


Three fungi cause orbital disease—
which ones?

--*Aspergillus*

--*Mucor*

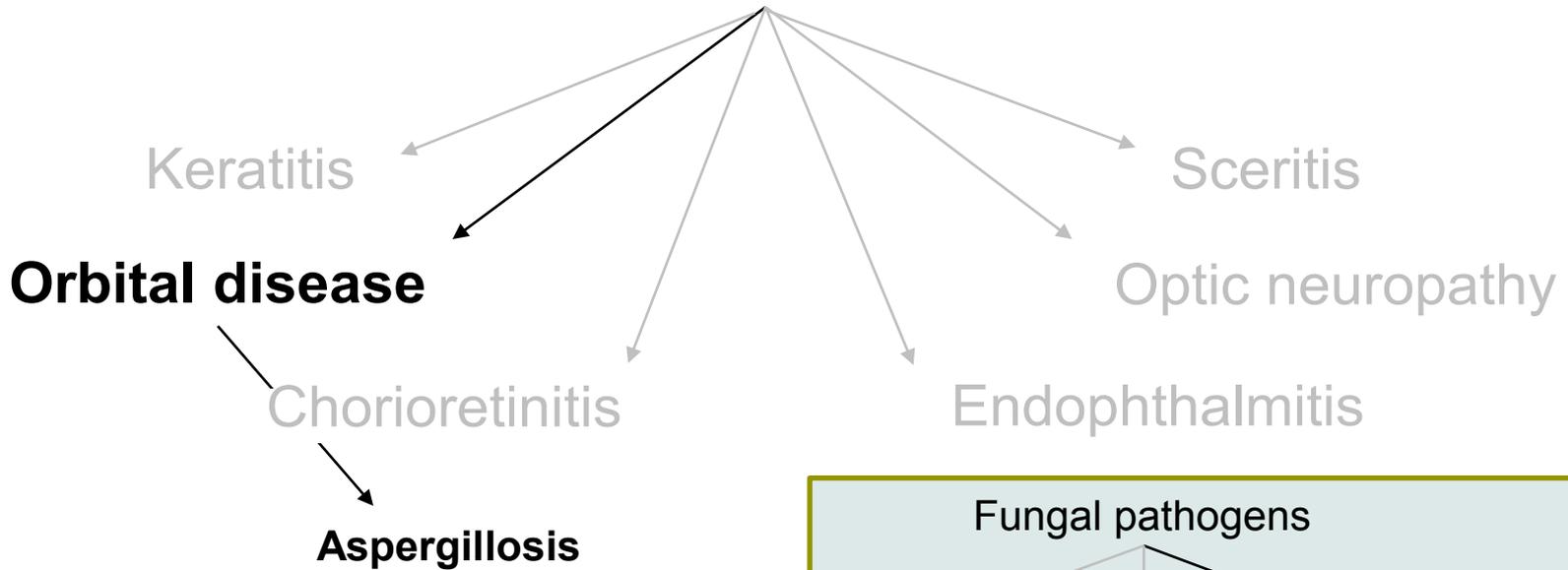
--*Rhizopus*



Common Ocular Fungal Pathogens



Fungal pathogenic conditions

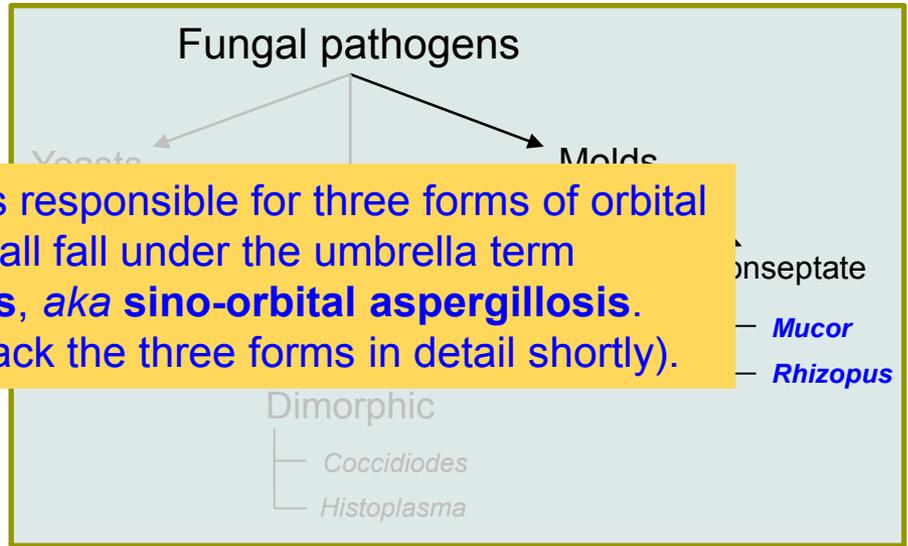


Three fungi cause orbital disease which ones?

- Aspergillus**
- Mucor*
- Rhizopus*



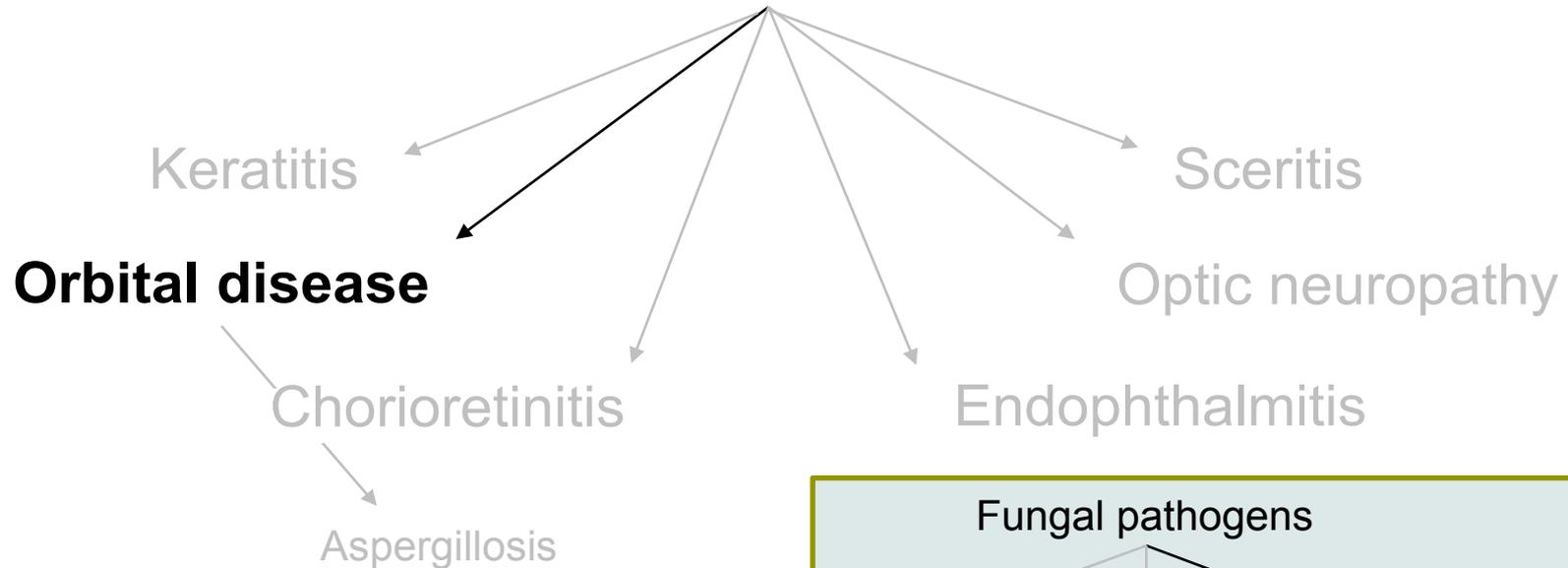
Aspergillus is responsible for three forms of orbital disease that all fall under the umbrella term **aspergillosis, aka sino-orbital aspergillosis**. (We will unpack the three forms in detail shortly).



Common Ocular Fungal Pathogens



Fungal pathogenic conditions



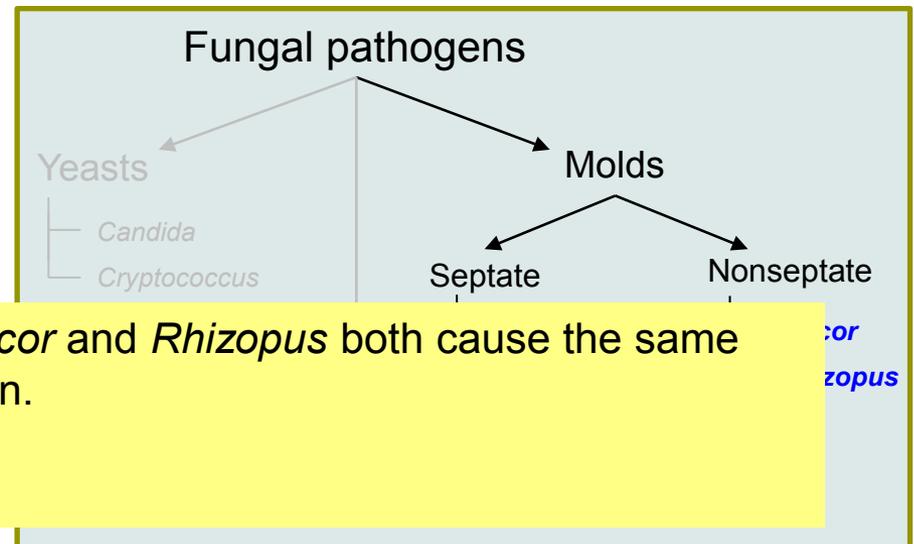
Three fungi cause orbital disease—
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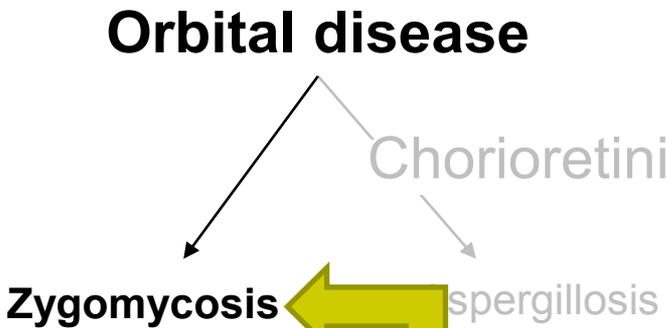
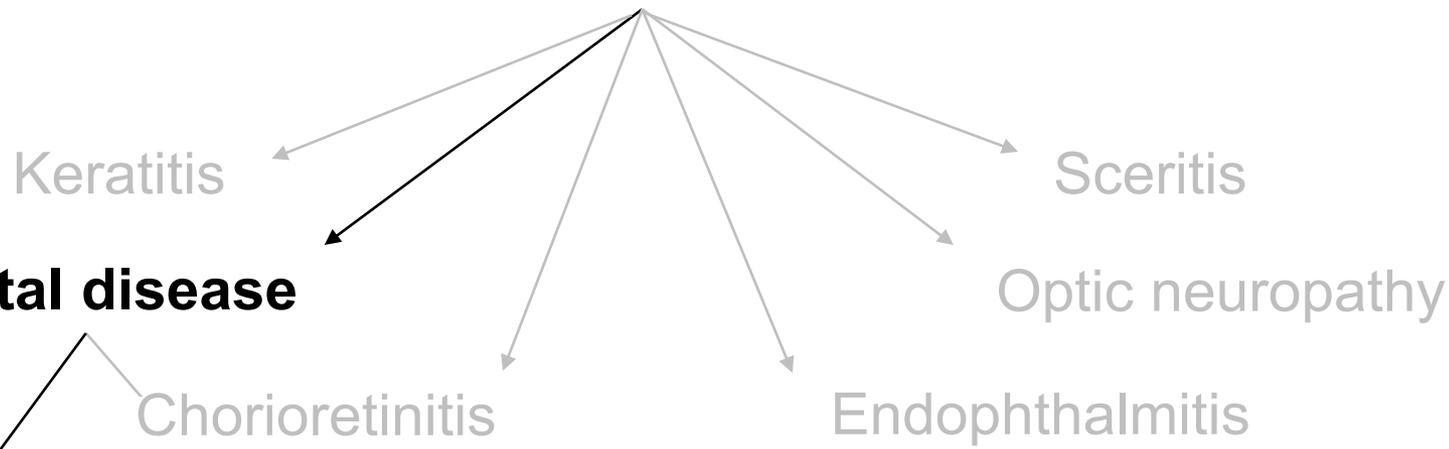
In contrast, *Mucor* and *Rhizopus* both cause the same clinical condition.



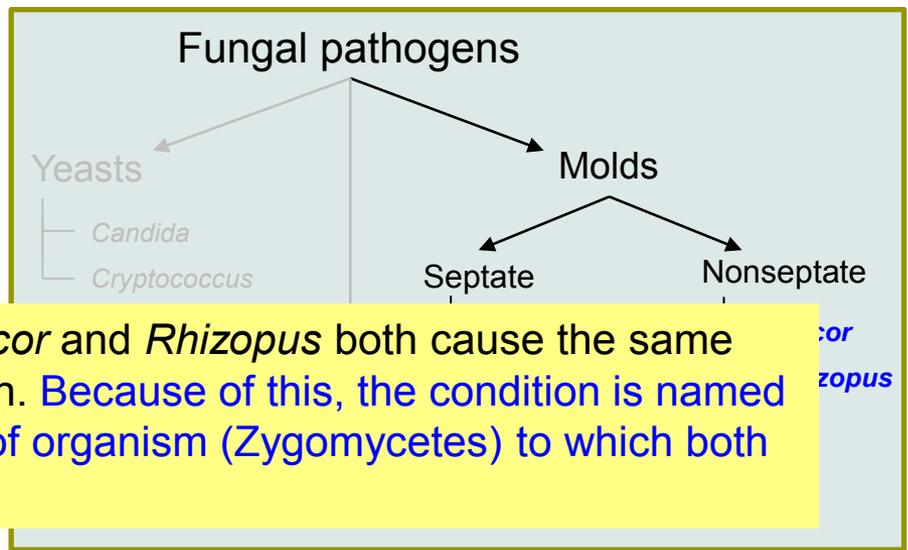


Common Ocular Fungal Pathogens

Fungal pathogenic conditions



Three fungi cause orbital disease— which ones?
 --*Aspergillus*
 --***Mucor***
 --***Rhizopus*** } Zygomycetes



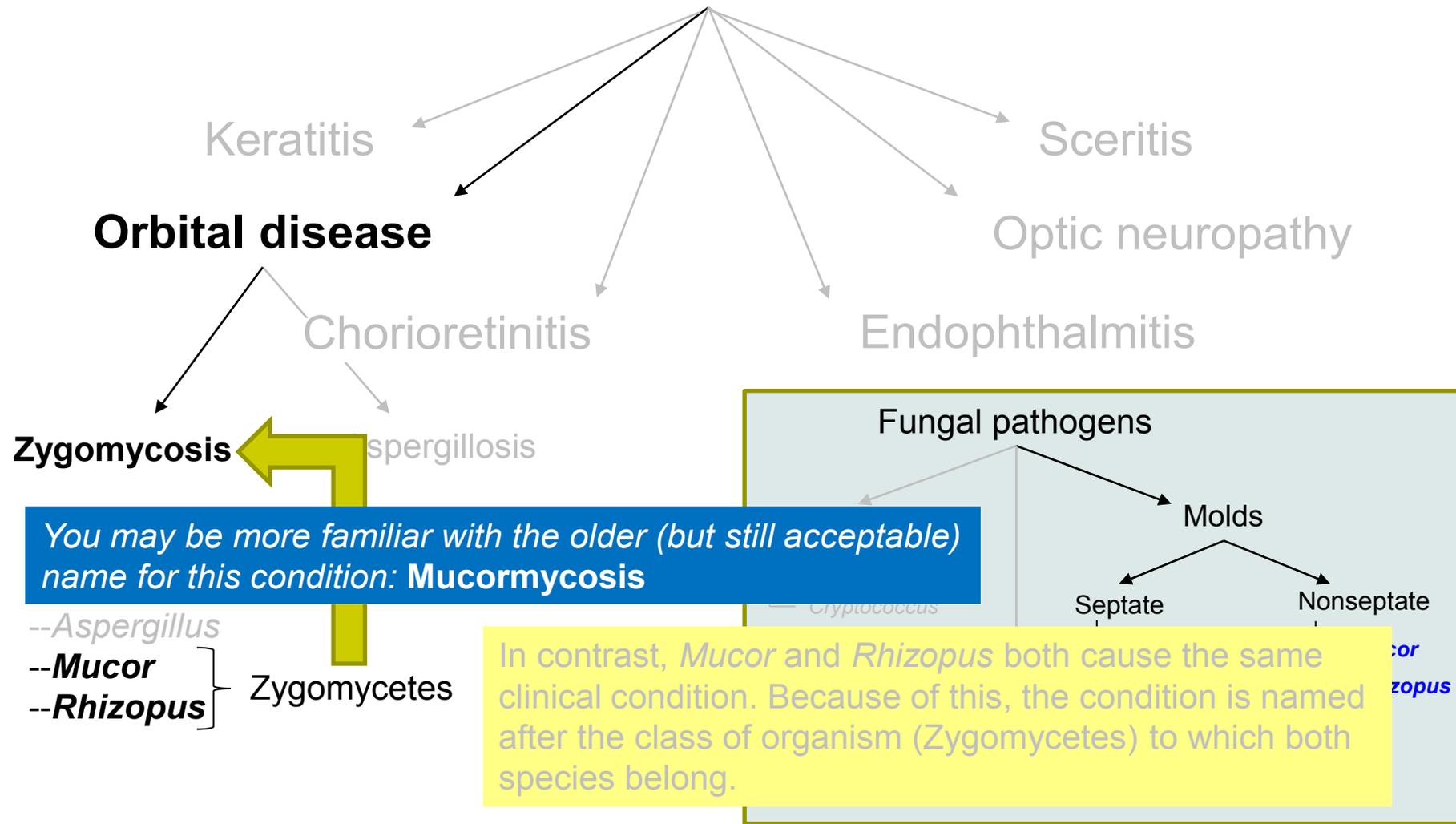
In contrast, *Mucor* and *Rhizopus* both cause the same clinical condition. Because of this, the condition is named after the class of organism (Zygomycetes) to which both species belong.

Mucor
Rhizopus



Common Ocular Fungal Pathogens

Fungal pathogenic conditions



You may be more familiar with the older (but still acceptable) name for this condition: **Mucormycosis**

In contrast, *Mucor* and *Rhizopus* both cause the same clinical condition. Because of this, the condition is named after the class of organism (Zygomycetes) to which both species belong.

- Aspergillus*
 - Mucor***
 - Rhizopus***
- } Zygomycetes

Mucor
Rhizopus

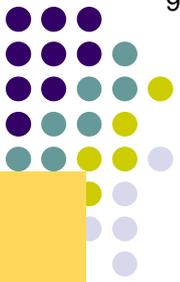
Common Ocular Fungal Pathogens



Among fungal causes of orbital dz, where does zygomycosis rank in terms of commonality?

Zygomycosis

Common Ocular Fungal Pathogens



Among fungal causes of orbital dz, where does zygomycosis rank in terms of commonality?
It is the most common

Zygomycosis

Common Ocular Fungal Pathogens



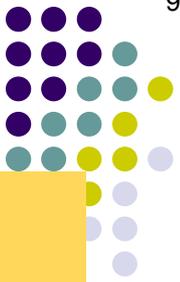
Among fungal causes of orbital dz, where does zygomycosis rank in terms of commonality?

It is the most common

Among fungal causes of orbital dz, where does zygomycosis rank in terms of virulence?

Zygomycosis

Common Ocular Fungal Pathogens



Among fungal causes of orbital dz, where does zygomycosis rank in terms of commonality?

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Among fungal causes of orbital dz, where does zygomycosis rank in terms of virulence?

It is the most virulent

Zygomycosis

Common Ocular Fungal Pathogens



Among fungal causes of orbital dz, where does zygomycosis rank in terms of commonality?

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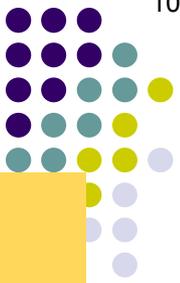
Among fungal causes of orbital dz, where does zygomycosis rank in terms of virulence?

It is the **most virulent**

So, these are highly virulent pathogens?

Zygomycosis

Common Ocular Fungal Pathogens



Among fungal causes of orbital dz, where does zygomycosis rank in terms of commonality?

It is the most common

Among fungal causes of orbital dz, where does zygomycosis rank in terms of virulence?

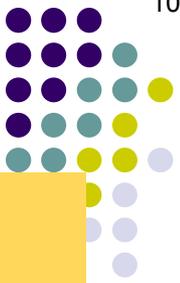
It is the **most virulent**

So, these are highly virulent pathogens?

Actually no—they are ubiquitous, and normally pose little or no threat

Zygomycosis

Common Ocular Fungal Pathogens



Among fungal causes of orbital dz, where does zygomycosis rank in terms of commonality?

It is the most common

Among fungal causes of orbital dz, where does zygomycosis rank in terms of virulence?

It is the **most virulent**

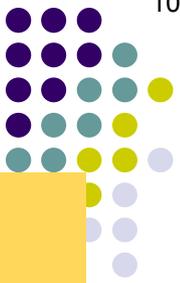
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Actually no—they are ubiquitous, and normally pose little or no threat

So then, under what circumstance are they highly virulent?

Zygomycosis

Common Ocular Fungal Pathogens



Among fungal causes of orbital dz, where does zygomycosis rank in terms of commonality?

It is the most common

Among fungal causes of orbital dz, where does zygomycosis rank in terms of virulence?

It is the **most virulent**

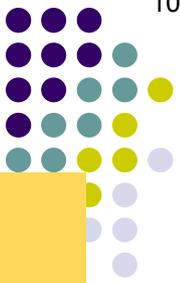
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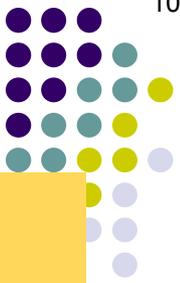
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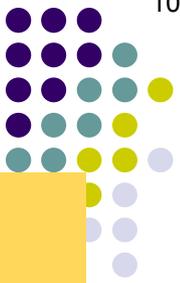
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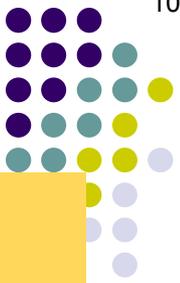
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--Malignancy

--Neutropenic pts

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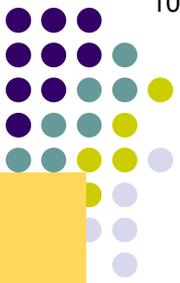
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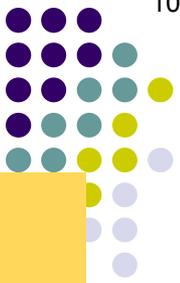
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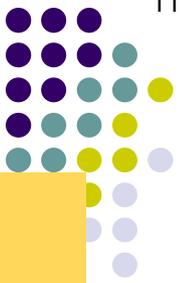
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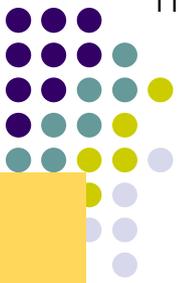
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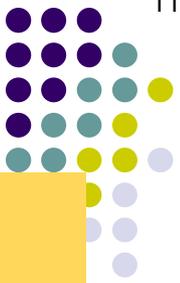
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Via direct extension of infection from an adjacent sinus

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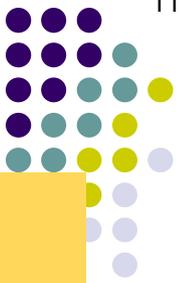
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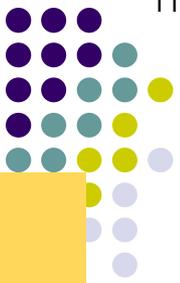
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Via fungemia

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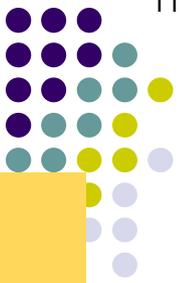
How does the organism get into the sinus?

Via fungemia

How does the organism get into the body in the first place?

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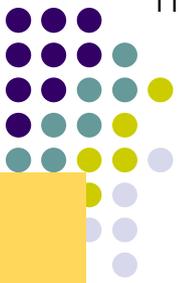
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The lungs, ie, inhalation

Zygomycosis

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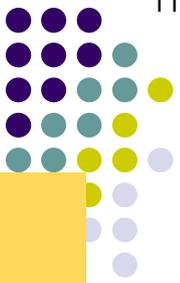
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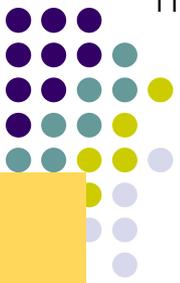
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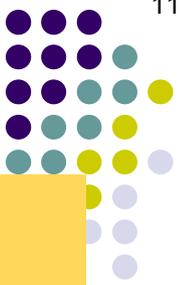
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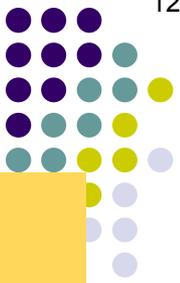
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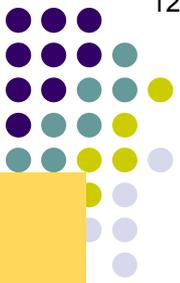
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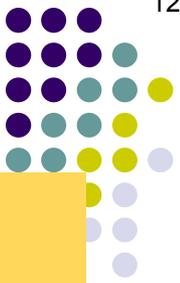
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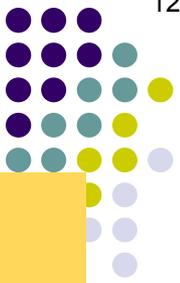
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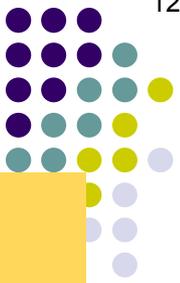
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two words

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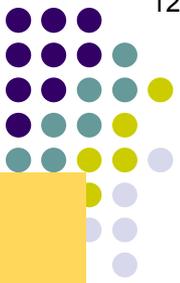
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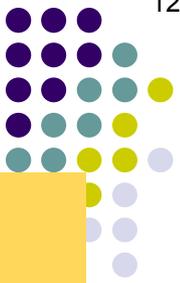
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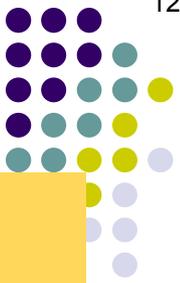
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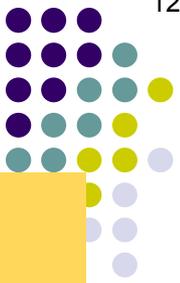
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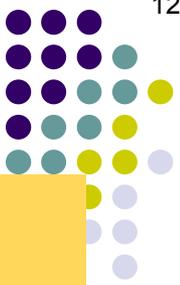
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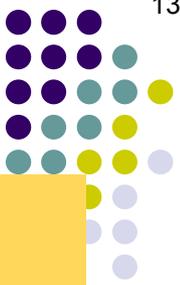
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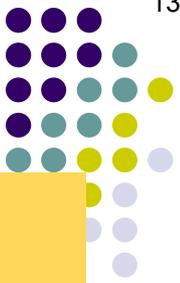
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If the 'right' vessels become thrombosed, the eye and orbit will be deceptively quiet in appearance, giving the impression that the process is milder than it actually is

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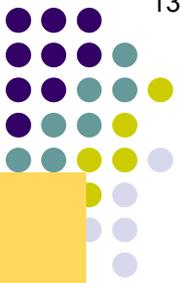
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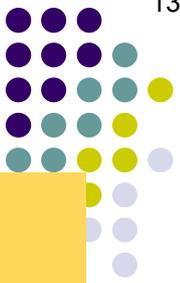
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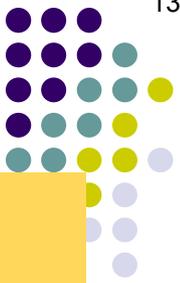
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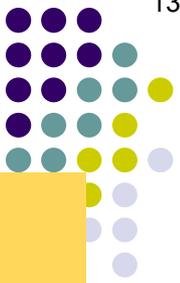
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Via direct extension of infection from an adjacent sinus

The organism has a strong predilection for a particular sort of anatomic structure—what is it?

Blood vessels. This is a key fact to remember about zygomycosis—all of the badness stems from derangements of blood flow.

How do these pts typically present?

With proptosis and **orbital apex syndrome**

Zygomycosis

What are the exam findings in orbital apex syndrome?

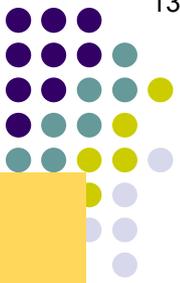
--Complete ptosis

--?

--?

--?

Common Ocular Fungal Pathogens



Among fungal causes of orbital dz, where does zygomycosis rank in terms of commonality?

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--?

--?

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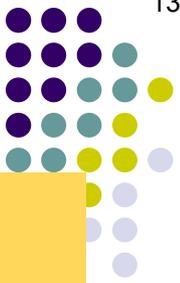
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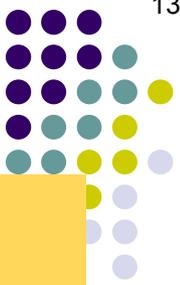
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-- *What is an external ophthalmoplegia?*

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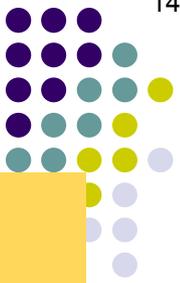
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-- *What is an external ophthalmoplegia?*

Paralysis of the extraocular muscles

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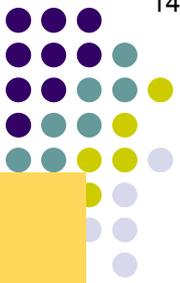
--**Ophthalmoplegia** (both **internal** and external)

--?

-- *What is an external ophthalmoplegia? **Internal?***

Paralysis of the extraocular muscles.

Common Ocular Fungal Pathogens



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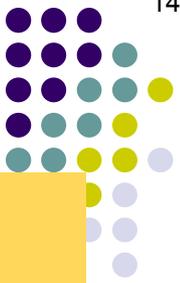
--**Ophthalmoplegia** (both **internal** and external)

--?

-- *What is an external ophthalmoplegia? Internal?*

Paralysis of the extraocular muscles. Paralysis of the muscles inside the eye, ie, the pupillary and ciliary muscles.

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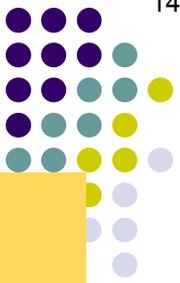
With proptosis and **orbital apex syndrome**

Zygomycosis

What are the exam findings in orbital apex syndrome?

- Complete ptosis
- Ophthalmoplegia (both internal and external)
- Corneal sensation is
- ?

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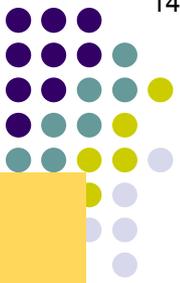
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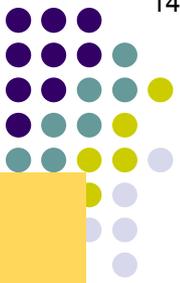
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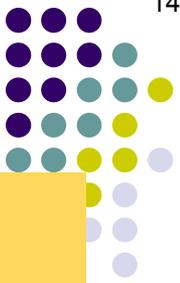
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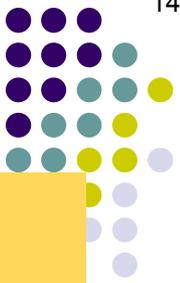
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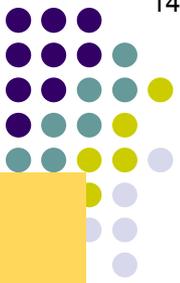
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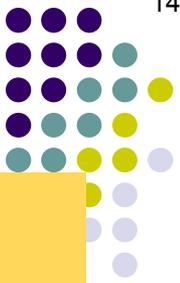
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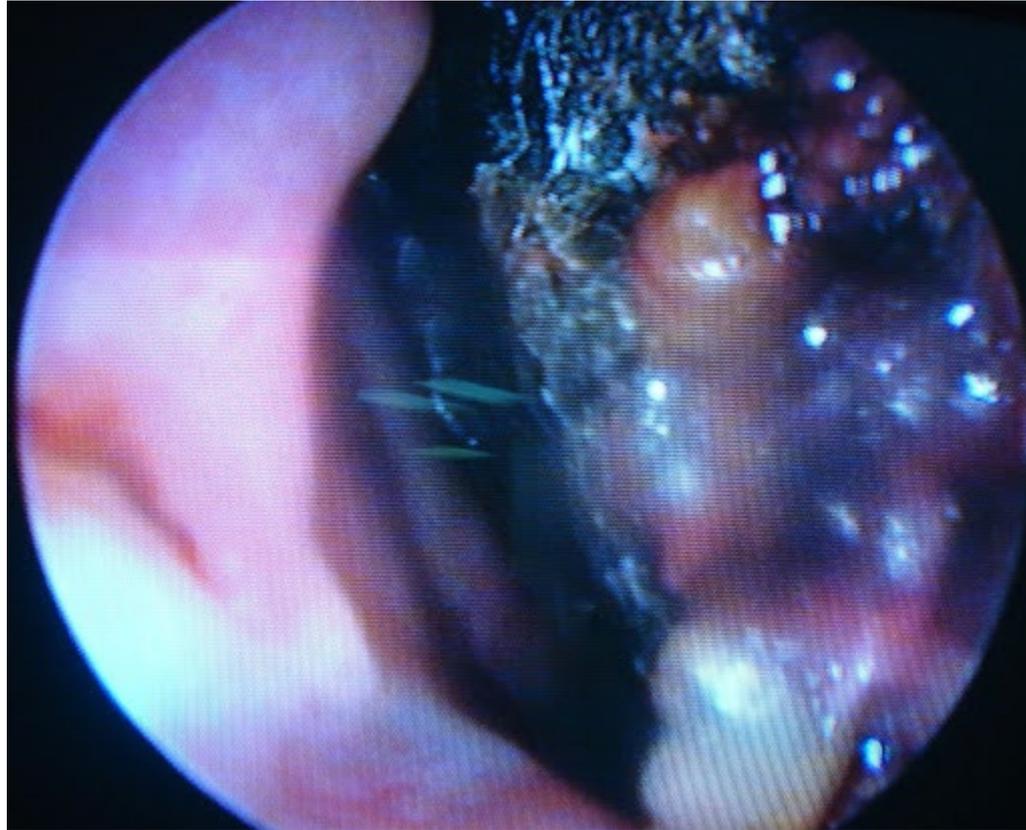
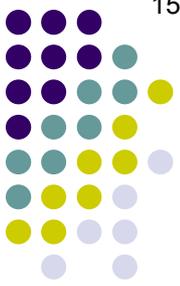
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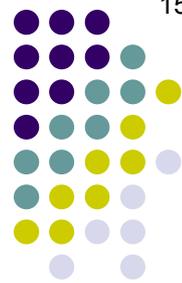
Spotting a black eschar on the nasopharyngeal mucosa. By biopsying the eschar and finding nonseptated hyphae on it.

Common Ocular Fungal Pathogens



Zygomycosis: Necrotic sinus tissue with eschar

Common Ocular Fungal Pathogens



A

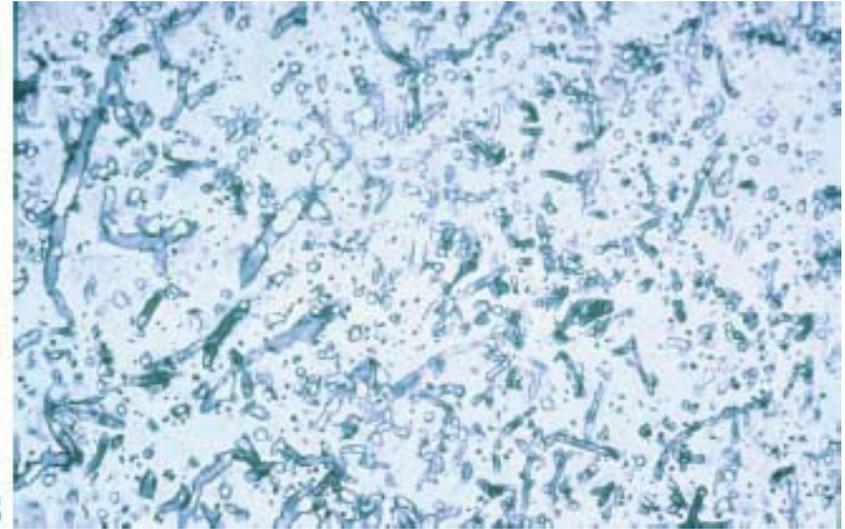
A, A patient with zygomyces eroding the hard palate

Zygomycosis

Common Ocular Fungal Pathogens



A

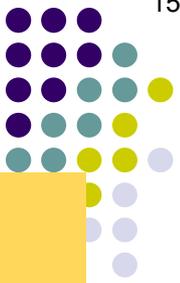


B

A, A patient with zygomycosis eroding the hard palate
B, Biopsy specimen demonstrates typical nonseptate hyphae

Zygomycosis

Common Ocular Fungal Pathogens



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How is zygomycosis managed?

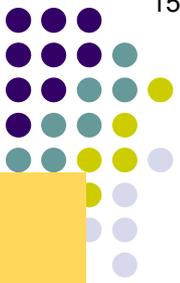
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--?

Three things have to happen...

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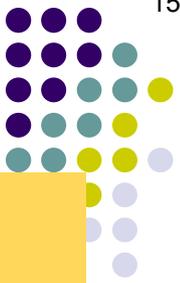
How is zygomycosis managed?

--? [what got the pt in this mess in the first place]

--?

--?

Common Ocular Fungal Pathogens



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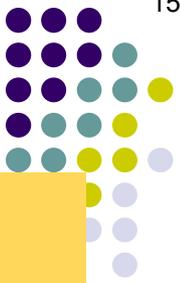
How is zygomycosis managed?

--The underlying debilitating condition **must** be reversed—get IM to resolve the DKA

--? [this surgical goal is pretty obvious]

--?

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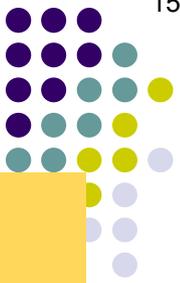
How is zygomycosis managed?

--The underlying debilitating condition **must** be reversed—get IM to resolve the DKA

--The infected tissue must be debrided—get ENT and Oculoplastics involved

--? *[this medical step is pretty obvious too]*

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--Get Ampho B on board

Common Ocular Fungal Pathogens



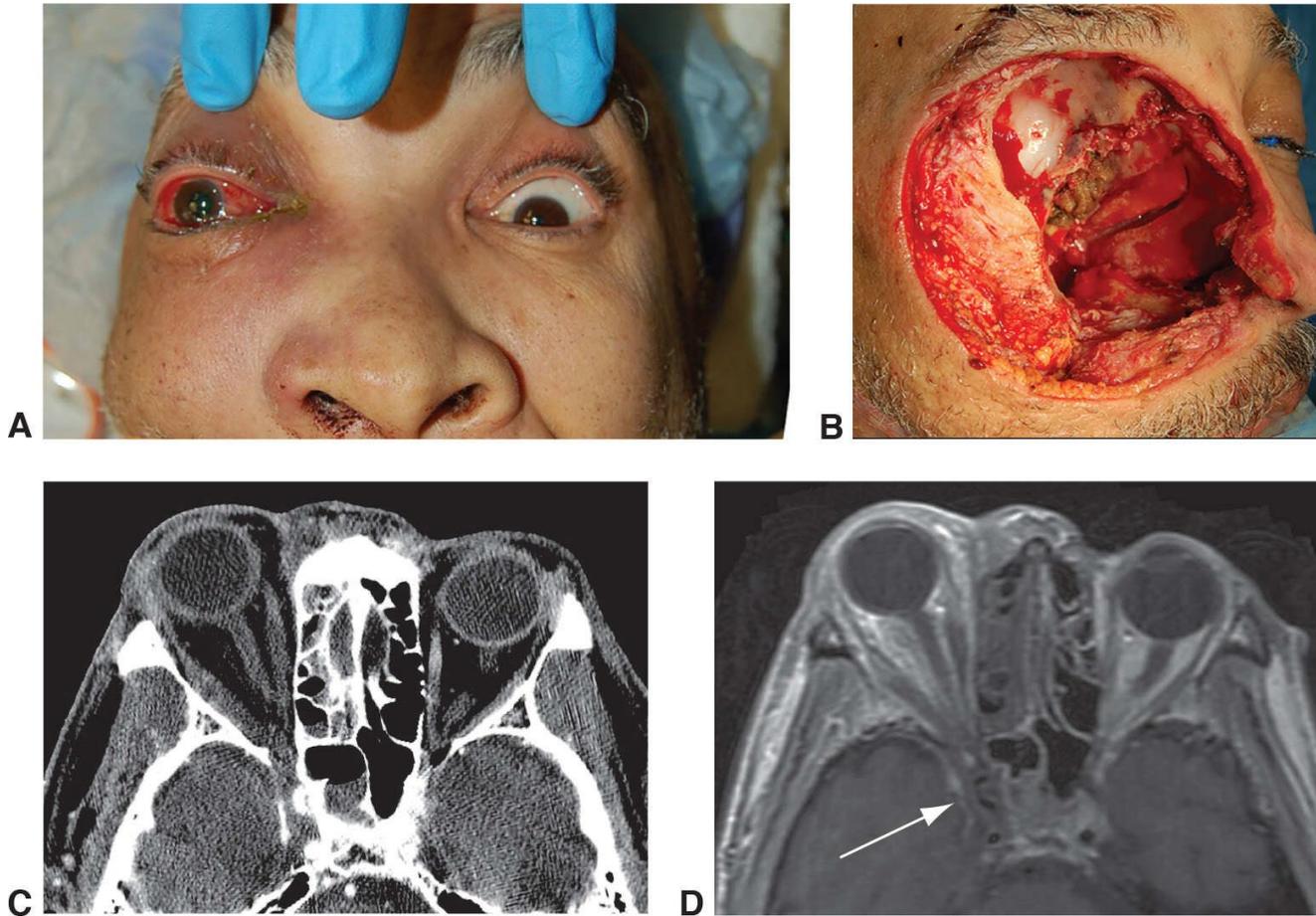
Zygomycosis in a patient with DKA. A, Complete right upper eyelid ptosis and ophthalmoplegia are present.

Common Ocular Fungal Pathogens



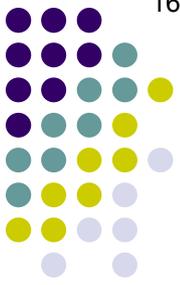
Zygomycosis in a patient with DKA. *A*, Complete right upper eyelid ptosis and ophthalmoplegia are present. *B*, Wide surgical debridement consisting of orbital exenteration and sinus surgery was life-saving.

Common Ocular Fungal Pathogens

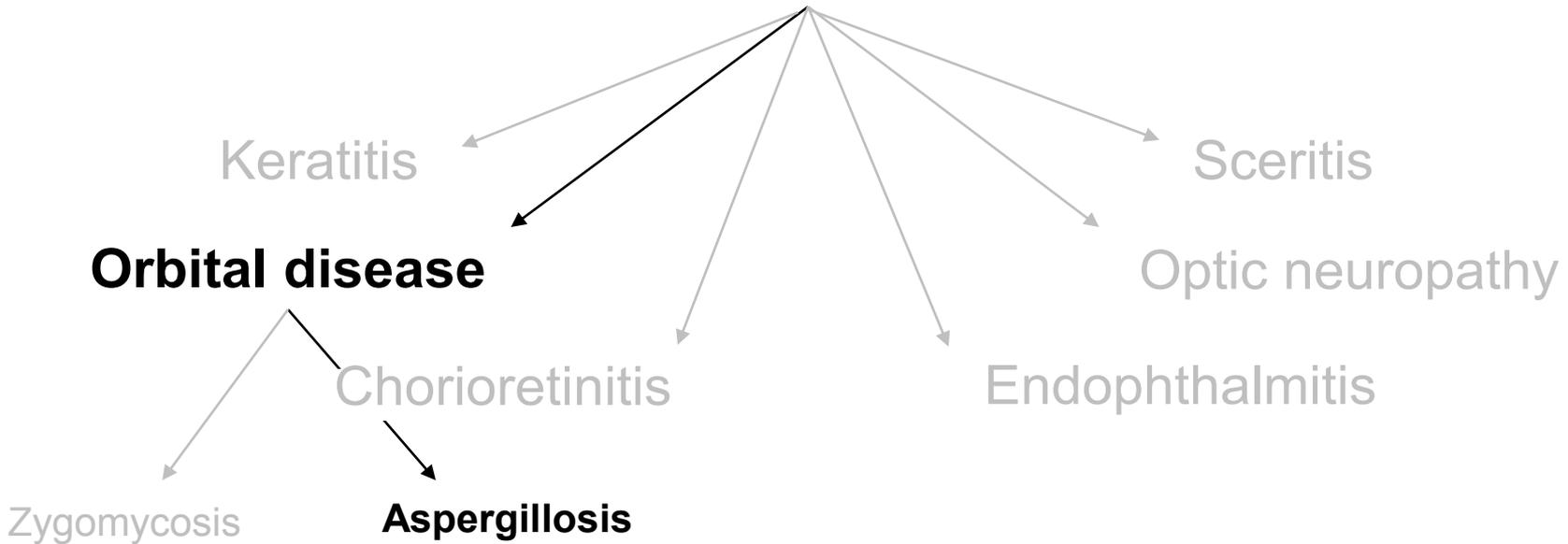


Zygomycosis in a patient with DKA. *A*, Complete right upper eyelid ptosis and ophthalmoplegia are present. *B*, Wide surgical debridement consisting of orbital exenteration and sinus surgery was life-saving. CT (*C*) and MRI (*D*) axial scans show orbital and sinus involvement as well as cavernous sinus thrombosis (*arrow*).

Common Ocular Fungal Pathogens



Fungal pathogenic **ic conditions**



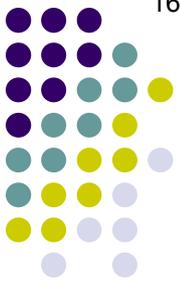
Aspergillosis can produce orbital dz via three distinct mechanisms:

--?

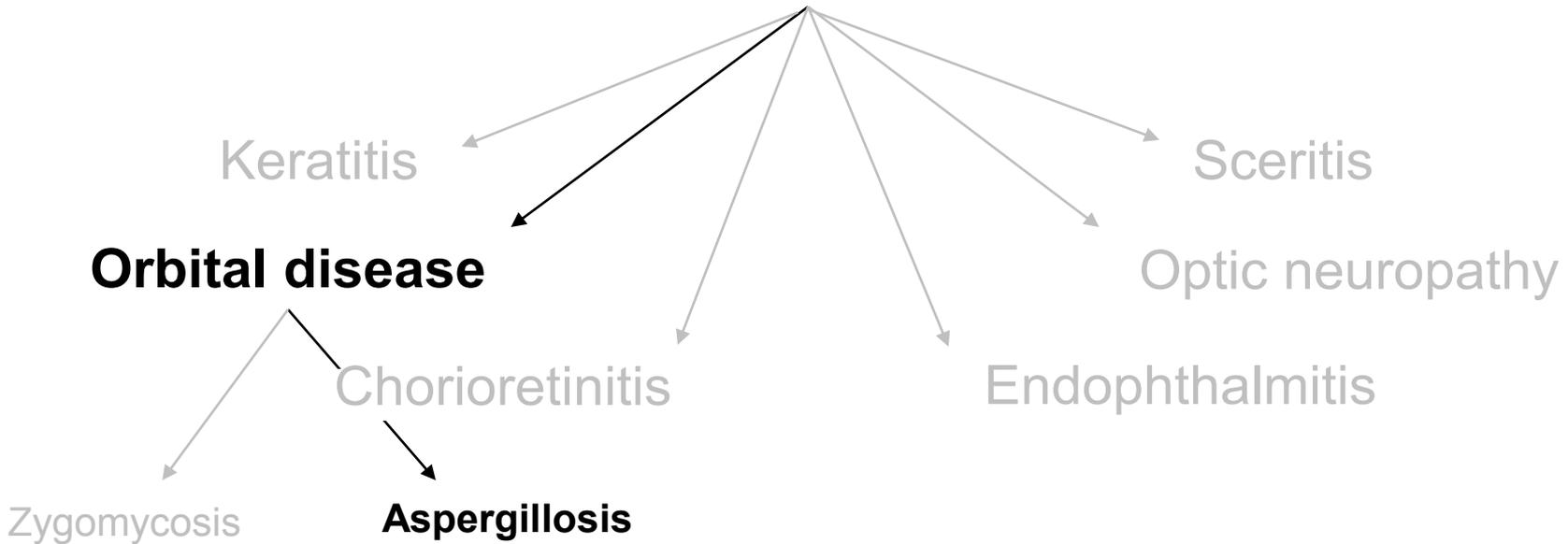
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Common Ocular Fungal Pathogens



Fungal pathogenic conditions



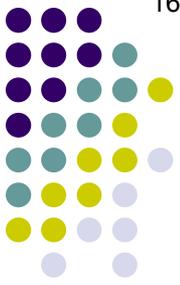
Aspergillosis can produce orbital dz via three distinct mechanisms:

--By orbital tissue

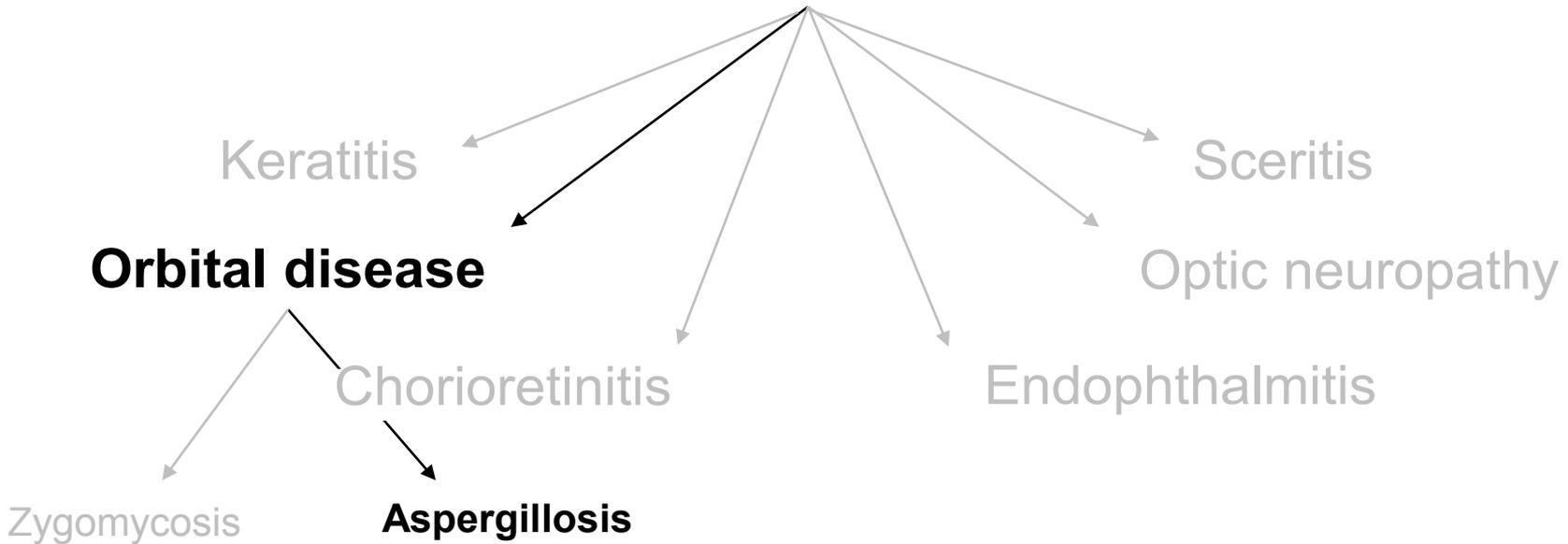
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Common Ocular Fungal Pathogens



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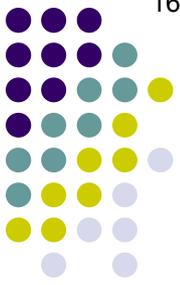
Aspergillosis can produce orbital dz via three distinct mechanisms:

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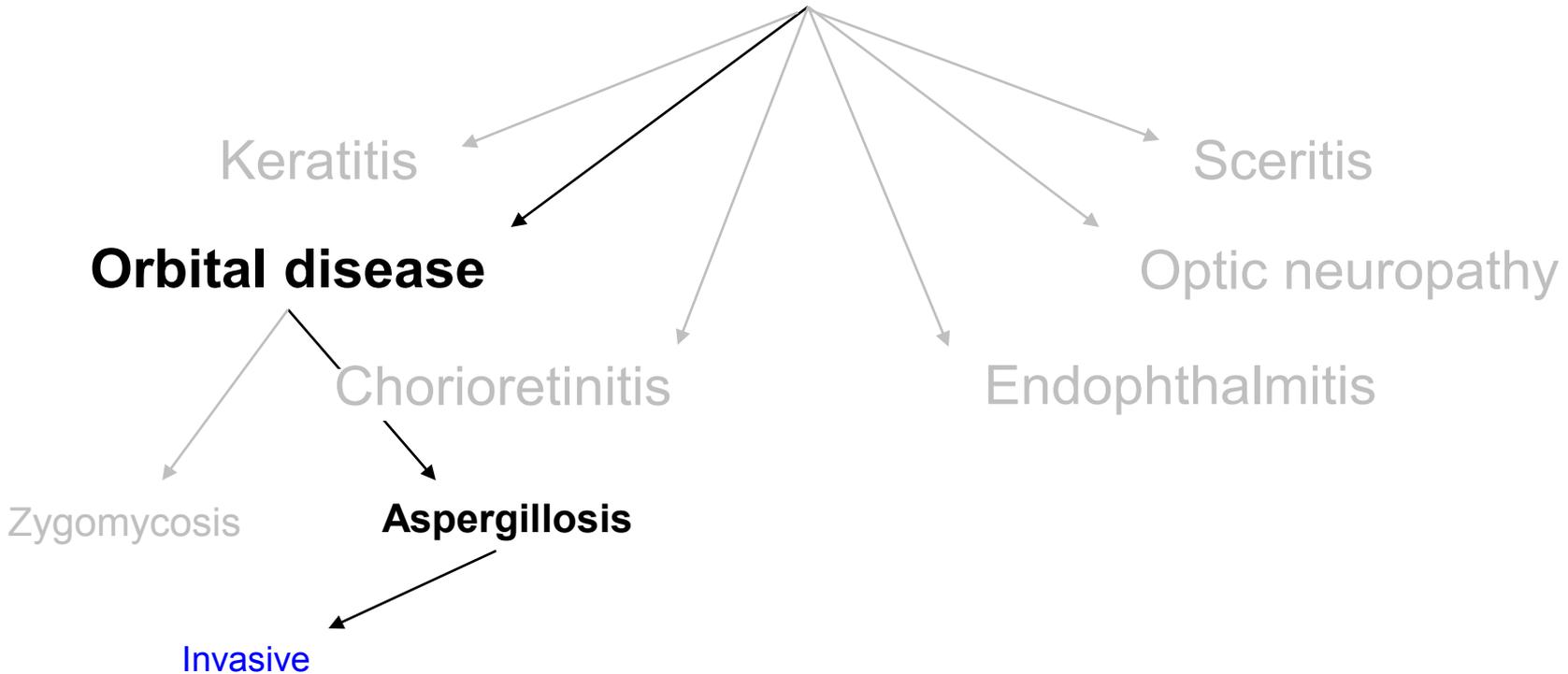
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Common Ocular Fungal Pathogens



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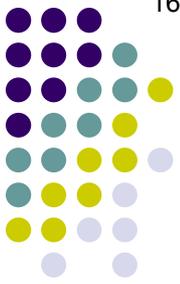
Aspergillosis can produce orbital dz via three distinct mechanisms:

--By infecting orbital tissue. **The BCSC refers to this as *invasive aspergillosis*.**

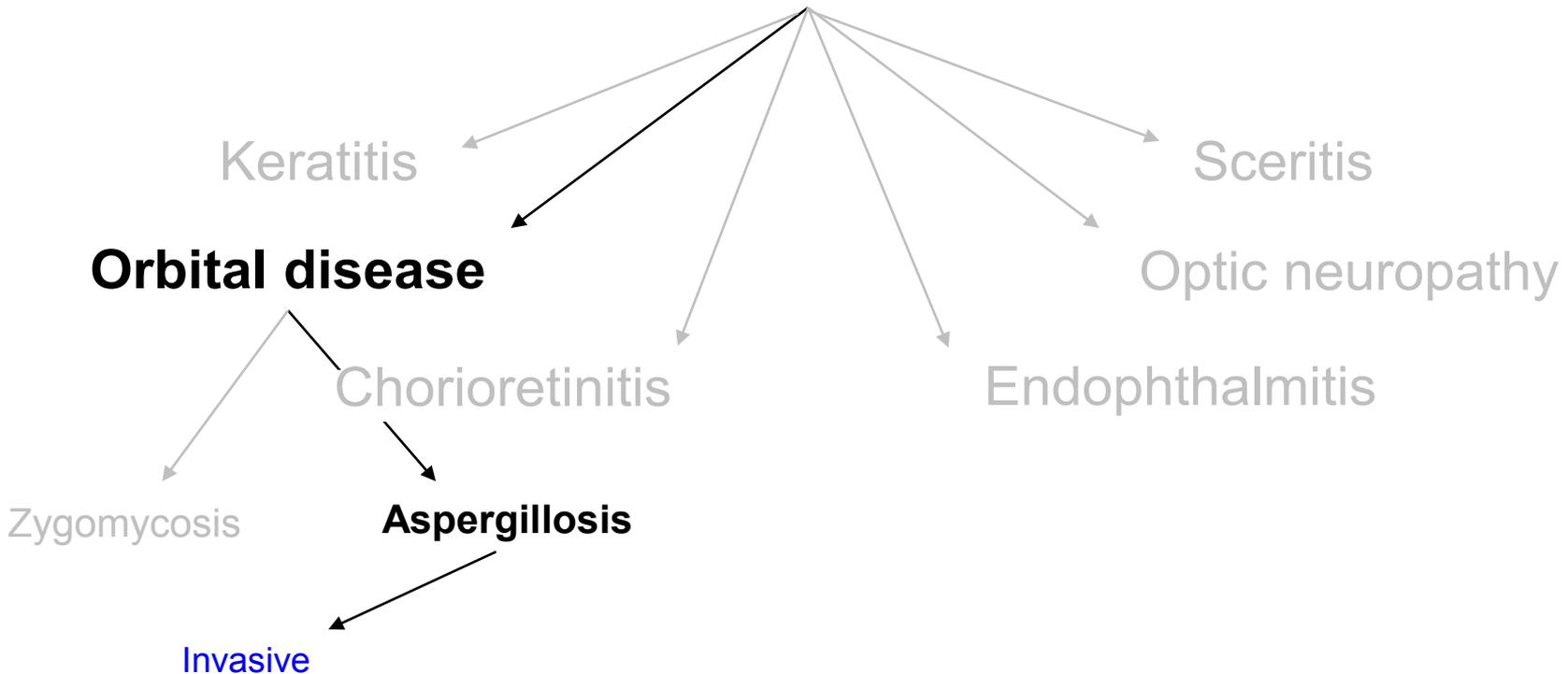
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Common Ocular Fungal Pathogens



Fungal pathogenicic conditions



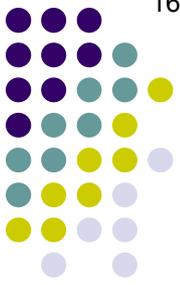
Aspergillosis can produce orbital dz via three distinct mechanisms:

--By infecting orbital tissue. The *BCSC* refers to this as *invasive aspergillosis*.

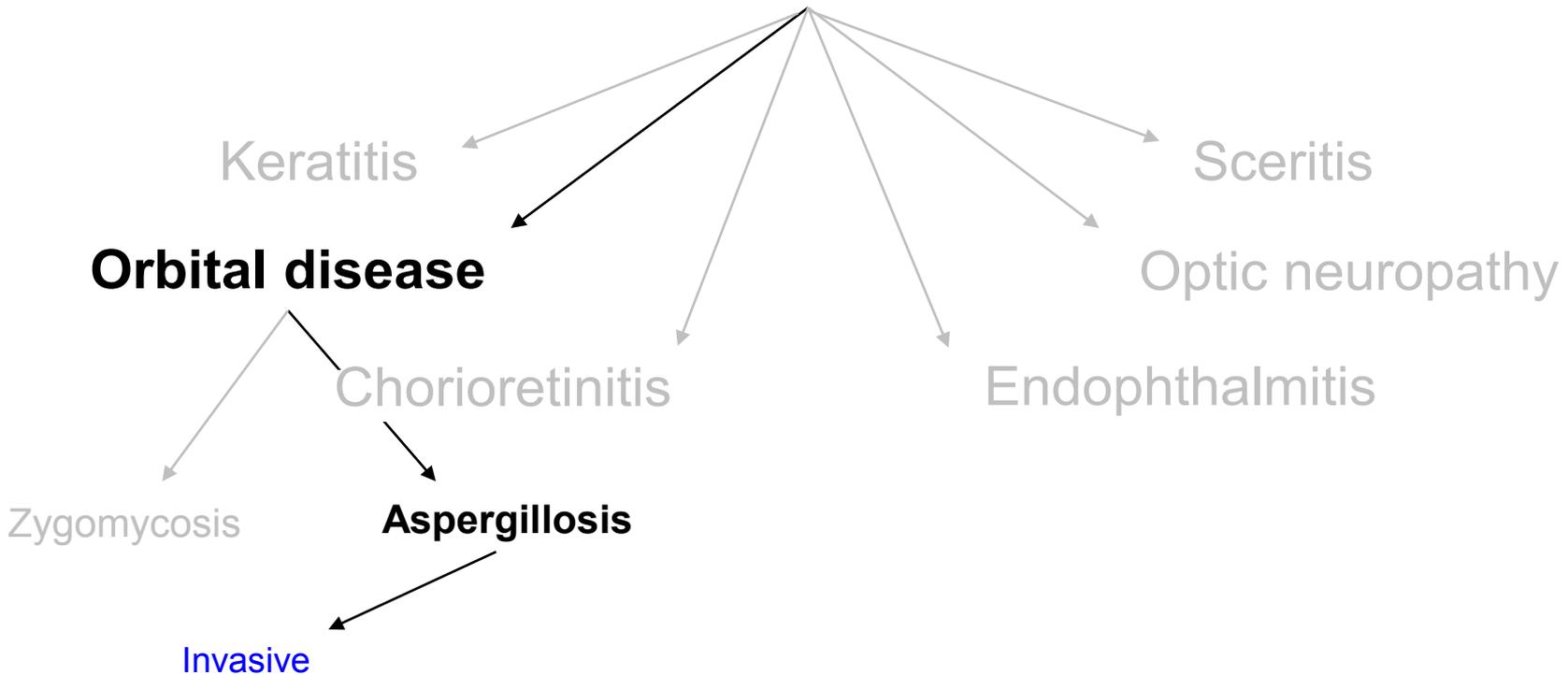
--By eliciting an two words in orbital tissue

--?

Common Ocular Fungal Pathogens



Fungal pathogenicic conditions



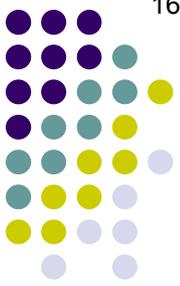
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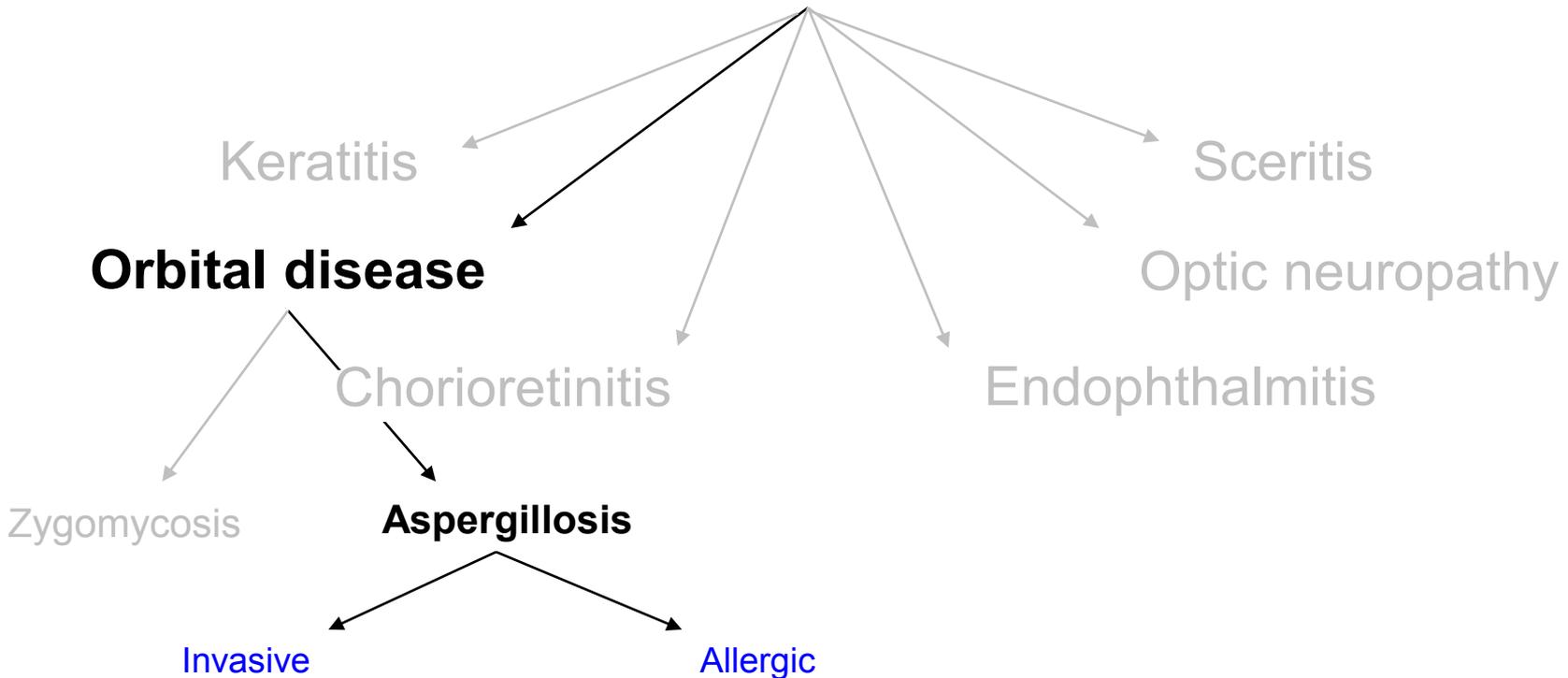
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Common Ocular Fungal Pathogens



Fungal pathogenic conditions



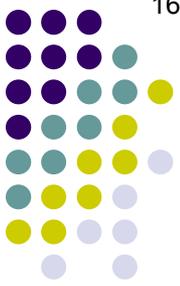
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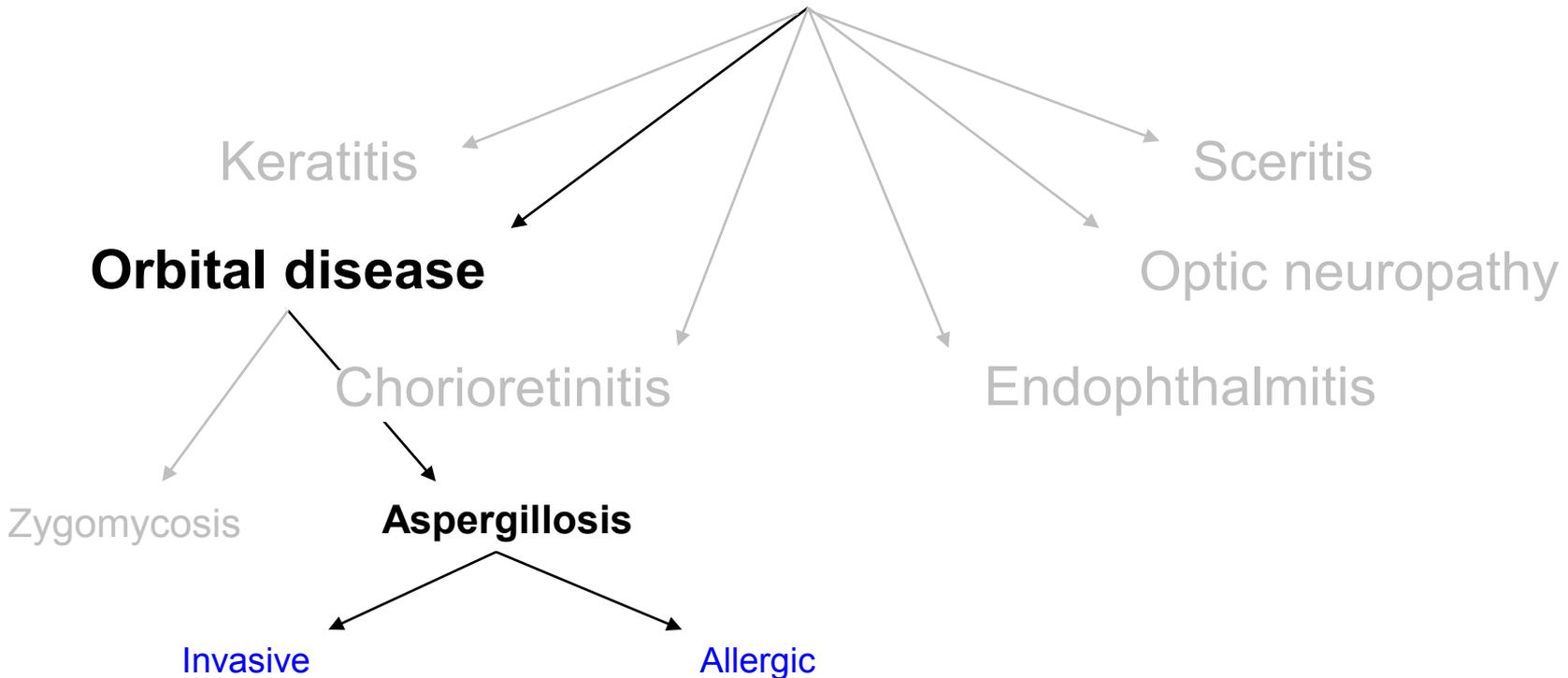
--By eliciting an allergic reaction in orbital tissue. **This is called *allergic aspergillosis*.**

--?

Common Ocular Fungal Pathogens



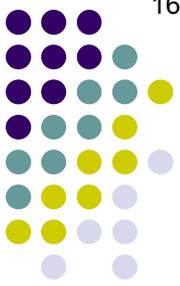
Fungal pathogenic conditions



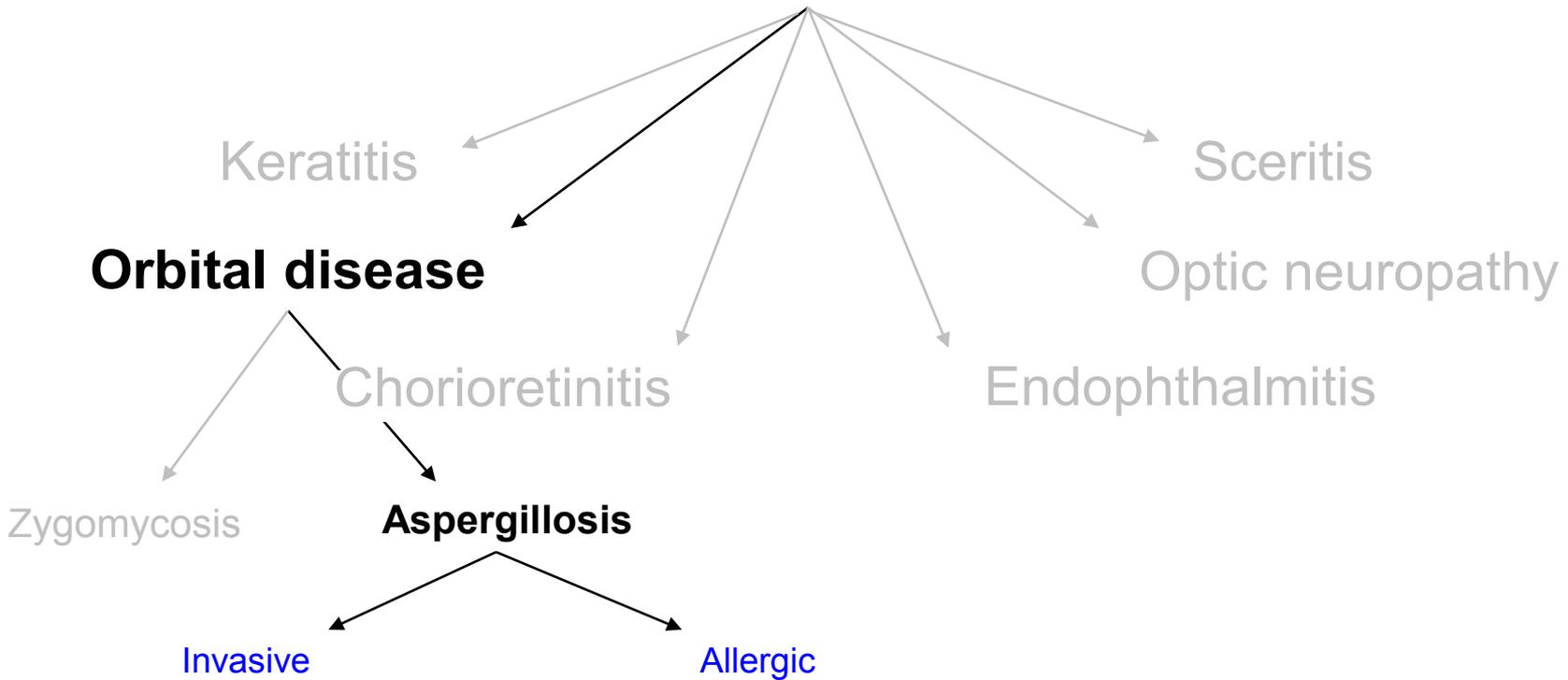
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- By forming a three words in the orbit

Common Ocular Fungal Pathogens



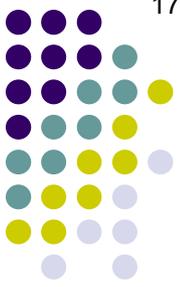
Fungal pathogenic conditions



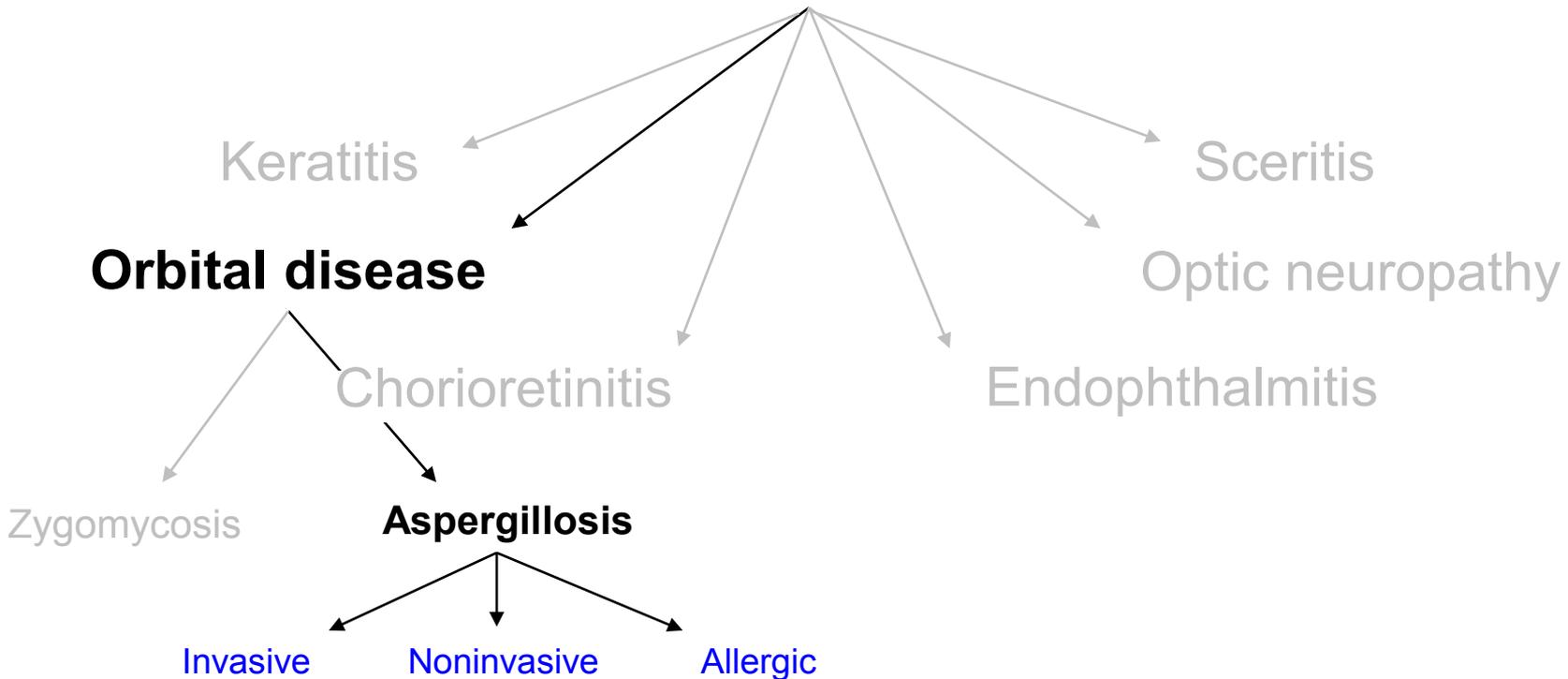
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Common Ocular Fungal Pathogens



Fungal pathogenic conditions

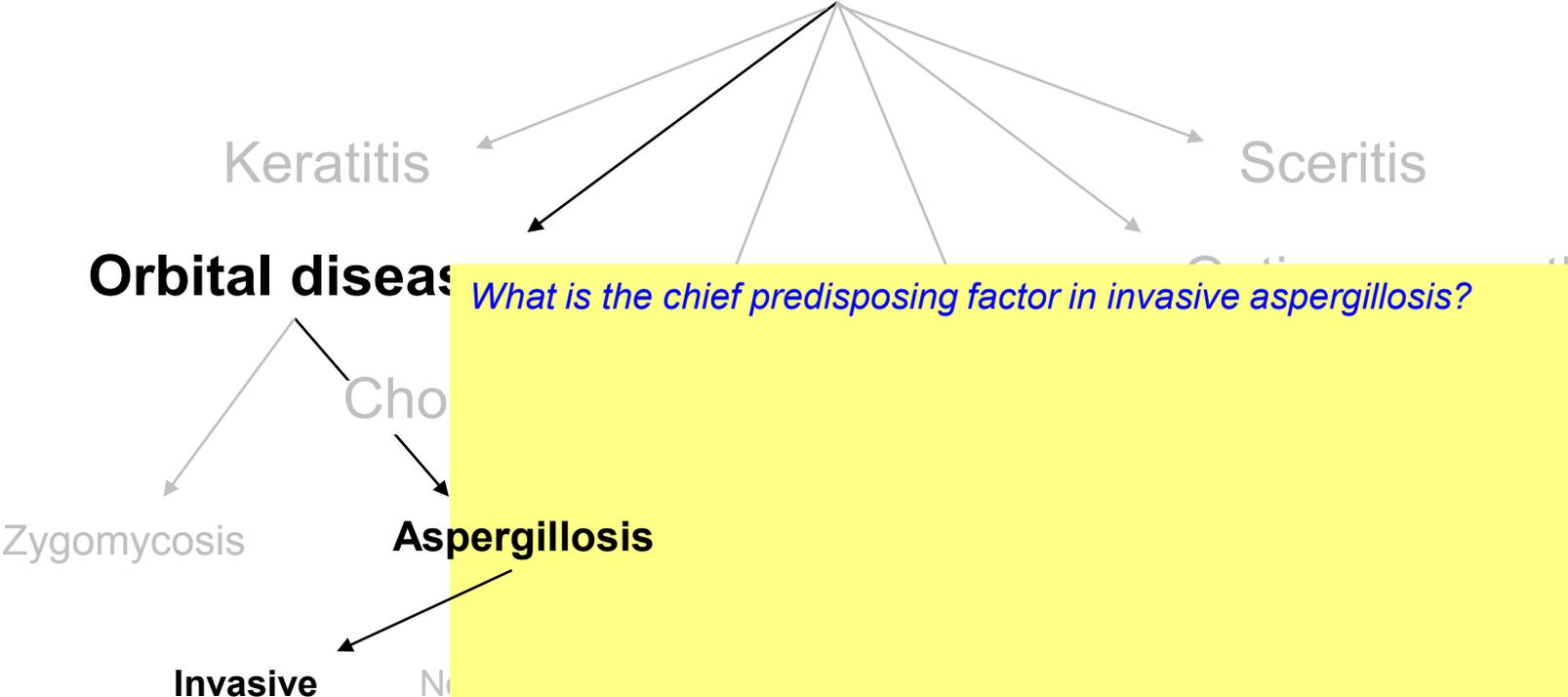


Aspergillosis can produce orbital dz via three distinct mechanisms:

- By infecting orbital tissue. **The BCSC refers to this as *invasive aspergillosis*.**
- By eliciting an allergic reaction in orbital tissue. **This is called *allergic aspergillosis*.**
- By forming a space-occupying mass in the orbit. **This is *noninvasive aspergillosis*.**



Fungal pathogenicic conditions



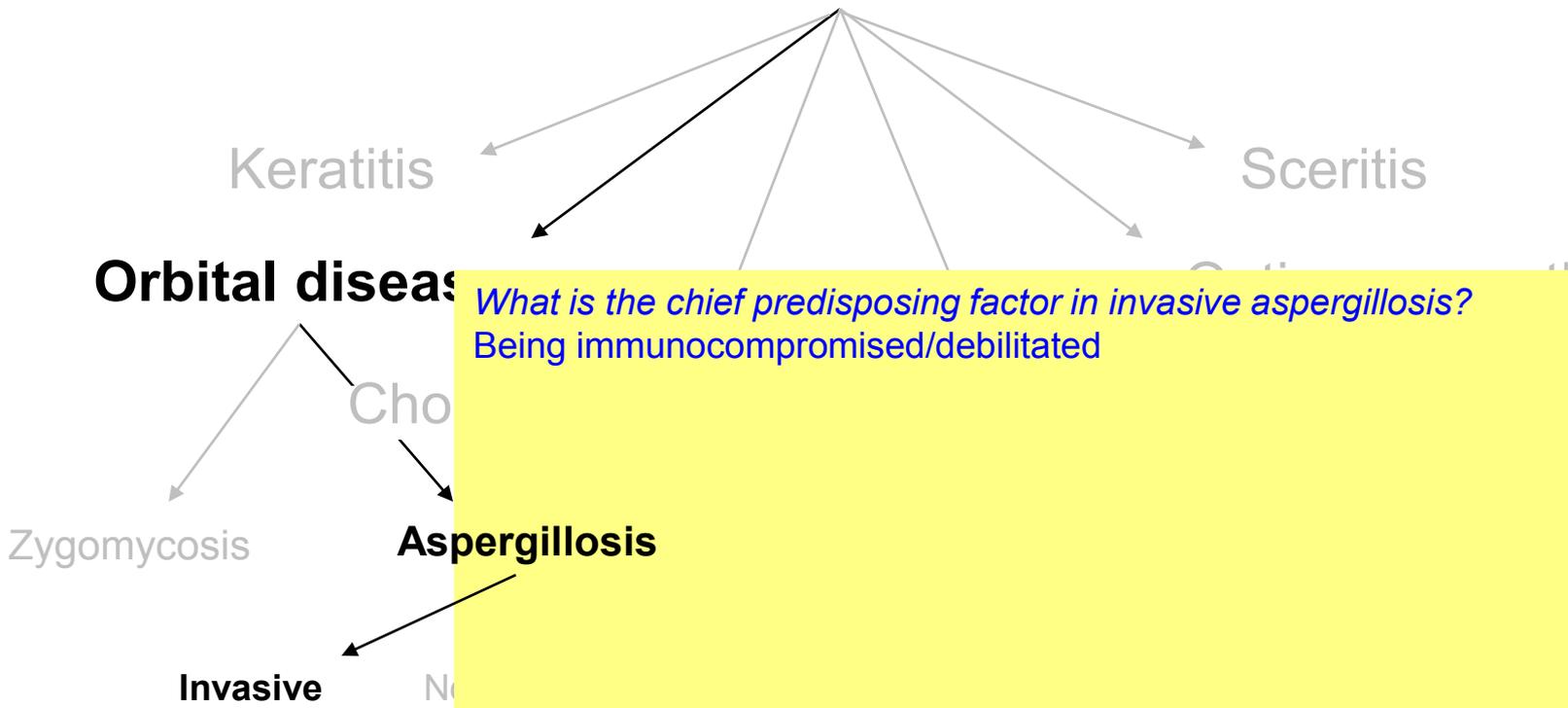
What is the chief predisposing factor in invasive aspergillosis?



Common Ocular Fungal Pathogens

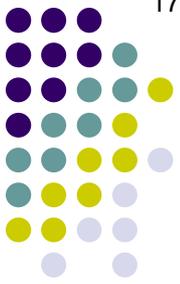


Fungal pathogenic conditions

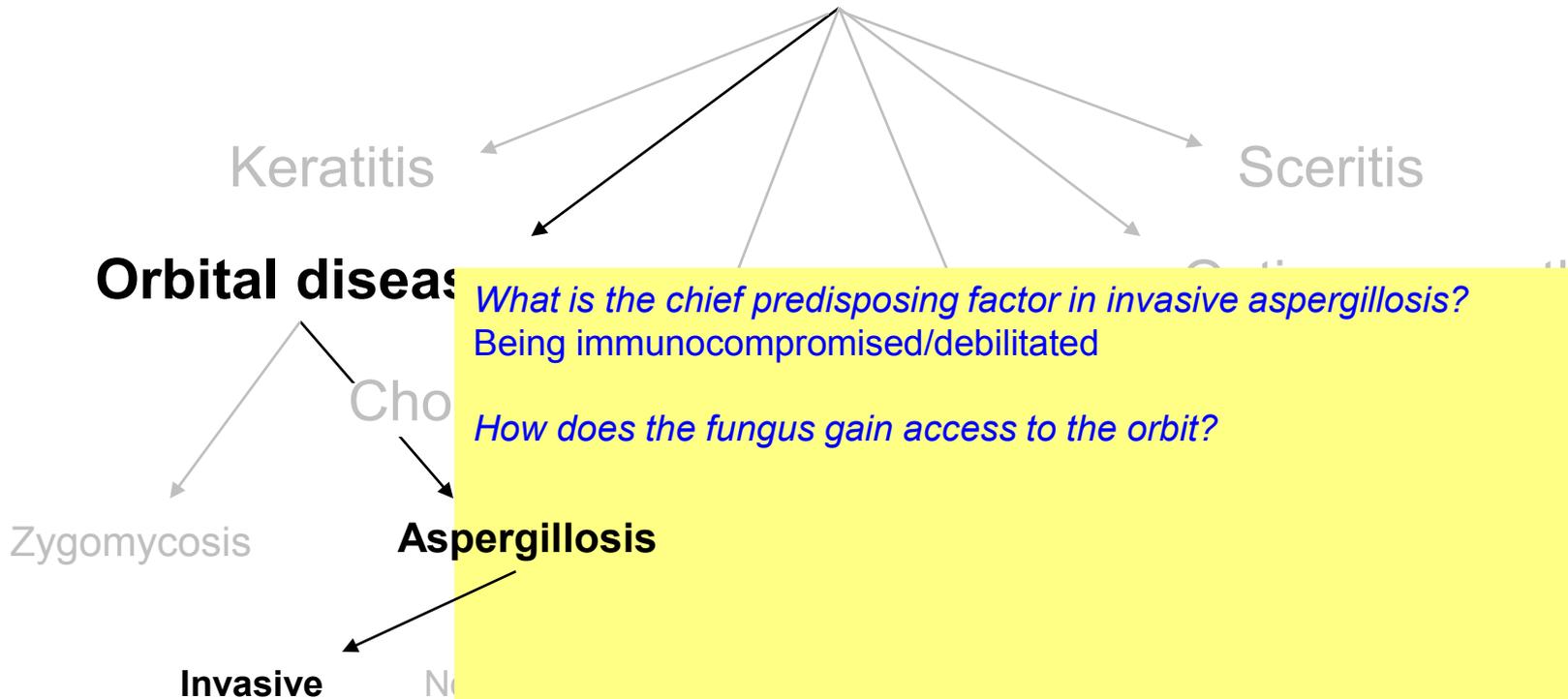


What is the chief predisposing factor in invasive aspergillosis?
Being immunocompromised/debilitated

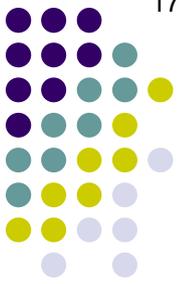
Common Ocular Fungal Pathogens



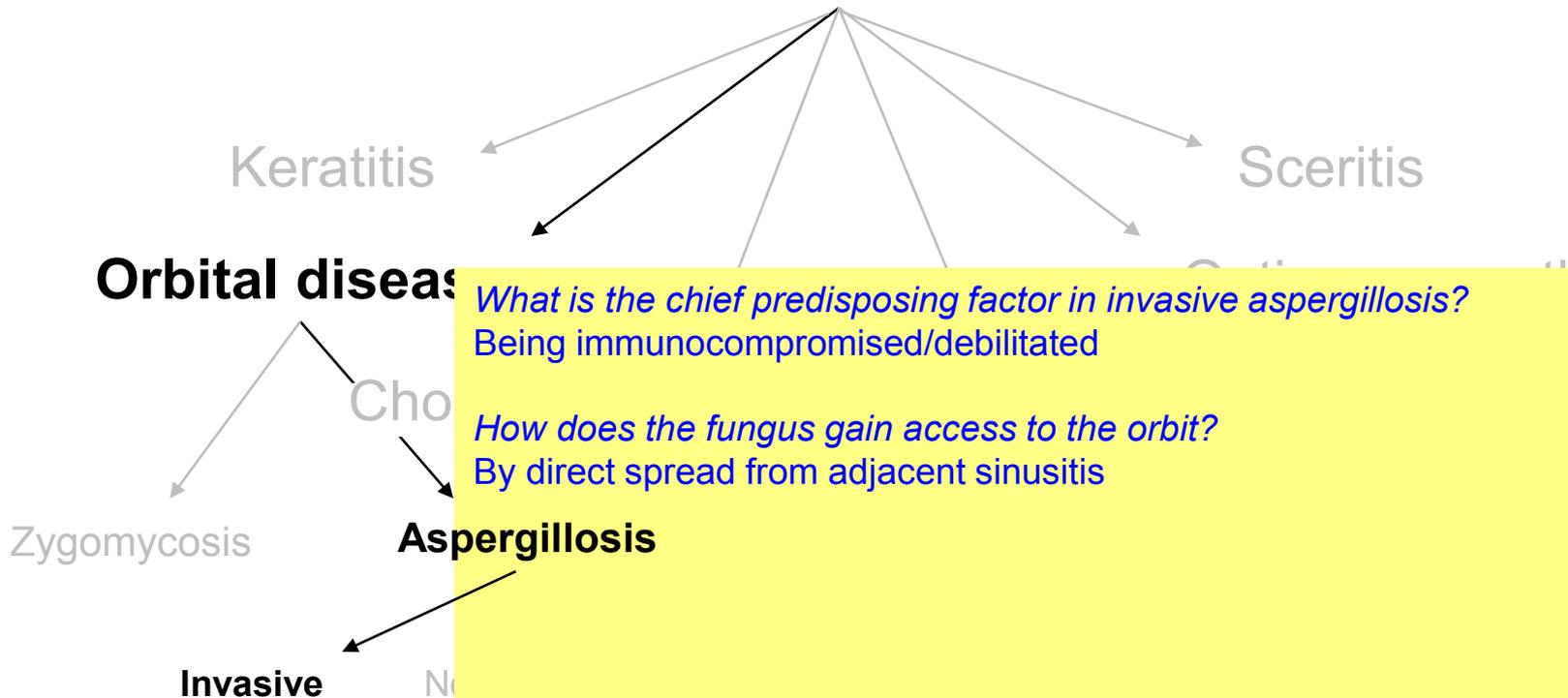
Fungal pathogenic conditions



Common Ocular Fungal Pathogens



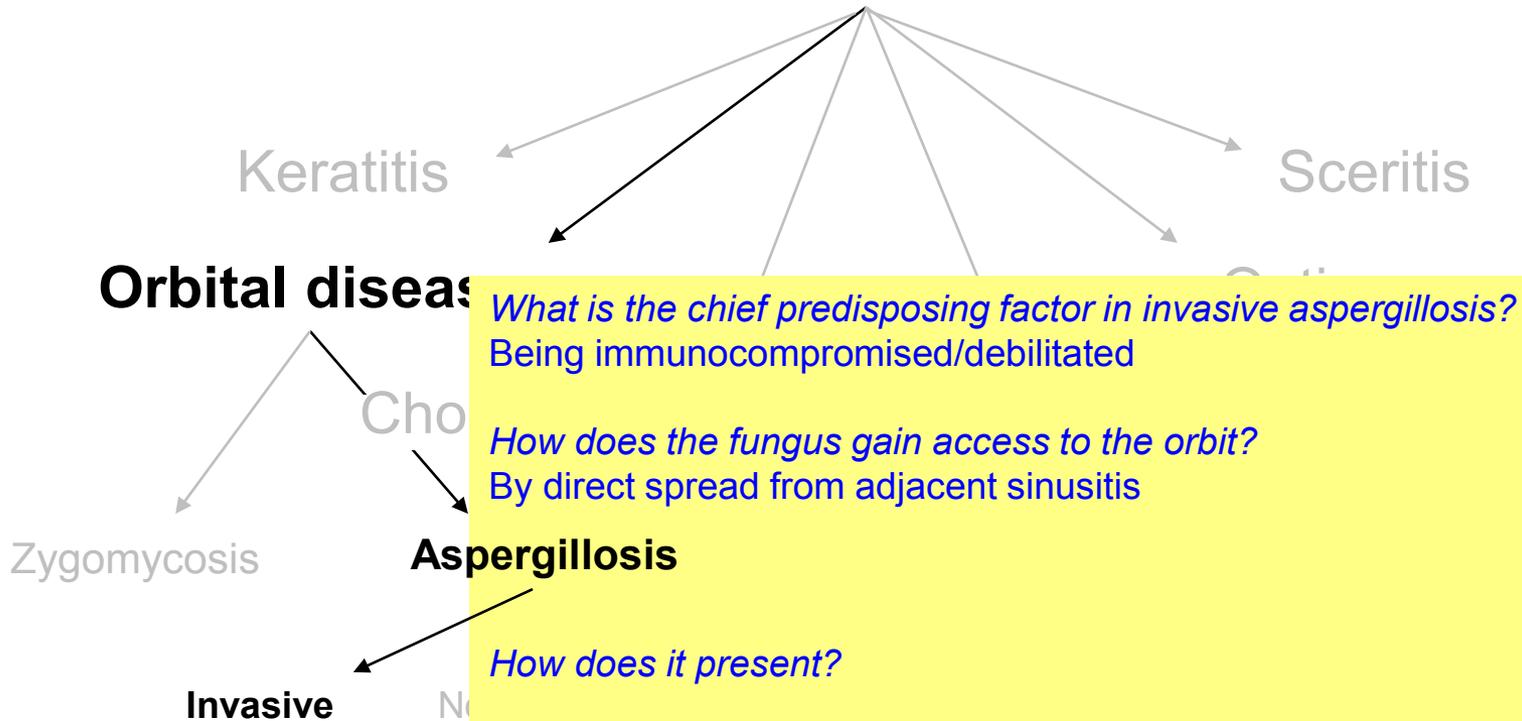
Fungal pathogenic conditions



Common Ocular Fungal Pathogens



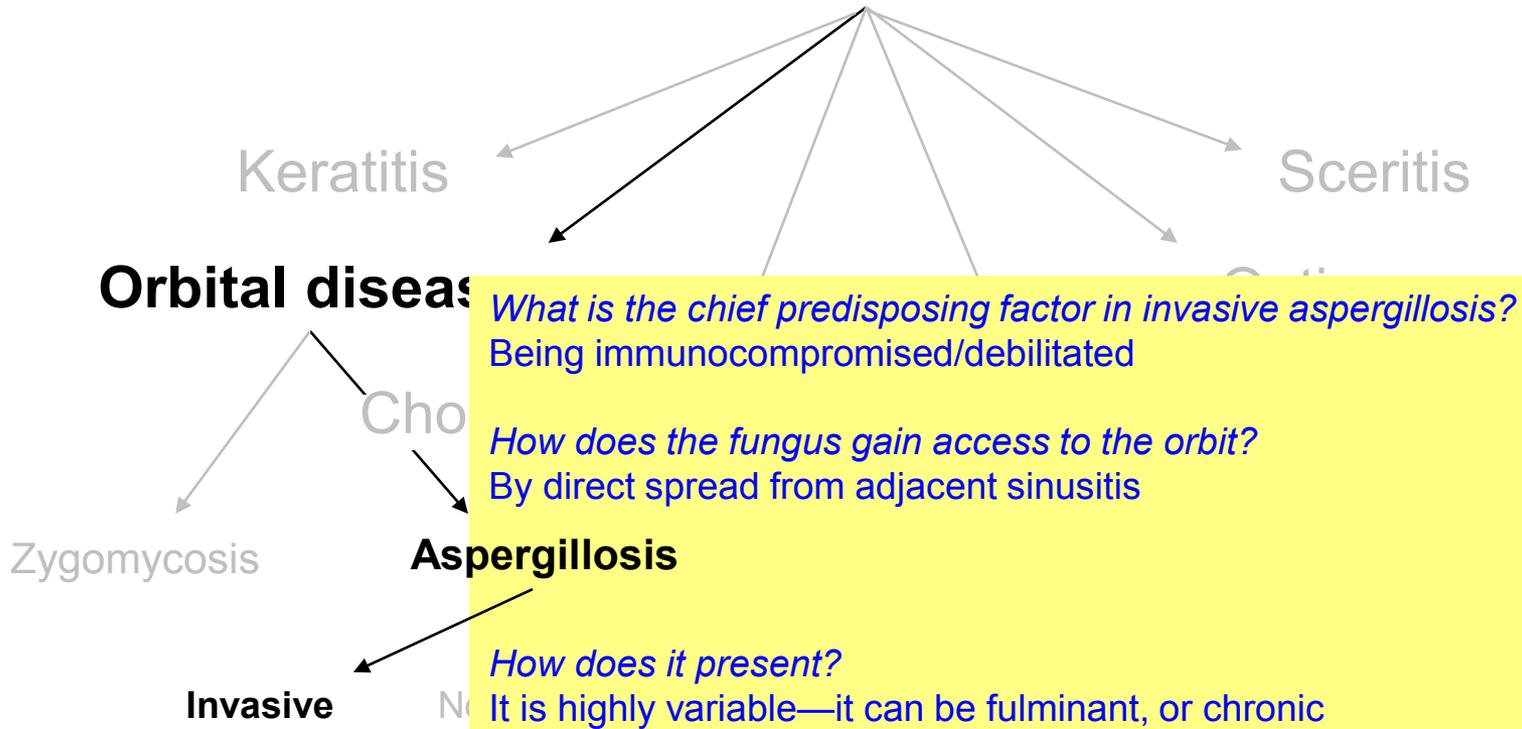
Fungal pathogenic conditions



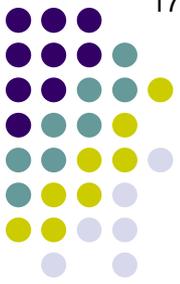
Common Ocular Fungal Pathogens



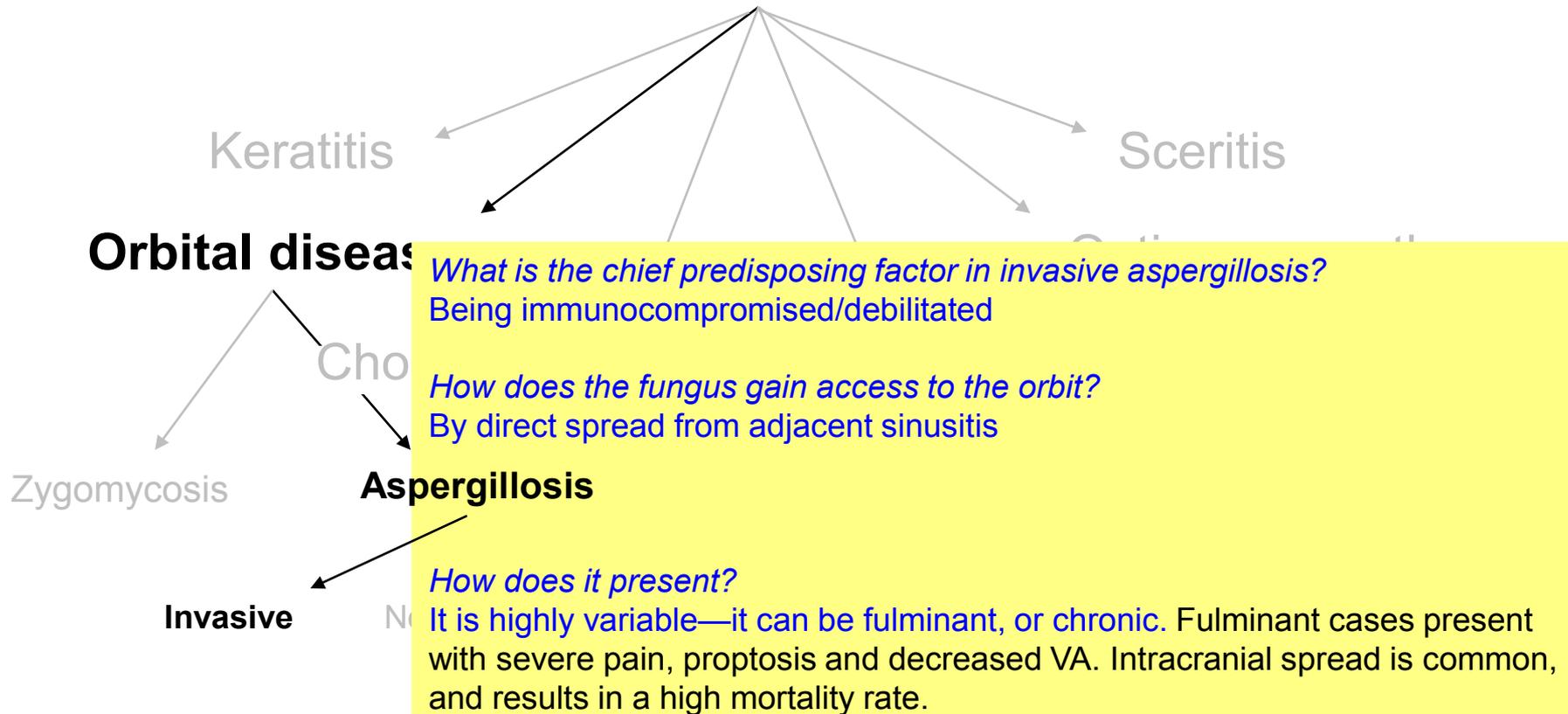
Fungal pathogenic conditions



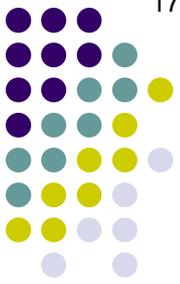
Common Ocular Fungal Pathogens



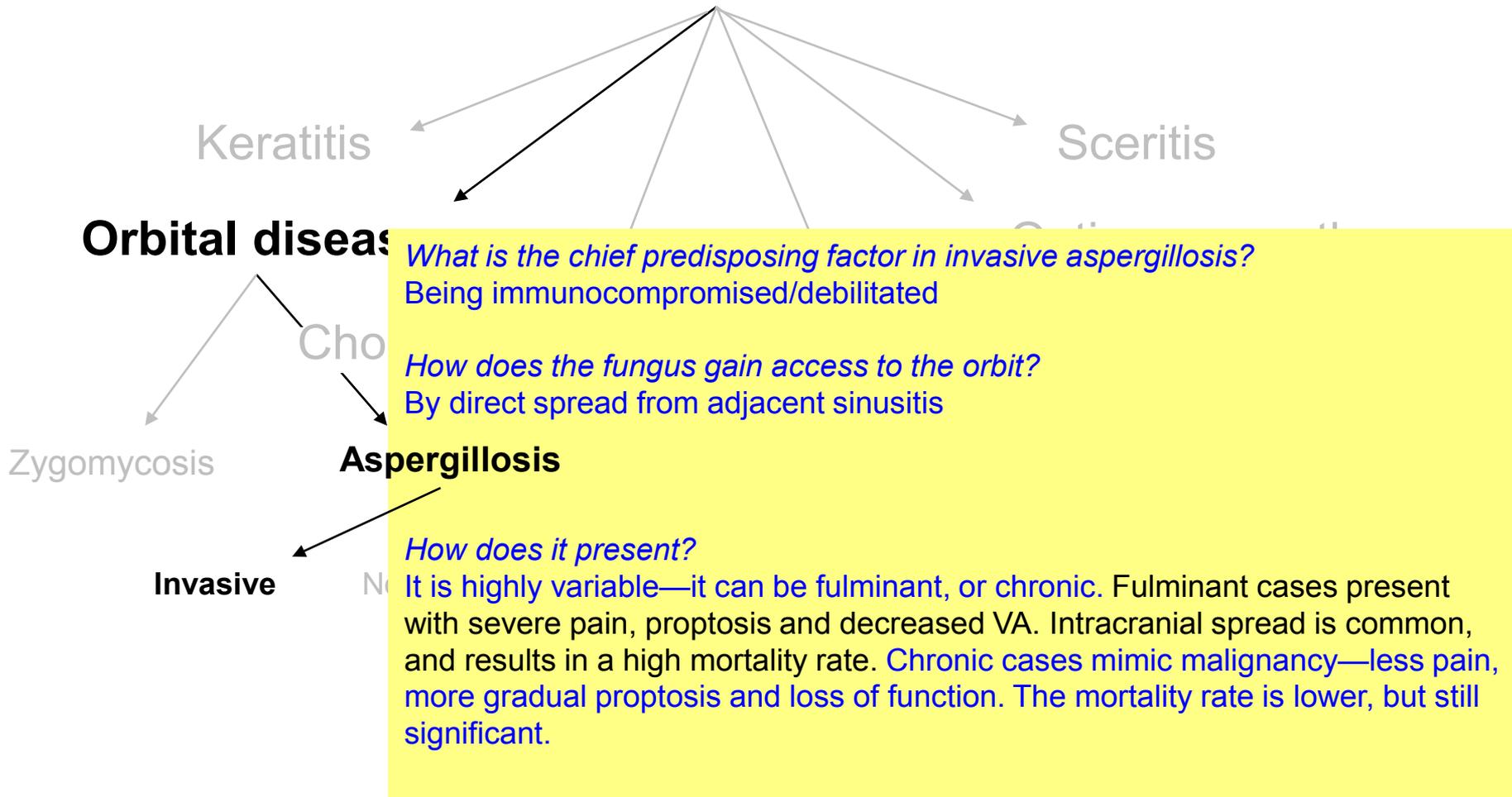
Fungal pathogenic conditions



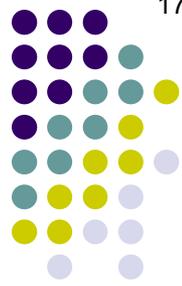
Common Ocular Fungal Pathogens



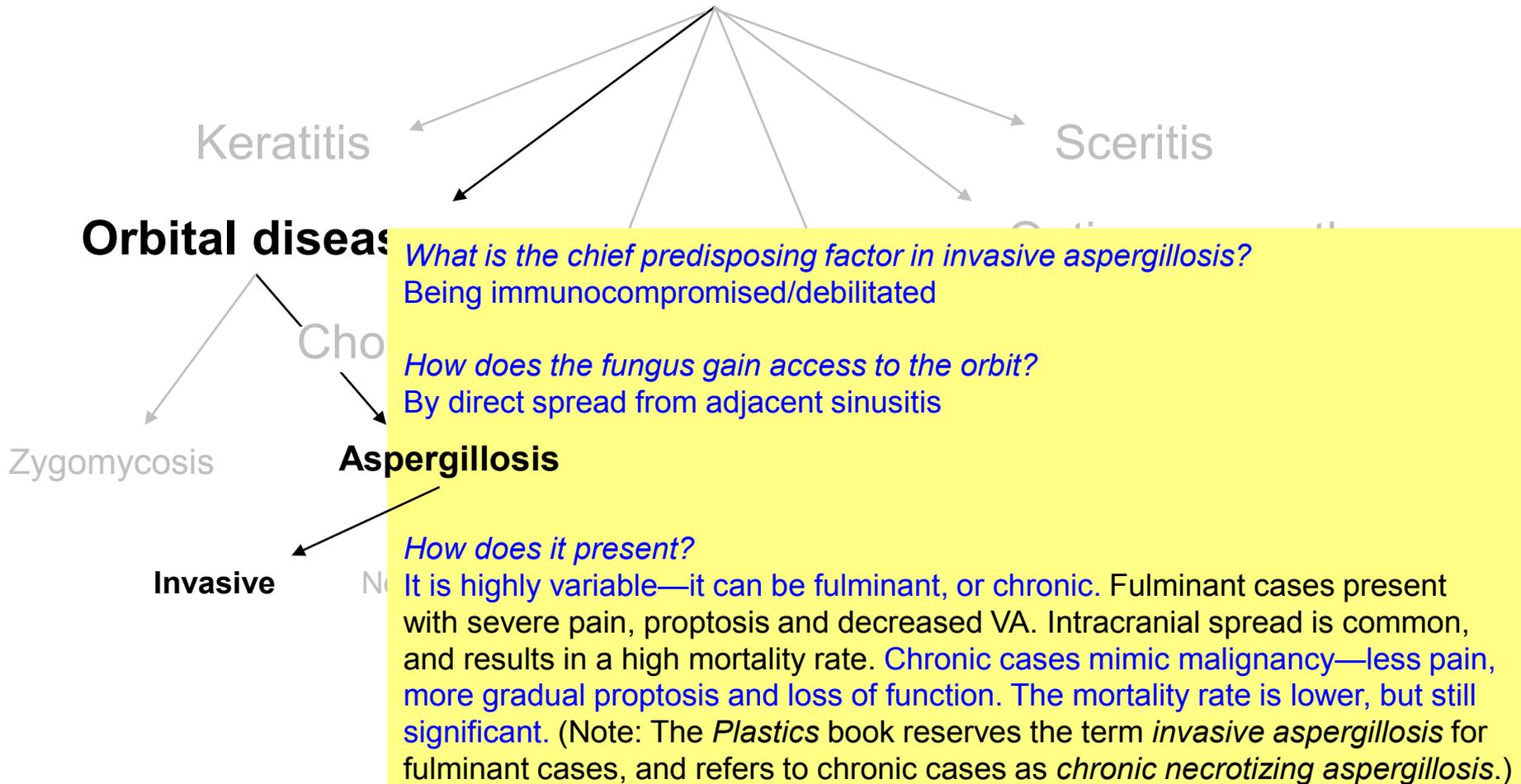
Fungal pathogenic conditions



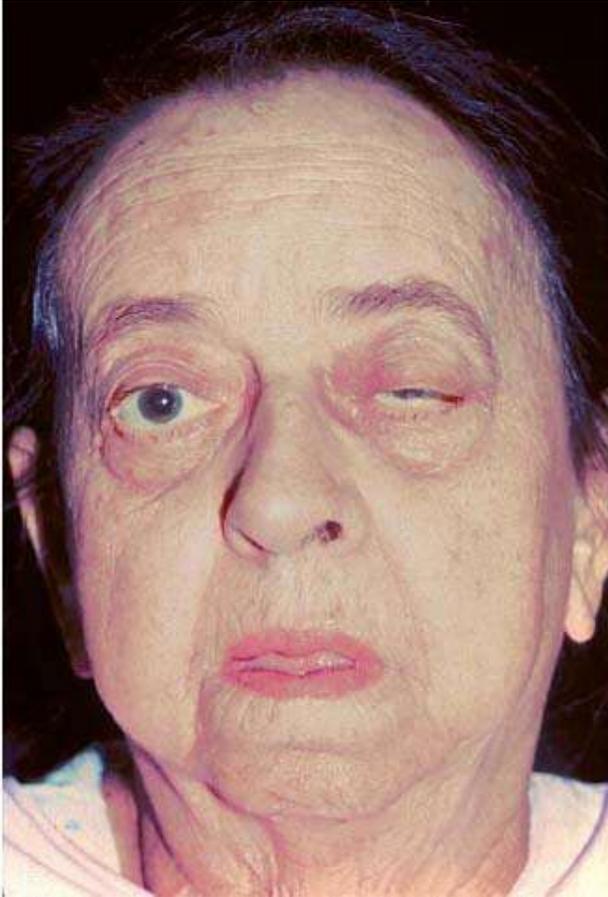
Common Ocular Fungal Pathogens



Fungal pathogenic conditions

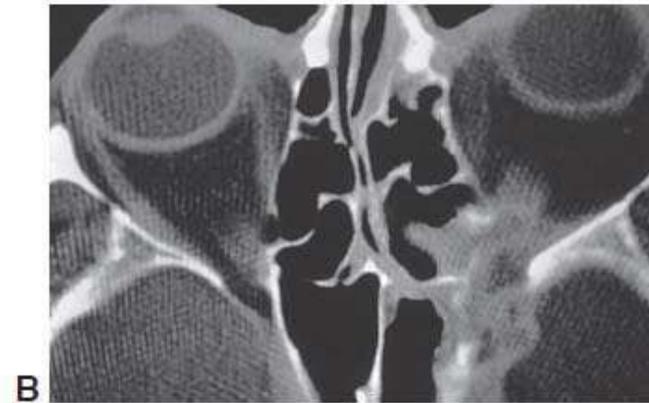
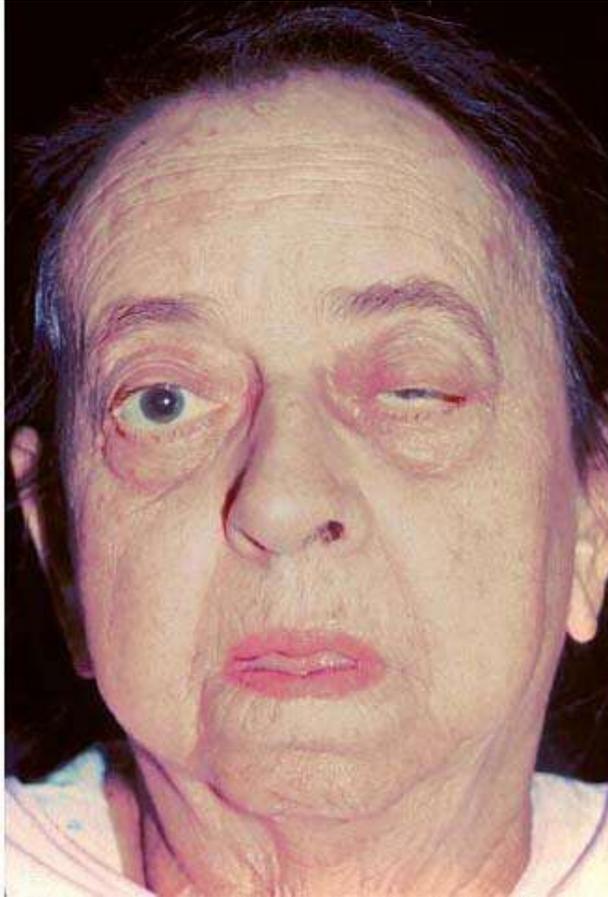


Common Ocular Fungal Pathogens



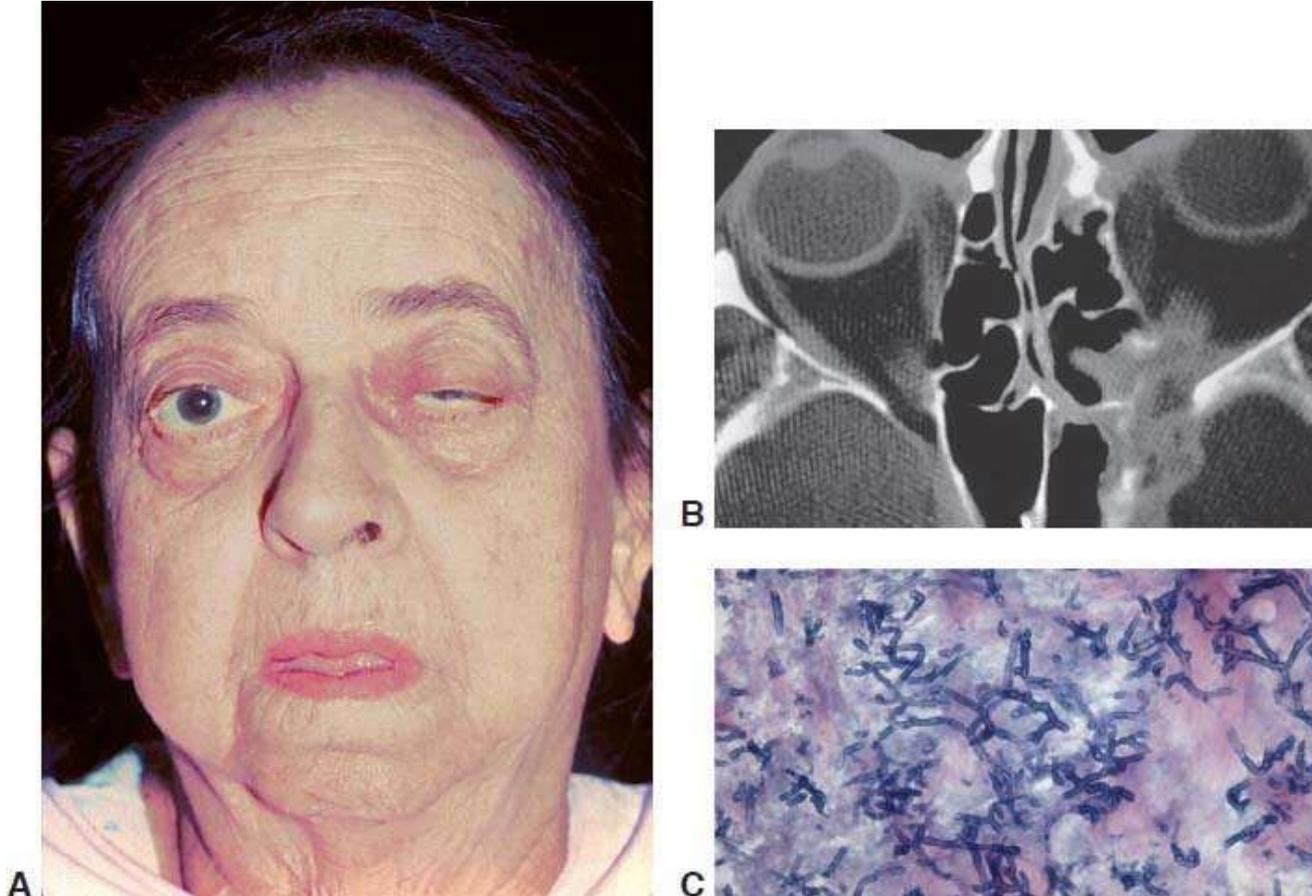
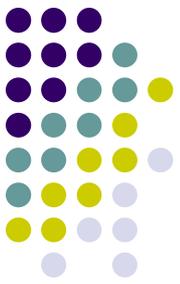
This 82-year-old woman presented with a 6-week history of left brow and orbital pain. **A**, 4 weeks before evaluation, she suddenly lost vision in her left eye, and ptosis and proptosis developed 1 week later.

Common Ocular Fungal Pathogens



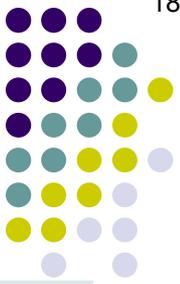
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Common Ocular Fungal Pathogens



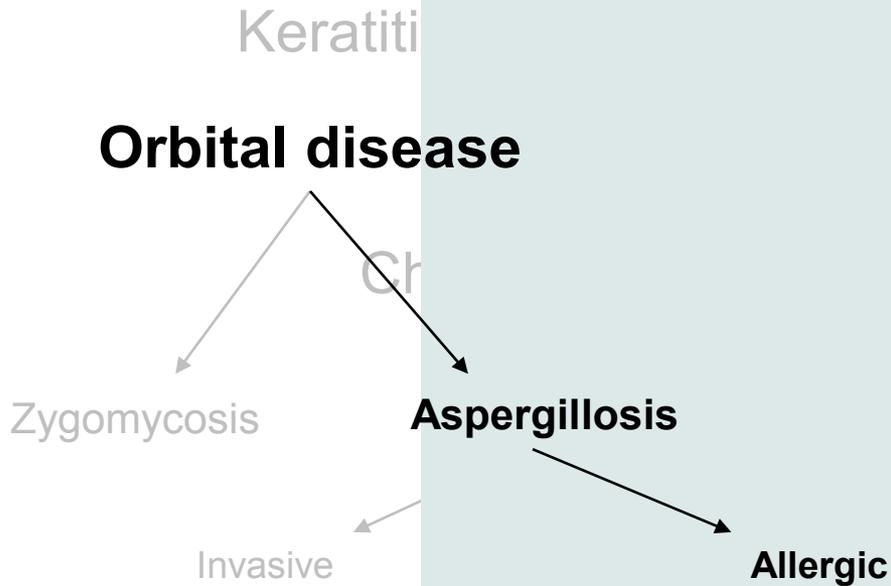
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Common Ocular Fungal Pathogens

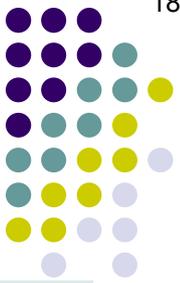


Fungal pathogenic conditions

Who is the typical allergic aspergillosis pt?



Common Ocular Fungal Pathogens



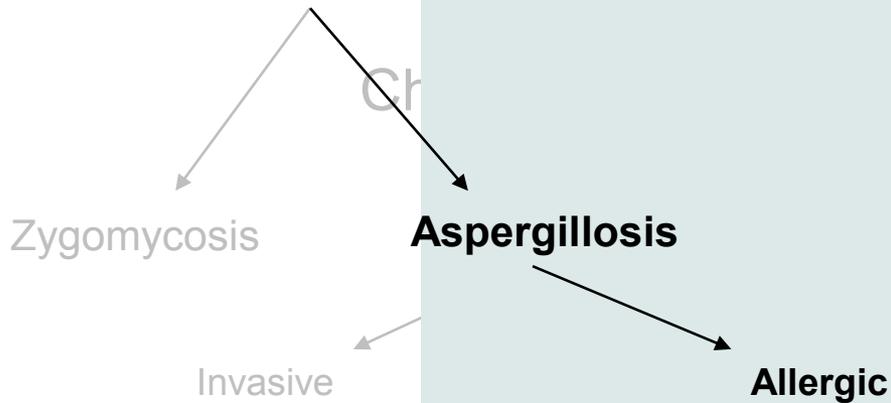
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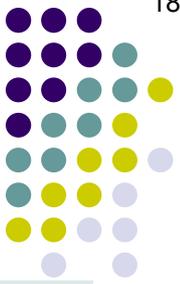
An individual with a PMHx of [redacted], chronic [redacted], and nasal [redacted]

Keratitis

Orbital disease



Common Ocular Fungal Pathogens



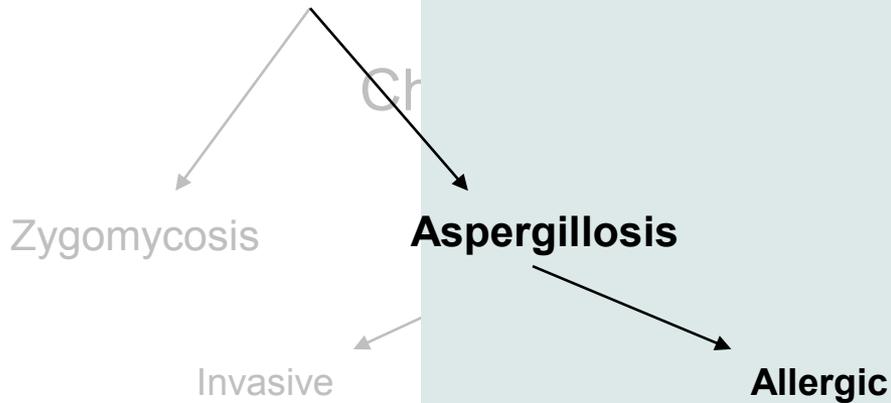
Fungal pathogenic conditions

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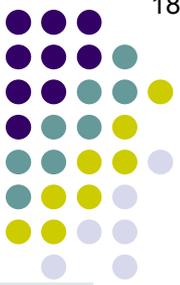
An individual with a PMHx of atopy , chronic sinusitis , and nasal polyposis

Keratitis

Orbital disease



Common Ocular Fungal Pathogens



Fungal pathogenic conditions

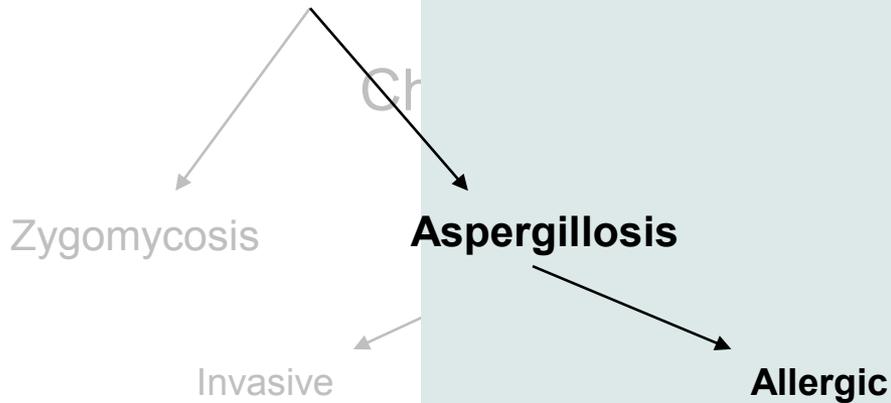
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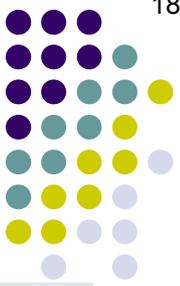
Do they tend to be immunocompromised, like invasive aspergillosis pts?

Keratitis

Orbital disease



Common Ocular Fungal Pathogens



Fungal pathogenic conditions

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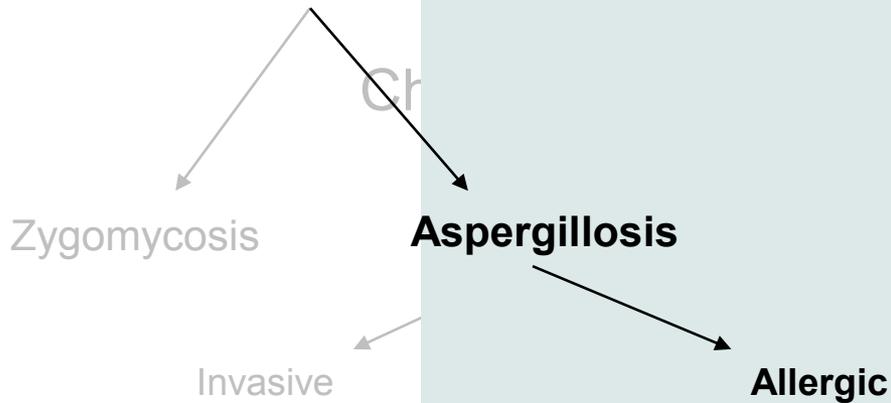
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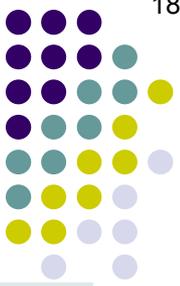
No, just the opposite—these pts are almost always immunocompetent (the condition requires the mounting of a robust immune response)

Keratitis

Orbital disease



Common Ocular Fungal Pathogens



Fungal pathogenic conditions

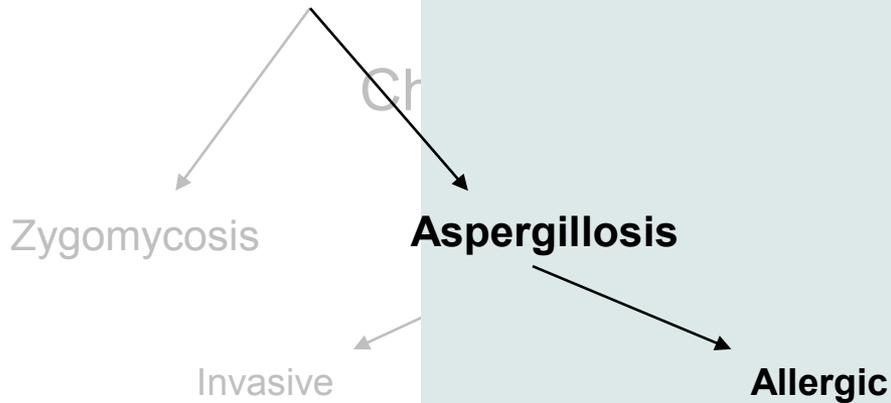
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An individual with a PMHx of atopy , chronic sinusitis , and nasal polyposis

What would a blood draw reveal?

Keratitis

Orbital disease



Common Ocular Fungal Pathogens



Fungal pathogenic conditions

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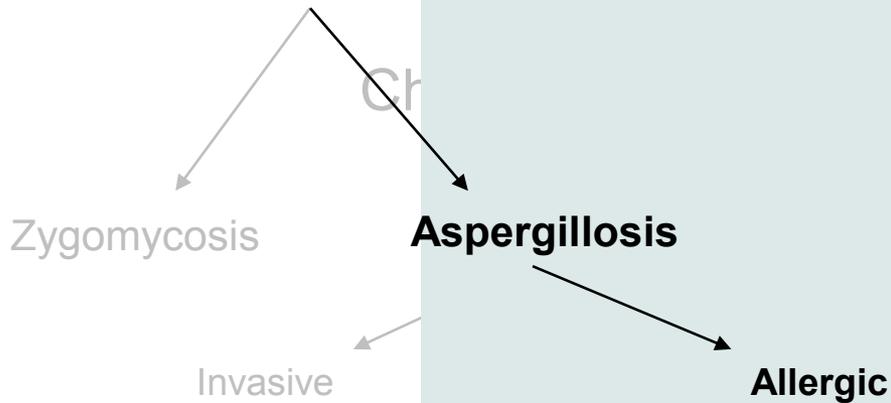
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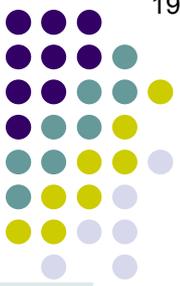
The usual atopic/allergic findings: Lots of **cell type** and high levels of **Ig type**

Keratitis

Orbital disease



Common Ocular Fungal Pathogens



Fungal pathogenic conditions

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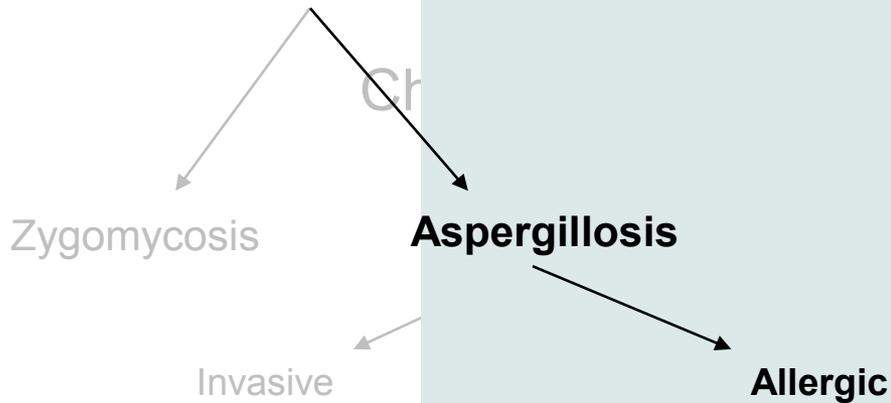
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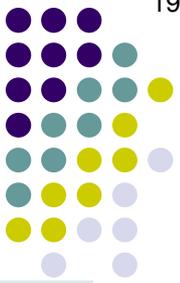
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Keratitis

Orbital disease



Common Ocular Fungal Pathogens



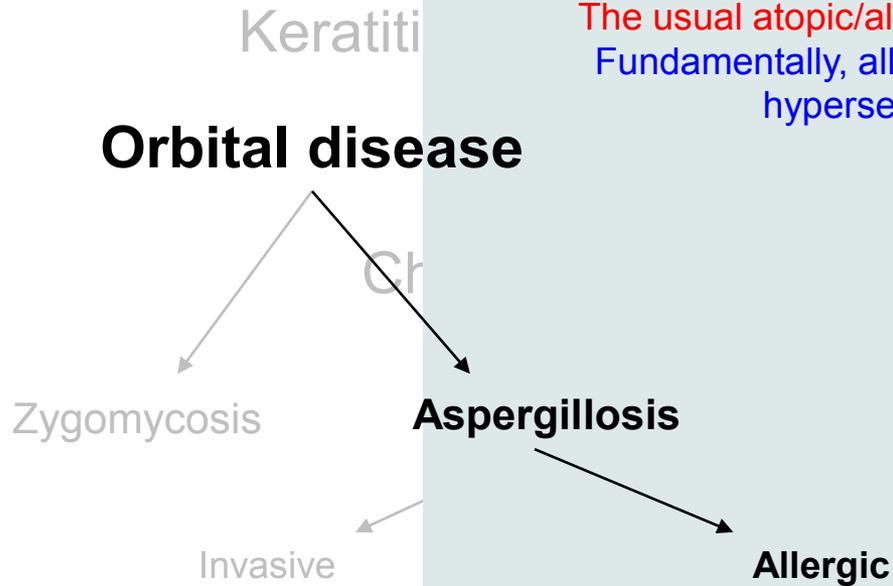
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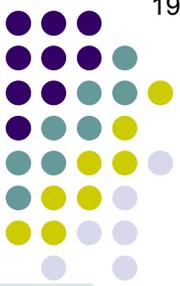
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Common Ocular Fungal Pathogens



Fungal pathogenic conditions

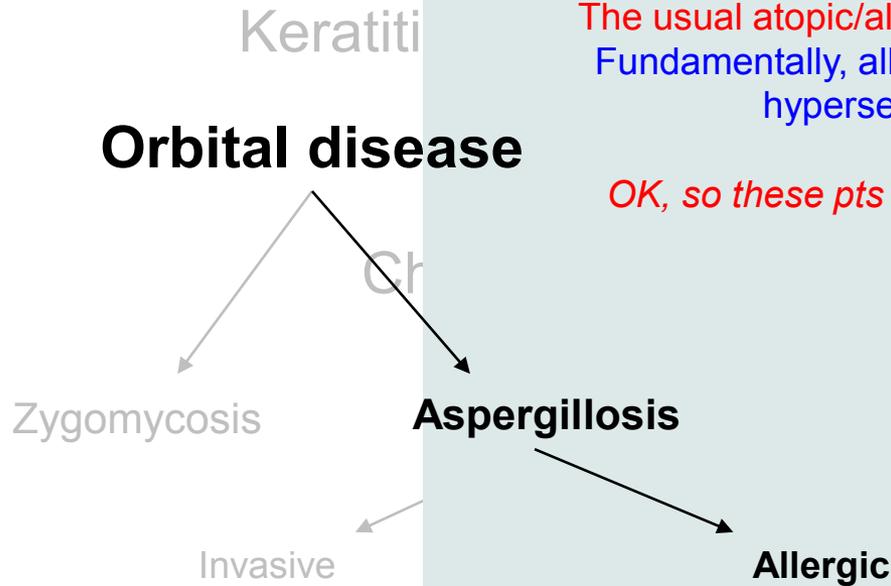
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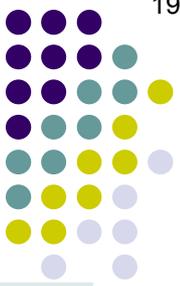
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OK, so these pts have a stuffy nose. Why is this worth talking about?



Common Ocular Fungal Pathogens



Fungal pathogenic conditions

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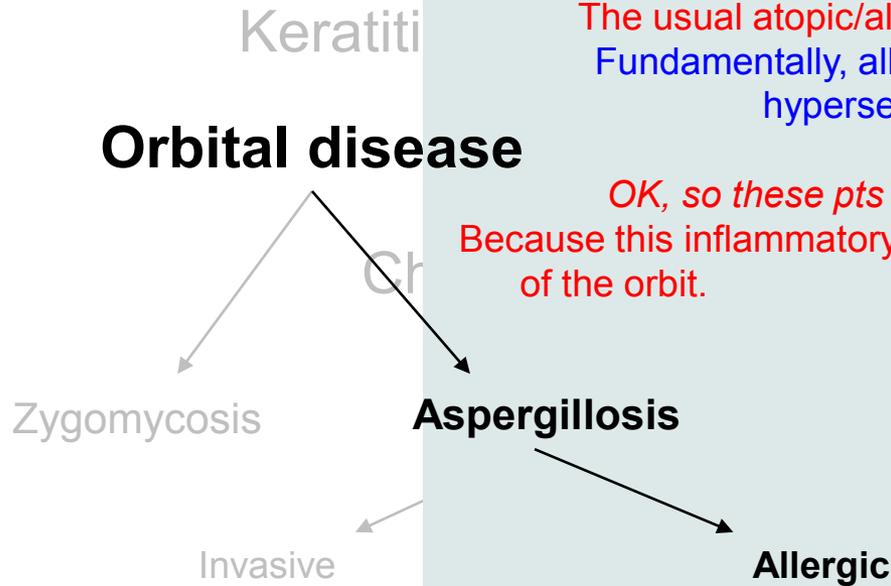
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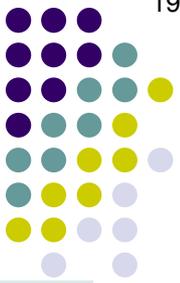
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Common Ocular Fungal Pathogens



Fungal pathogenic conditions

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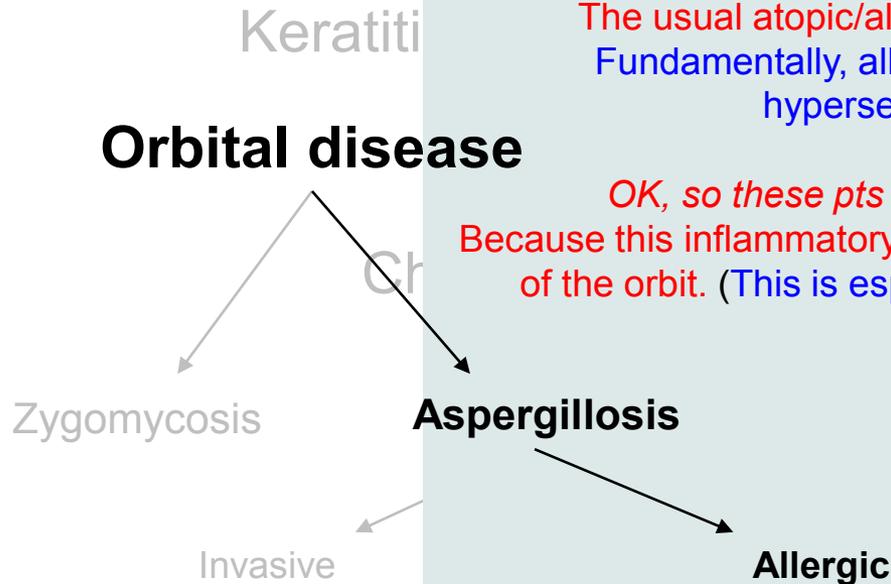
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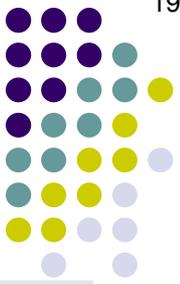
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Common Ocular Fungal Pathogens



Fungal pathogenic conditions

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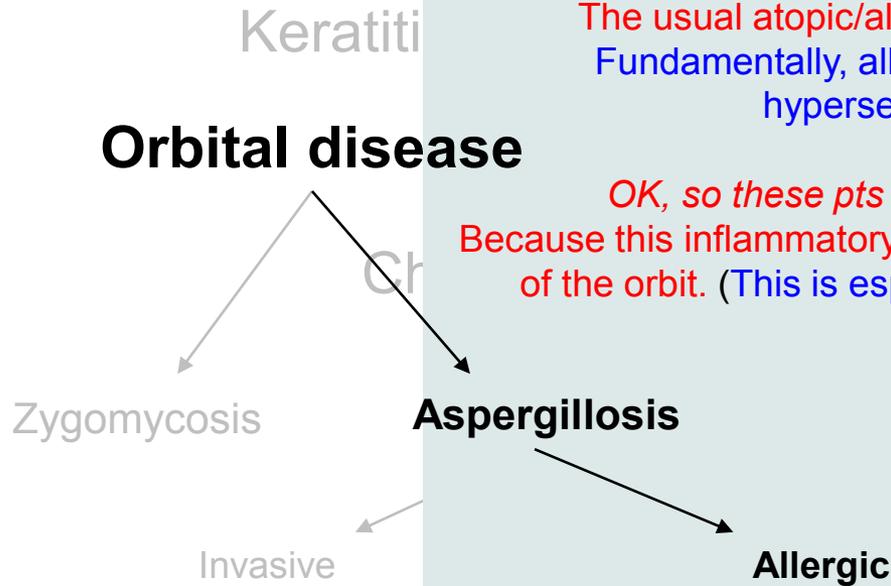
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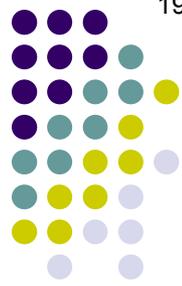
Because this inflammatory sinus-mucosa response can spread to the mucosa of the orbit. (This is especially the case if the sphenoid sinus is involved.)

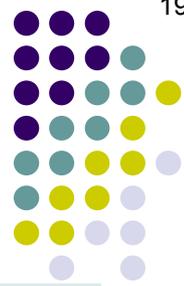


Common Ocular Fungal Pathogens



CT demonstrating allergic aspergillosis involving the left posterior ethmoid and sphenoid sinus with bony expansion and compression of the left optic nerve





Common Ocular Fungal Pathogens

Fungal pathogenic conditions

Who is the typical allergic aspergillosis pt?

An individual with a PMHx of atopy , chronic sinusitis , and nasal polyposis

What would a blood draw reveal?

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Keratitis

Orbital disease

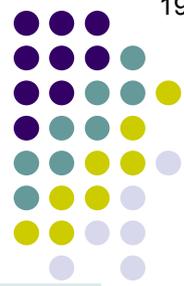
Because this **inflammatory sinus-mucosa response can spread to the mucosa of the orbit.** (This is especially the case if the sphenoid sinus is involved.)

When this occurs, how does it manifest clinically, ie, what S/S will be present?

Zygomycosis

Invasive

Allergic



Common Ocular Fungal Pathogens

Fungal pathogenic conditions

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Keratitis

Orbital disease

Because this **inflammatory sinus-mucosa response can spread to the mucosa of the orbit.** (This is especially the case if the sphenoid sinus is involved.)

When this occurs, how does it manifest clinically, ie, what S/S will be present?
In effect, the inflammation will act like a space-occupying mass near the orbital apex, thereby producing some combination of [redacted] , [redacted] , and

[redacted]
two words

Zygomycosis

Invasive

Allergic

Common Ocular Fungal Pathogens



Fungal pathogenic conditions

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Keratitis

Orbital disease

OK, the next question is, "Why is this?"

Because this **inflammatory sinus-mucosa response can spread to the mucosa of the orbit.** (This is especially the case if the sphenoid sinus is involved.)

When this occurs, how does it manifest clinically, ie, what S/S will be present?

In effect, the inflammation will act like a space-occupying mass near the orbital apex, thereby producing some combination of proptosis, ophthalmoplegia, and optic neuropathy

Zygomycosis

Invasive

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Common Ocular Fungal Pathogens



Fungal pathogenic conditions

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Keratitis

Orbital disease

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When this occurs, how does it manifest clinically, ie, what S/S will be present?

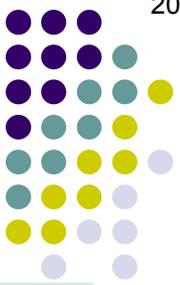
In effect, the inflammation will act like a space-occupying mass near the orbital apex, thereby producing some combination of proptosis , ophthalmoplegia , and optic neuropathy , as well as **localizing to the retrobulbar region**

Zygomycosis

Invasive

Allergic

Common Ocular Fungal Pathogens



Fungal pathogenic conditions

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Fundamentally, allergic aspergillosis is a garden-variety IgE-mediated hypersensitivity reaction of the sort often seen in atopic pts.

Keratitis

Orbital disease

OK, the next question is, "How does this happen?"

Because this **inflammatory sinus-mucosa response can spread to the mucosa of the orbit.** (This is especially the case if the sphenoid sinus is involved.)

When this occurs, how does it manifest clinically, ie, what S/S will be present?

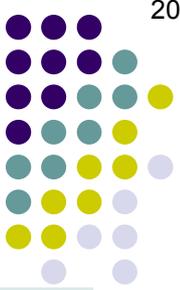
In effect, the inflammation will act like a space-occupying mass near the orbital apex, thereby producing some combination of proptosis , ophthalmoplegia , and optic neuropathy , as well as **pain localizing to the retrobulbar region**

Zygomycosis

Invasive

Allergic

Common Ocular Fungal Pathogens



Fungal pathogenic conditions

Who is the typical allergic aspergillosis pt?

An individual with a PMHx of atopy, chronic sinusitis, and nasal polyposis

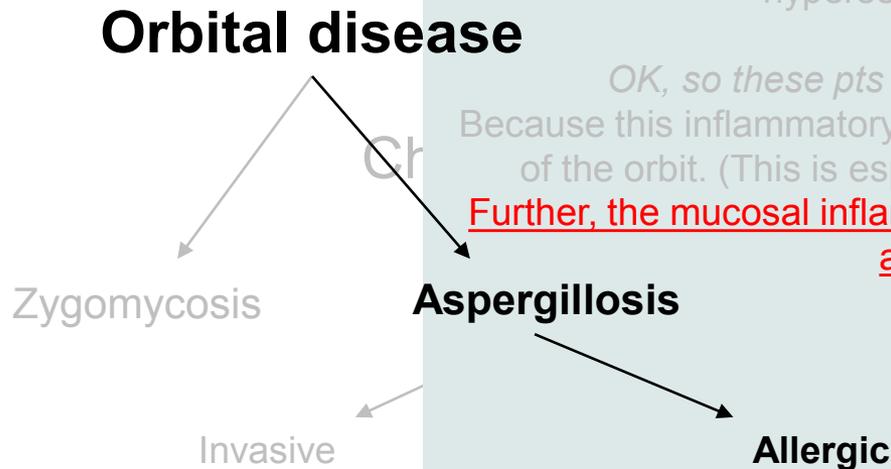
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OK, so these pts have a stuffy nose. Why is this worth talking about?

Because this inflammatory sinus-mucosa response can spread to the mucosa of the orbit. (This is especially the case if the sphenoid sinus is involved.)

Further, the mucosal inflammatory response is severe enough to erode bone, allowing the fungus access to the intracranial space.

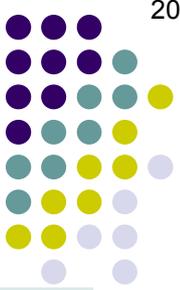


Common Ocular Fungal Pathogens



Allergic aspergillosis: Bony destruction

Common Ocular Fungal Pathogens



Fungal pathogenic conditions

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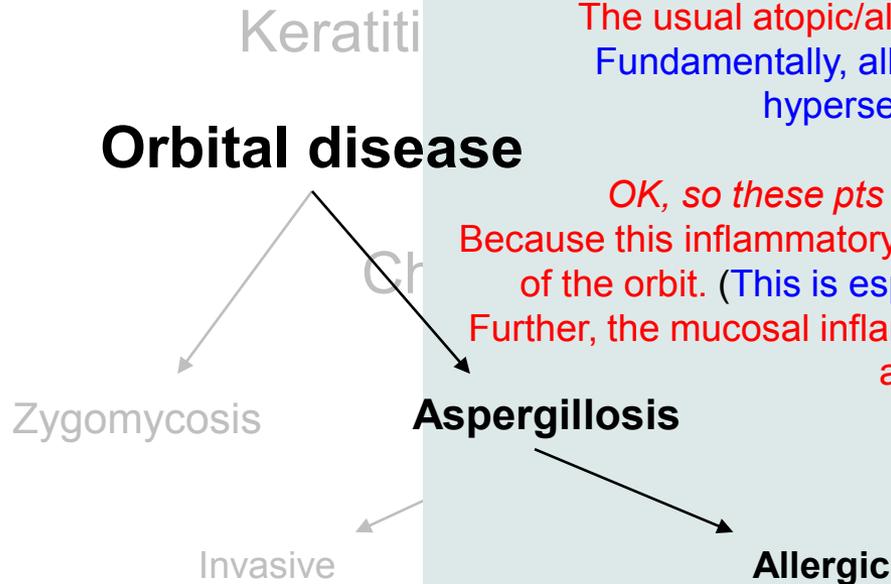
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How is allergic aspergillosis diagnosed?



Common Ocular Fungal Pathogens



Fungal pathogenic conditions

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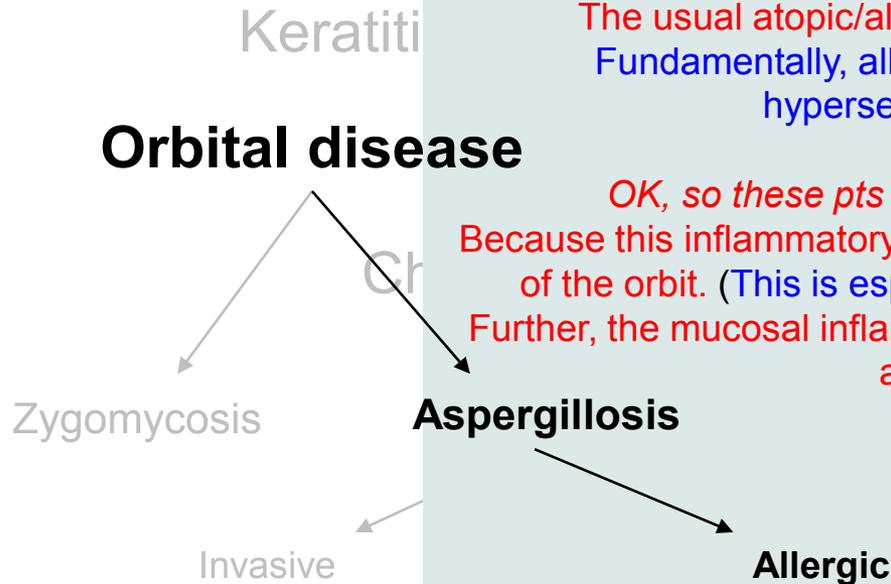
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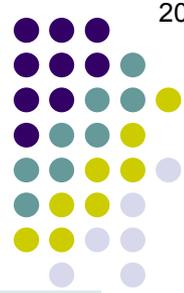
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How is allergic aspergillosis diagnosed?

Via sinus biopsy





Common Ocular Fungal Pathogens

Fungal pathogenic conditions

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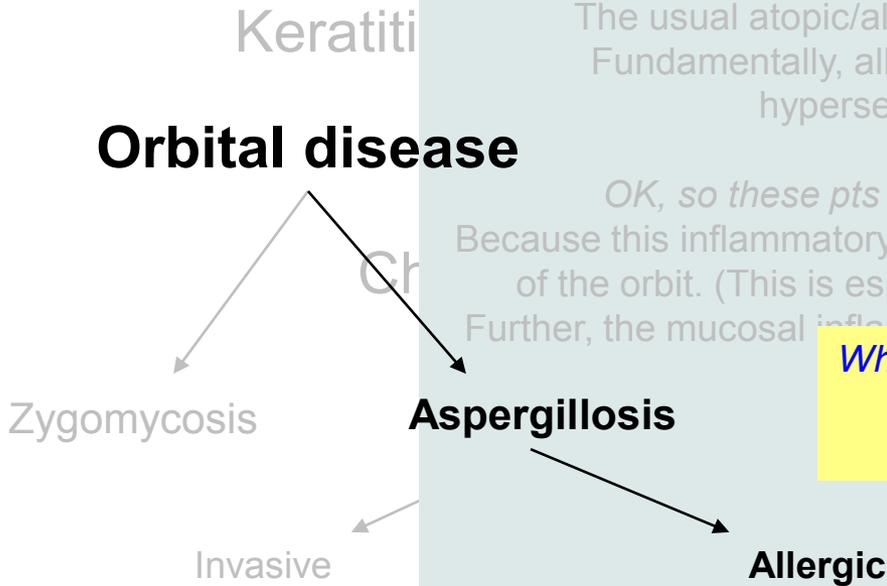
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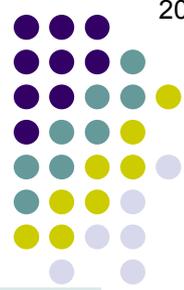
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What does the biopsy reveal?

Via **sinus biopsy**





Common Ocular Fungal Pathogens

Fungal pathogenic conditions

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What does the biopsy reveal?

Thick mucus (the classic description is 'eww like') containing fungal hyphae

Via **sinus biopsy**

Keratitis

Orbital disease

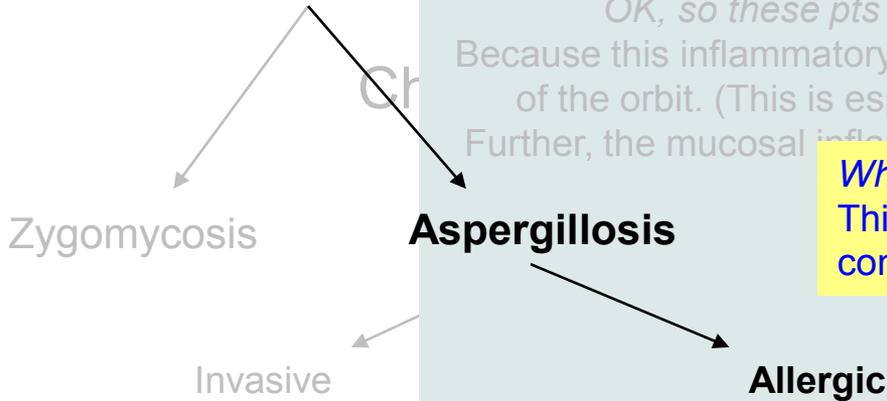
Ch

Aspergillosis

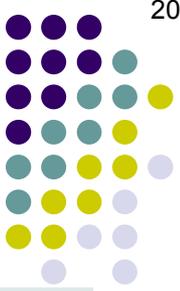
Allergic

Zygomycosis

Invasive



Common Ocular Fungal Pathogens



Fungal pathogenic conditions

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Orbital disease

Cr

What does the biopsy reveal?

Thick mucus (the classic description is 'peanut-butter like') containing fungal hyphae

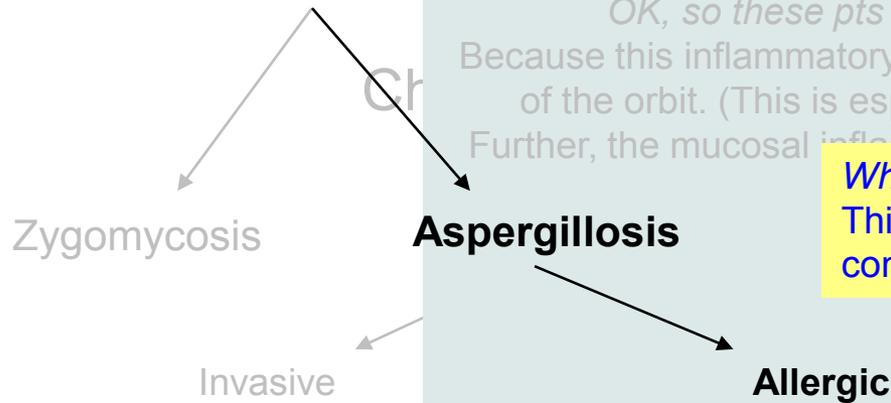
Zygomycosis

Aspergillosis

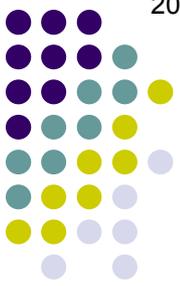
Via **sinus biopsy**

Invasive

Allergic

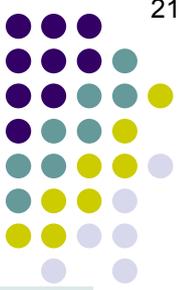


Common Ocular Fungal Pathogens



Allergic aspergillosis: Biopsy specimen plated on whole-wheat agar

Common Ocular Fungal Pathogens



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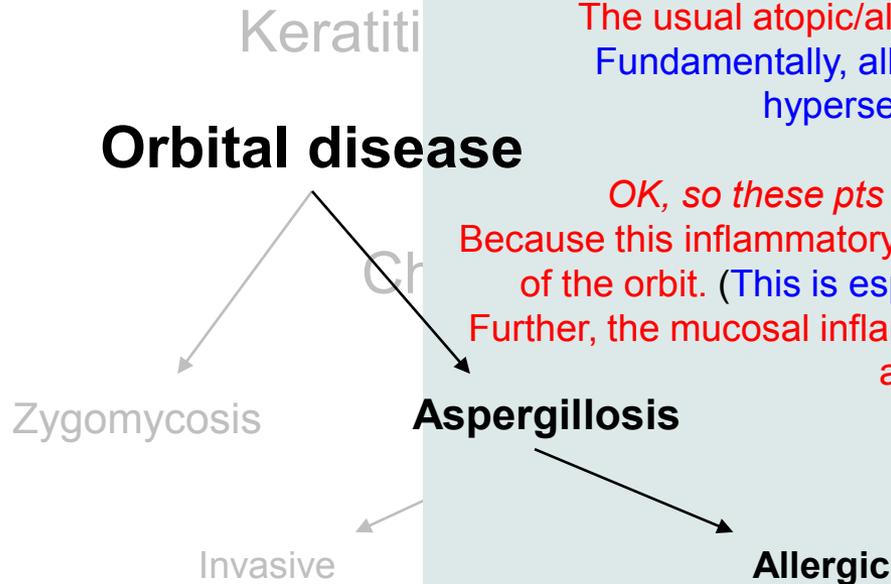
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Via sinus biopsy

How is it treated?



Common Ocular Fungal Pathogens



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How is allergic aspergillosis diagnosed?

Via sinus biopsy

How is it treated?

Via surgical debridement of the sinuses, and steroids

Keratitis

Orbital disease

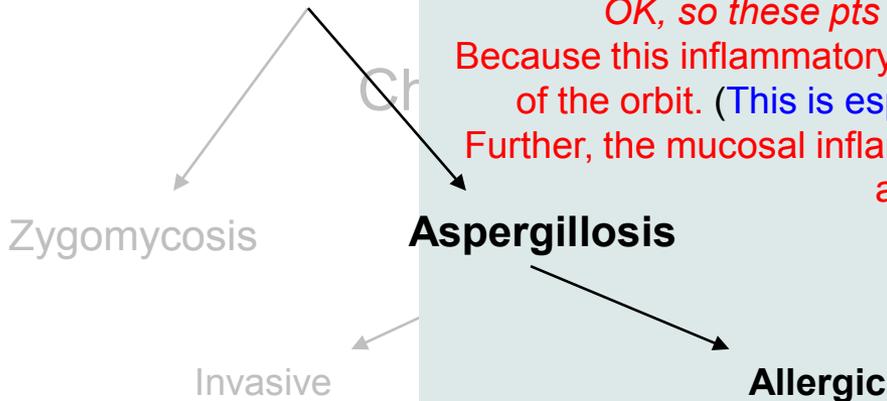
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Aspergillosis

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Common Ocular Fungal Pathogens



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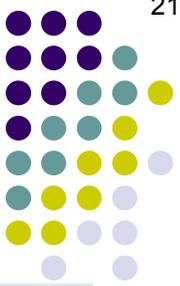
Via sinus biopsy

How is it treated?

Via surgical debridement of the sinuses, and steroids

You forgot to say 'antifungals.' And antifungals, right?

Common Ocular Fungal Pathogens



Fungal pathogenic conditions

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Common Ocular Fungal Pathogens



Fungal pathogenic conditions

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Common Ocular Fungal Pathogens



Fungal pathogenic conditions

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Orbital disease

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Zygomycosis

Aspergillosis

Invasive

Allergic

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Via sinus biopsy

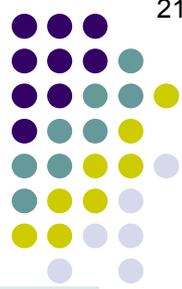
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Common Ocular Fungal Pathogens



Fungal pathogenic conditions

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Aspergillosis

Invasive

Allergic

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Via sinus biopsy

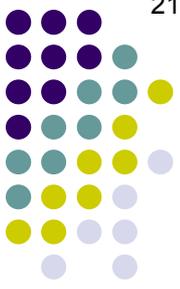
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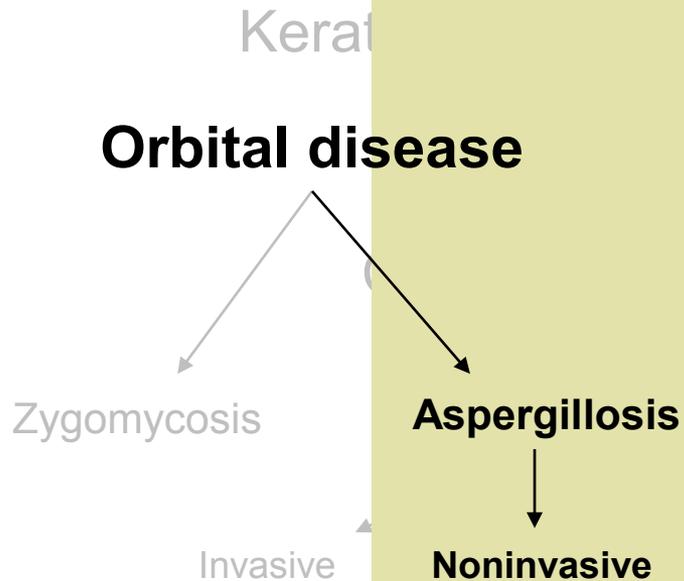
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Common Ocular Fungal Pathogens

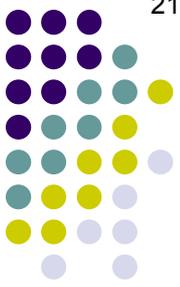


Fungal pathogenic conditions

In a nutshell, what is the pathologic process in noninvasive aspergillosis?



Common Ocular Fungal Pathogens



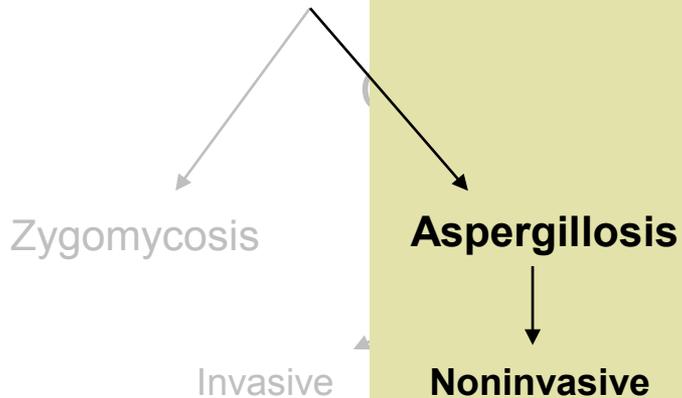
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The fungus proliferates within the air space of the sinus—ie, not *within* the mucosa so much as *upon* it. This extramucosal proliferation eventually fills the air space and forms a 'fungal ball' that acts as a space-occupying lesion.

Kerat

Orbital disease



Common Ocular Fungal Pathogens



Fungal pathogenic conditions

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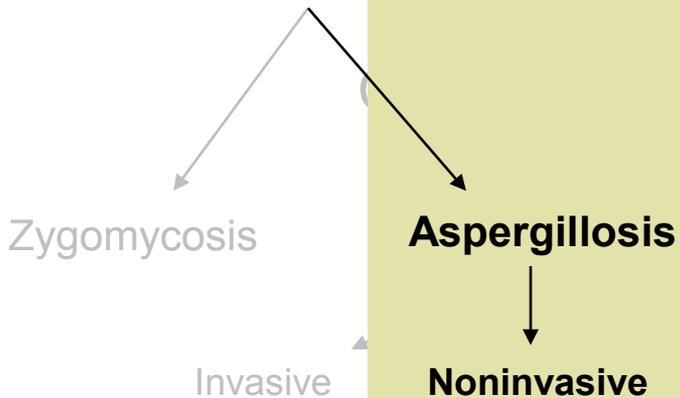
The fungus proliferates within the air space of the sinus—ie, not *within* the mucosa so much as *upon* it. This leads to the formation of a **'fungal ball'** and forms a mass of hyphae that fills the sinus and

What is the formal name for an Aspergillus fungal ball?

'fungal ball'

Kerat

Orbital disease



Common Ocular Fungal Pathogens



Fungal pathogenic conditions

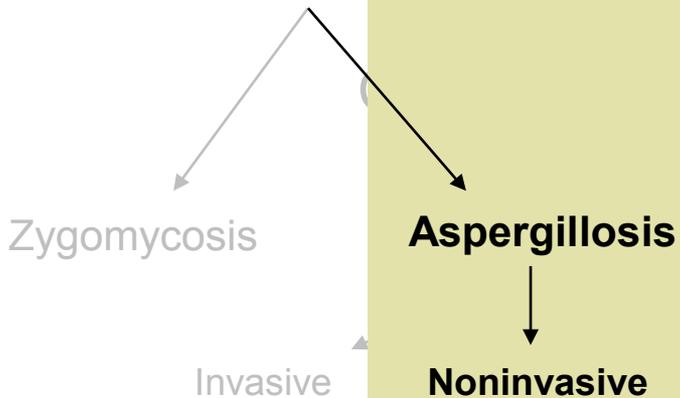
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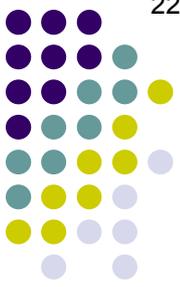
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An 'aspergilloma'

Kerat

Orbital disease



Common Ocular Fungal Pathogens



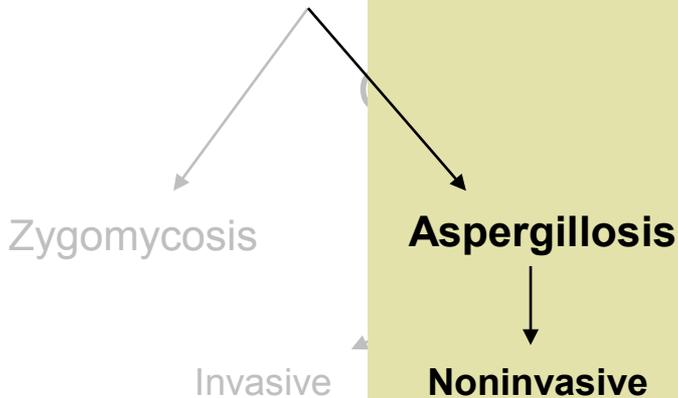
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Kerat

Orbital disease



Common Ocular Fungal Pathogens



Noninvasive aspergillosis: Orbital aspergilloma



Common Ocular Fungal Pathogens



Fungal pathogenicic conditions

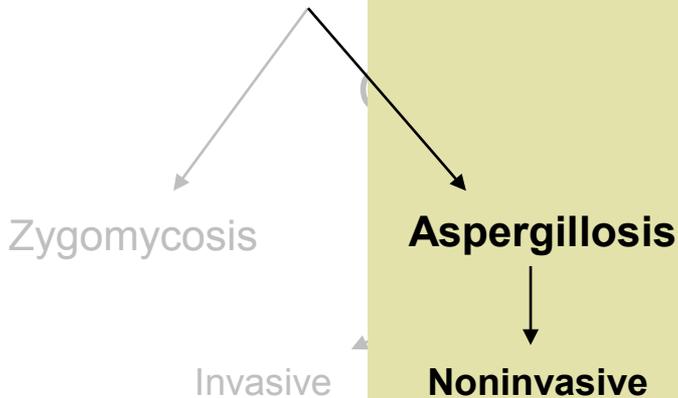
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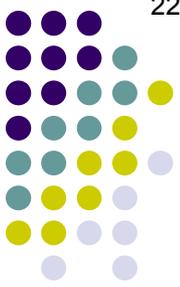
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Which sinuses are adjacent to the orbital apex?

Orbital disease



Common Ocular Fungal Pathogens



Fungal pathogenicic conditions

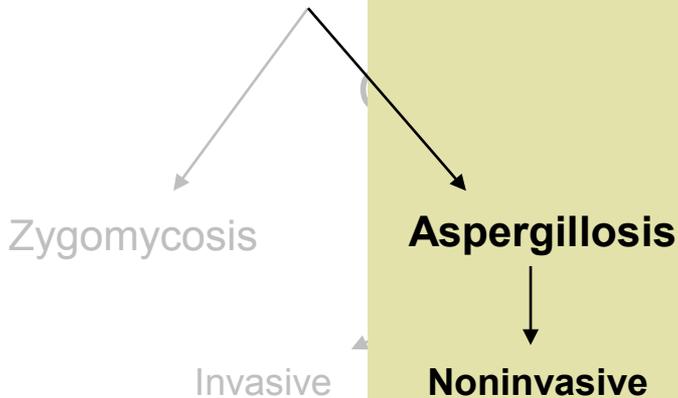
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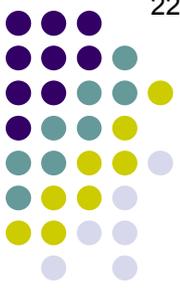
mass—proptosis, decreased vision, and pain.

*Which sinuses are adjacent to the orbital apex?
The sphenoid and ethmoid*

Orbital disease



Common Ocular Fungal Pathogens



Fungal pathogenicic conditions

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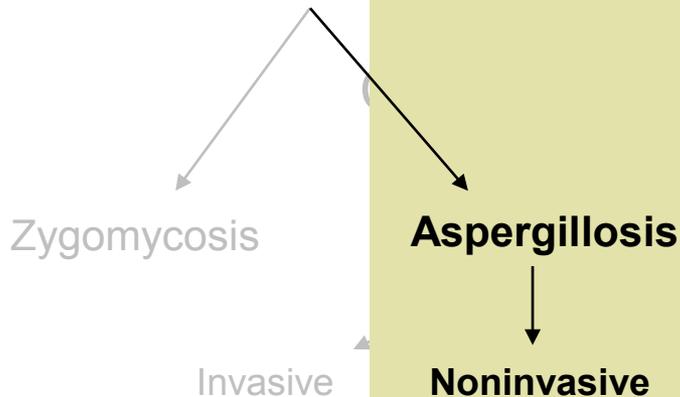
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Which sinuses are especially prone to hosting aspergillomas?

Orbital disease



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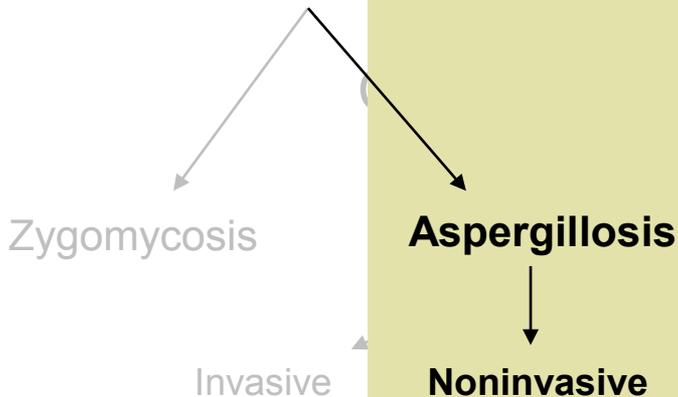
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The sphenoid and ethmoid

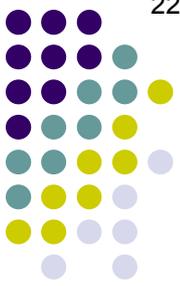
Orbital disease



Common Ocular Fungal Pathogens



CT showing large aspergilloma invading the sphenoid sinus and extending posteriorly with compression of the left optic nerve



Common Ocular Fungal Pathogens



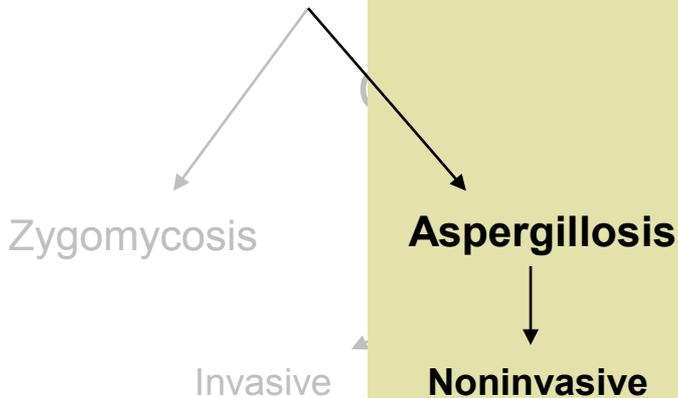
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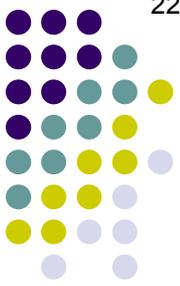
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Orbital disease

In addition to orbital S/S, what other complaints are typical?



Common Ocular Fungal Pathogens



Fungal pathogenic conditions

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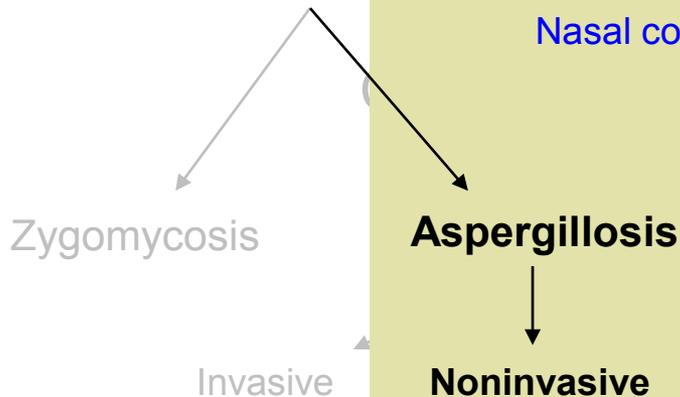
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Kerat

Orbital disease

In addition to orbital S/S, what other complaints are typical?

Nasal congestion and rhinorrhea, and HA localizing to the periorbital region



Common Ocular Fungal Pathogens



Fungal pathogenic conditions

In a nutshell, what is the pathologic process in noninvasive aspergillosis?

The fungus proliferates within the air space of the sinus—ie, not *within* the mucosa so much as *upon* it. This extramucosal proliferation eventually fills the air space and forms a 'fungal ball' that acts as a space-occupying lesion. **If an aspergilloma forms near the orbital apex, it will produce the same signs and symptoms as any other mass—proptosis, decreased VA, ophthalmoplegia, and pain.**

Kerat

Orbital disease

In addition to orbital S/S, what other complaints are typical?

Nasal congestion and rhinorrhea, and HA localizing to the periorbital region

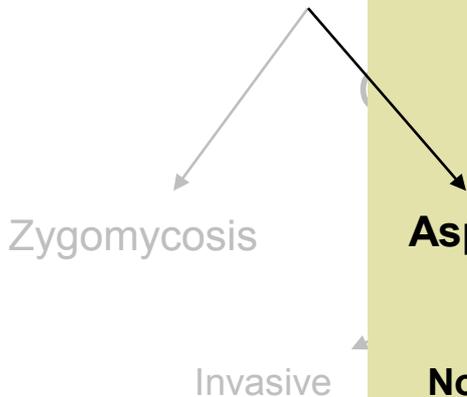
How much inflammation is typically associated with noninvasive aspergillosis?

Zygomycosis

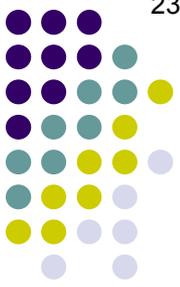
Invasive

Aspergillosis

Noninvasive



Common Ocular Fungal Pathogens



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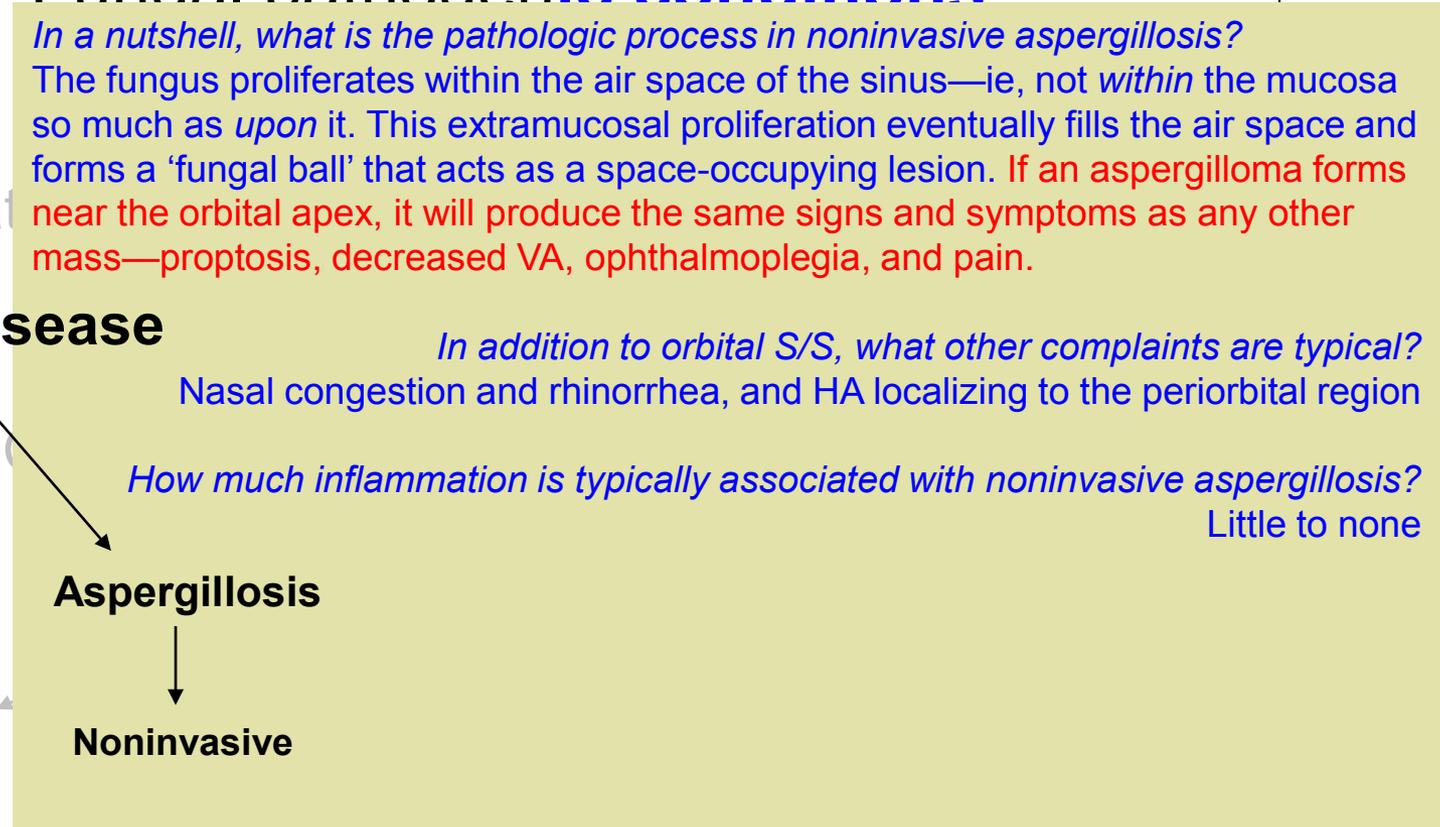
Little to none

Zygomycosis

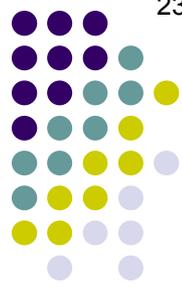
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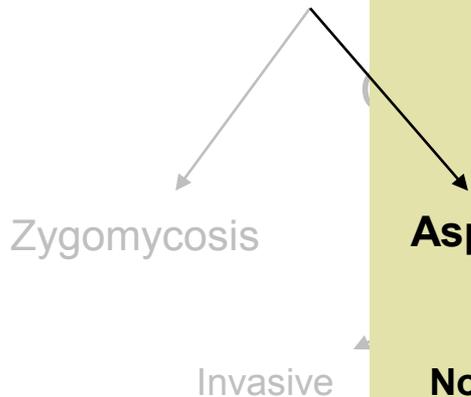
How much bony erosion typically occurs?

Aspergillosis

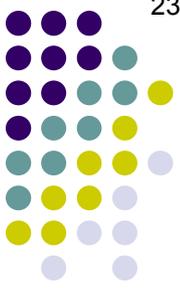
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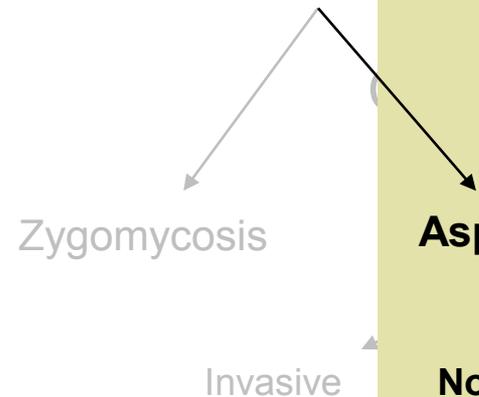
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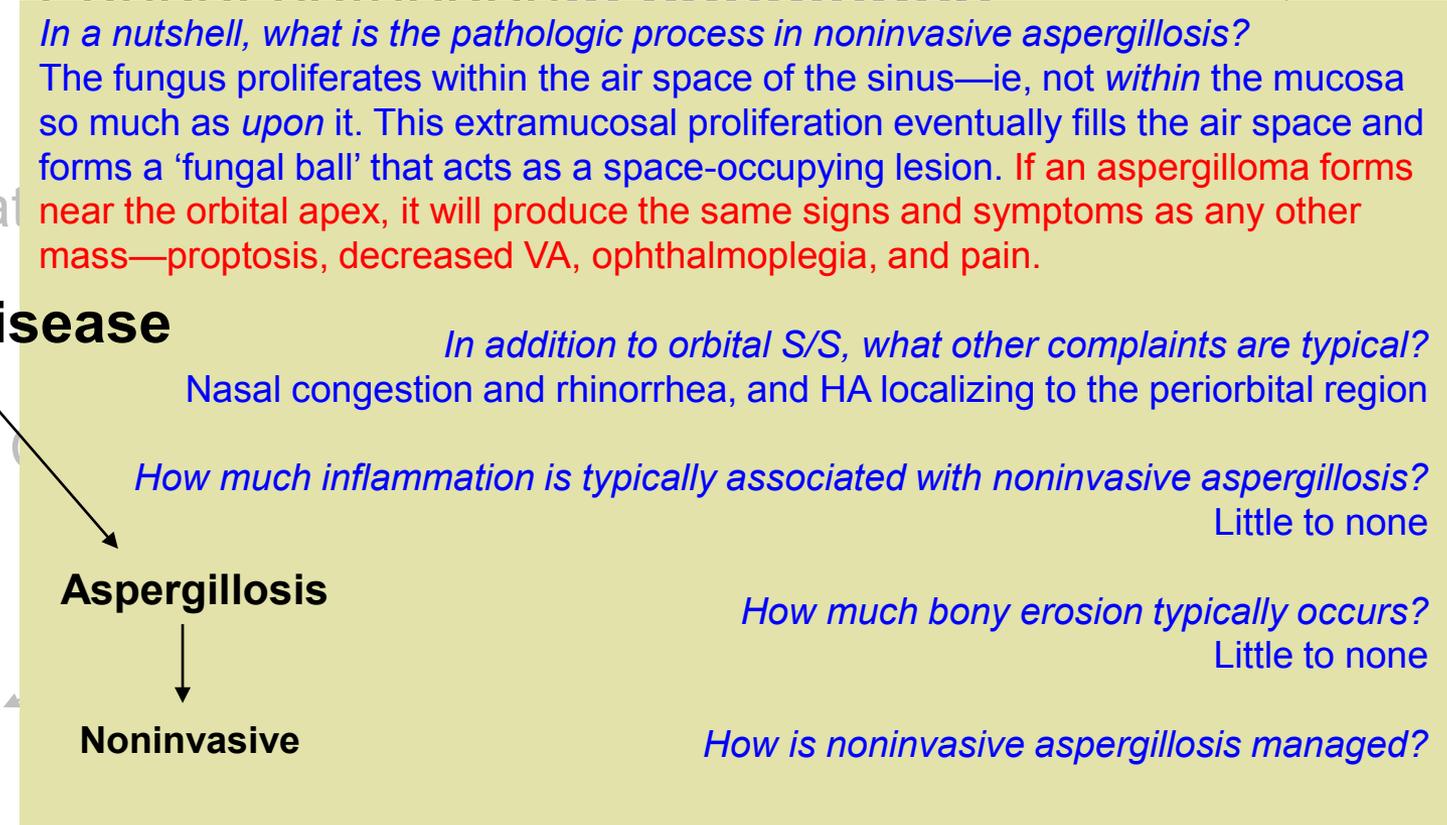
How is noninvasive aspergillosis managed?

Zygomycosis

Aspergillosis

Invasive

Noninvasive



Common Ocular Fungal Pathogens



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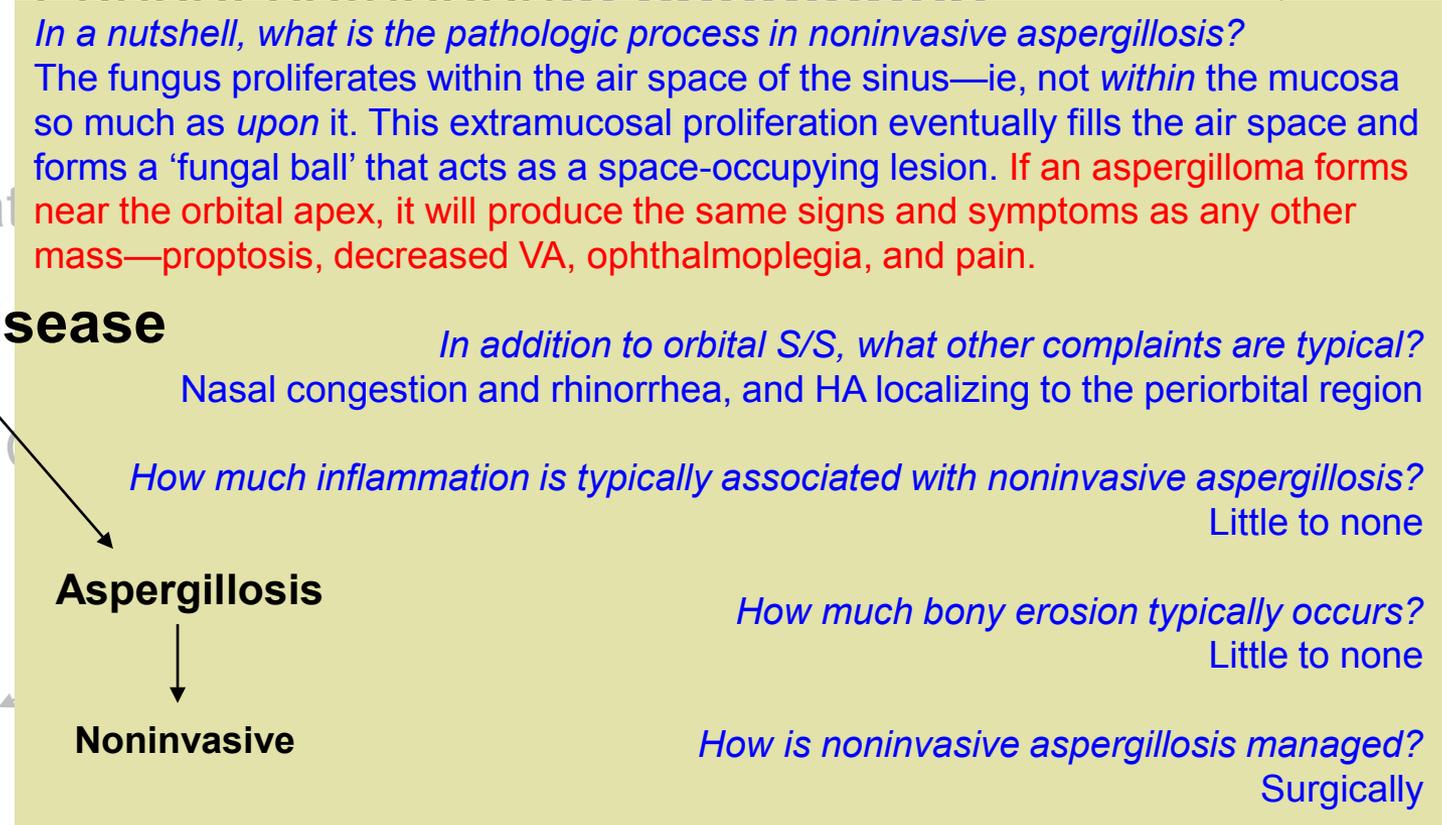
Surgically

Zygomycosis

Aspergillosis

Invasive

Noninvasive



Common Ocular Fungal Pathogens



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Are noninvasive aspergillosis pts immunocompromised like invasive aspergillosis pts, or immunocompetent like allergic aspergillosis pts?

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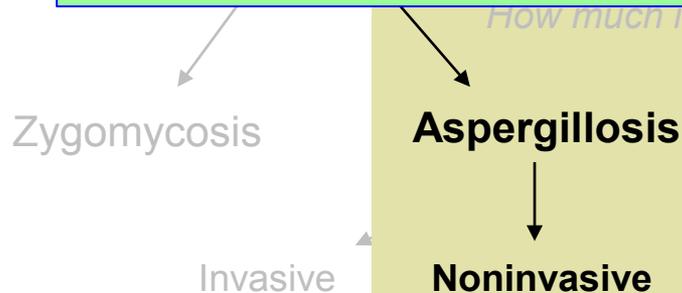
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Surgically



Common Ocular Fungal Pathogens



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Zygomycosis

Aspergillosis

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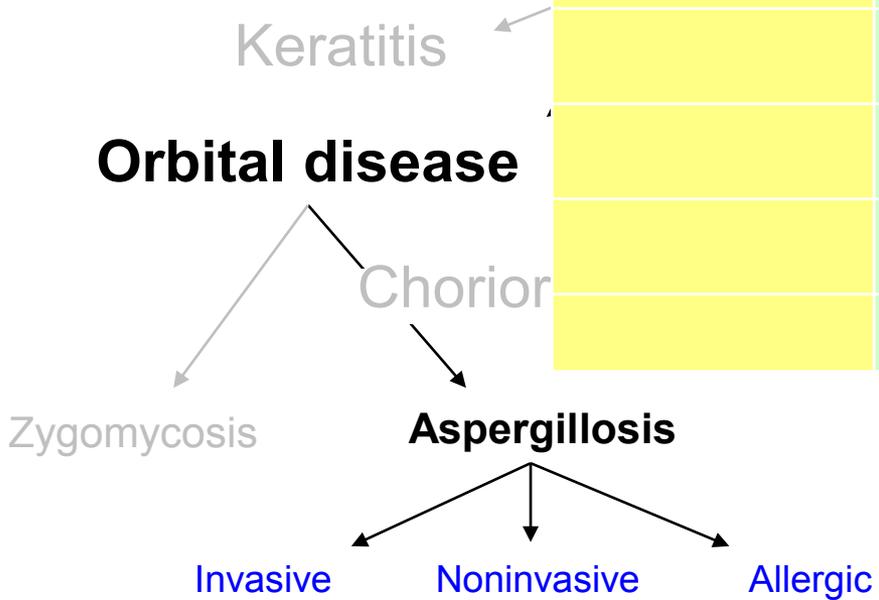
Surgically



Common Ocular Fungal Pathogens

Orbital aspergillosis t;l;dr

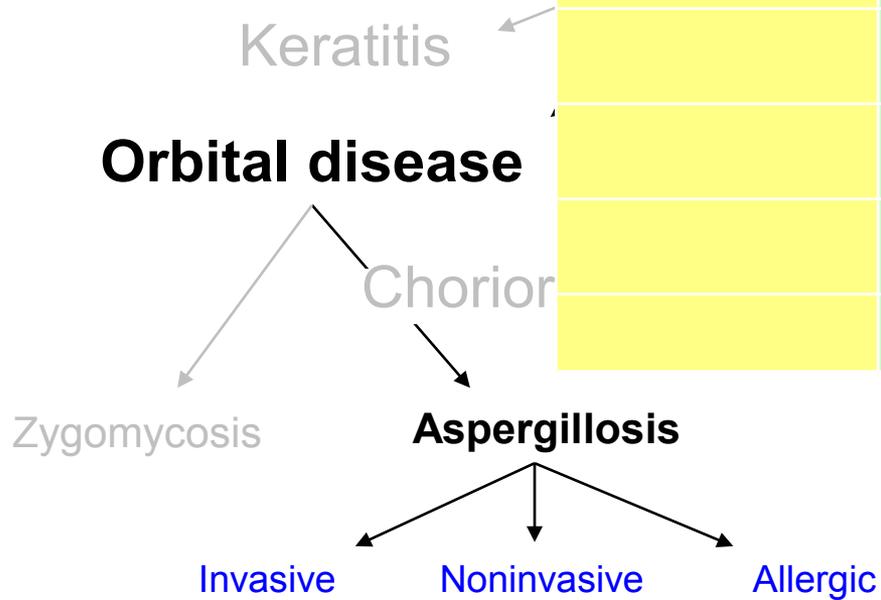
Fungi		Invasive aspergillosis	Allergic aspergillosis	Noninvasive aspergillosis
	Immunostatus	?	?	?



Common Ocular Fungal Pathogens



Orbital aspergillosis t;l;dr				
Fungi		<i>Invasive aspergillosis</i>	<i>Allergic aspergillosis</i>	<i>Noninvasive aspergillosis</i>
	Immunostatus	Compromised	Competent	Competent
	Bony erosions?	?	?	?

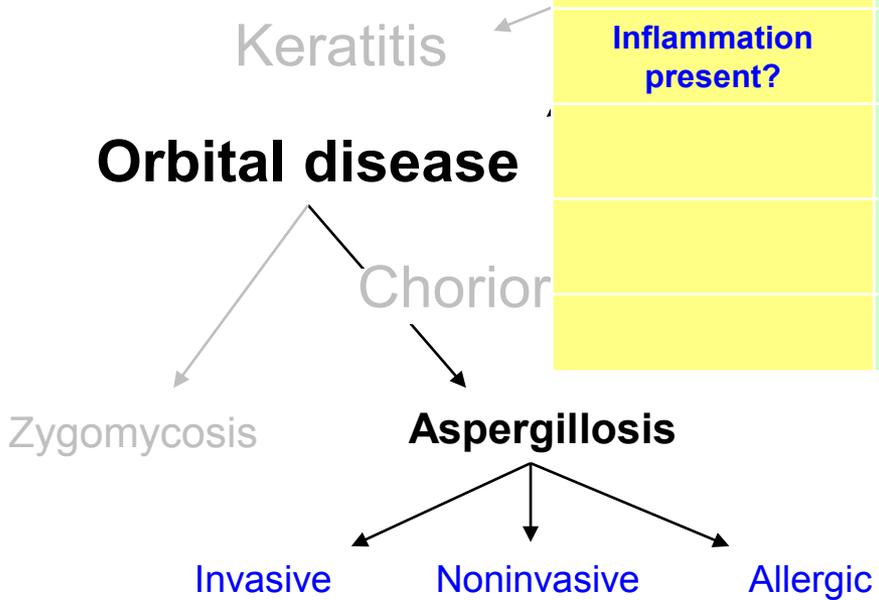




Common Ocular Fungal Pathogens

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	Immunostatus	Compromised	Competent	Competent
	Bony erosions?	Yes	Yes	No
	Inflammation present?	?	?	?

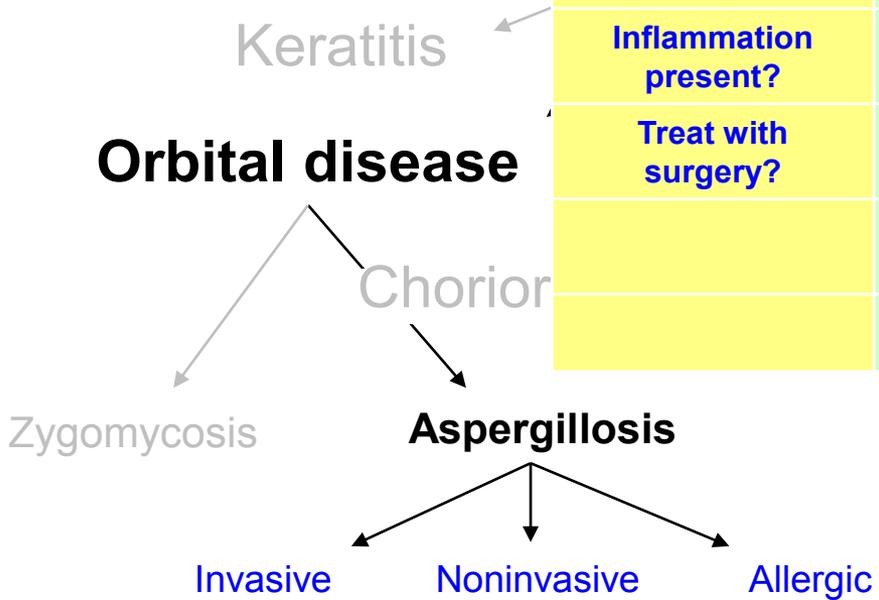




Common Ocular Fungal Pathogens

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Fungi		<i>Invasive aspergillosis</i>	<i>Allergic aspergillosis</i>	<i>Noninvasive aspergillosis</i>
	Immunostatus	Compromised	Competent	Competent
	Bony erosions?	Yes	Yes	No
	Inflammation present?	Yes	Yes	No
	Treat with surgery?	?	?	?

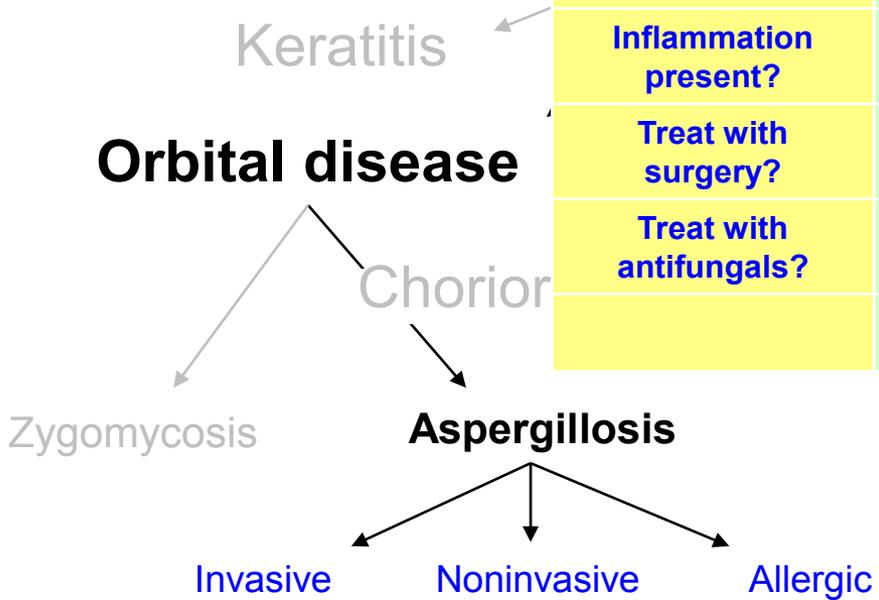




Common Ocular Fungal Pathogens

Orbital aspergillosis tl;dr

Fungus		<i>Invasive aspergillosis</i>	<i>Allergic aspergillosis</i>	<i>Noninvasive aspergillosis</i>
	Immunostatus	Compromised	Competent	Competent
	Bony erosions?	Yes	Yes	No
	Inflammation present?	Yes	Yes	No
	Treat with surgery?	Yes	Yes	Yes
	Treat with antifungals?	?	?	?



Common Ocular Fungal Pathogens



Orbital aspergillosis t;l;dr				
Fungus		<i>Invasive aspergillosis</i>	<i>Allergic aspergillosis</i>	<i>Noninvasive aspergillosis</i>
	Immunostatus	Compromised	Competent	Competent
	Bony erosions?	Yes	Yes	No
Keratitis	Inflammation present?	Yes	Yes	No
Orbital disease	Treat with surgery?	Yes	Yes	Yes
	Treat with antifungals?	Yes	No	No
	Mortality rate?	?	?	?

Zygomycosis

Aspergillosis

Invasive

Noninvasive

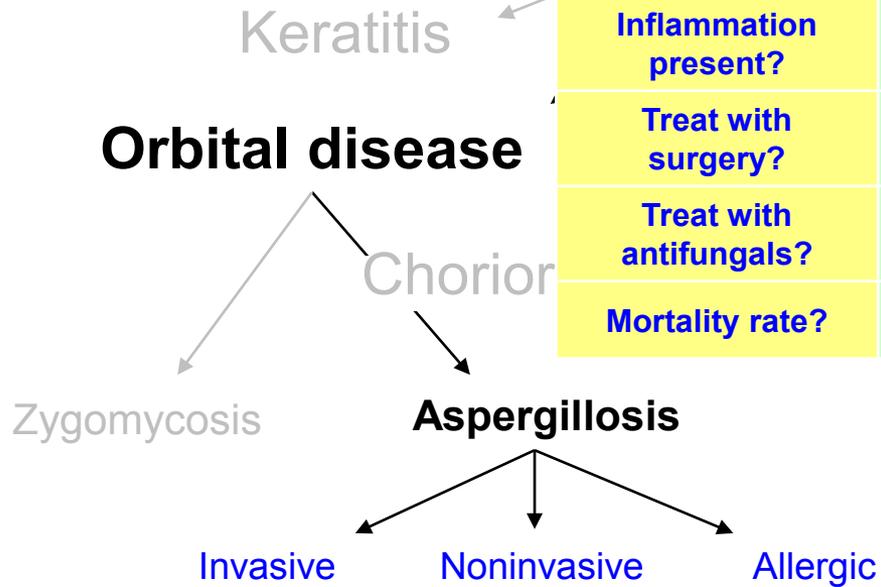
Allergic

Chorioid

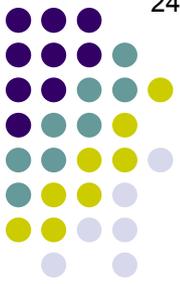
Common Ocular Fungal Pathogens



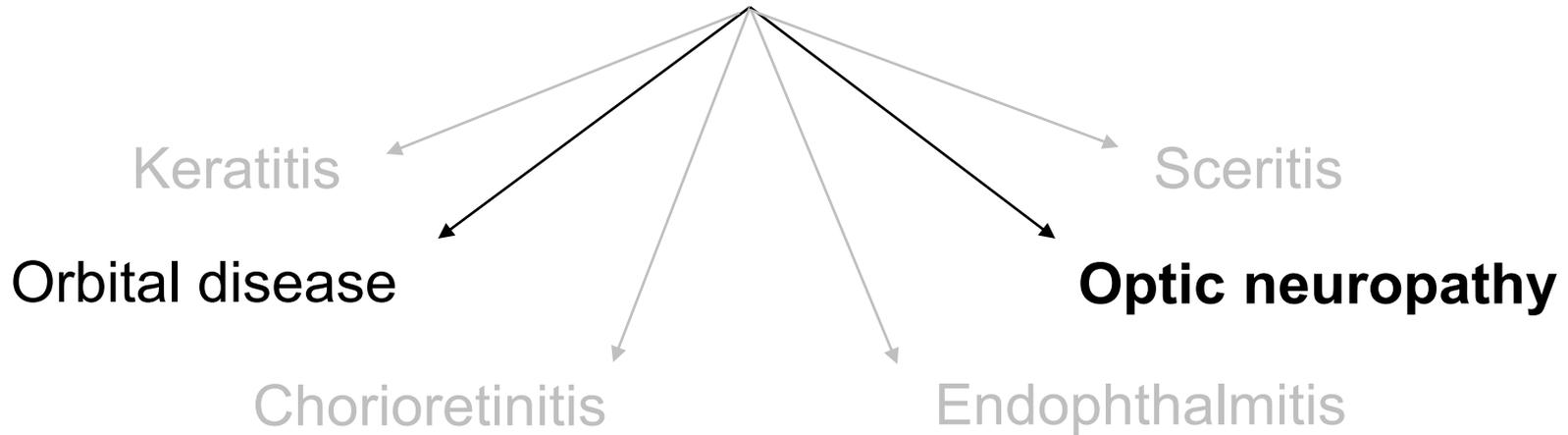
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	Immunostatus	Compromised	Competent	Competent
	Bony erosions?	Yes	Yes	No
	Inflammation present?	Yes	Yes	No
	Treat with surgery?	Yes	Yes	Yes
	Treat with antifungals?	Yes	No	No
	Mortality rate?	High	Lower	Lowest



Common Ocular Fungal Pathogens

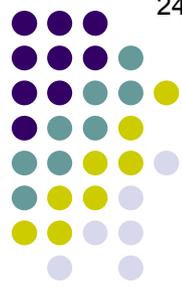


Fungal pathogenic **ic conditions**

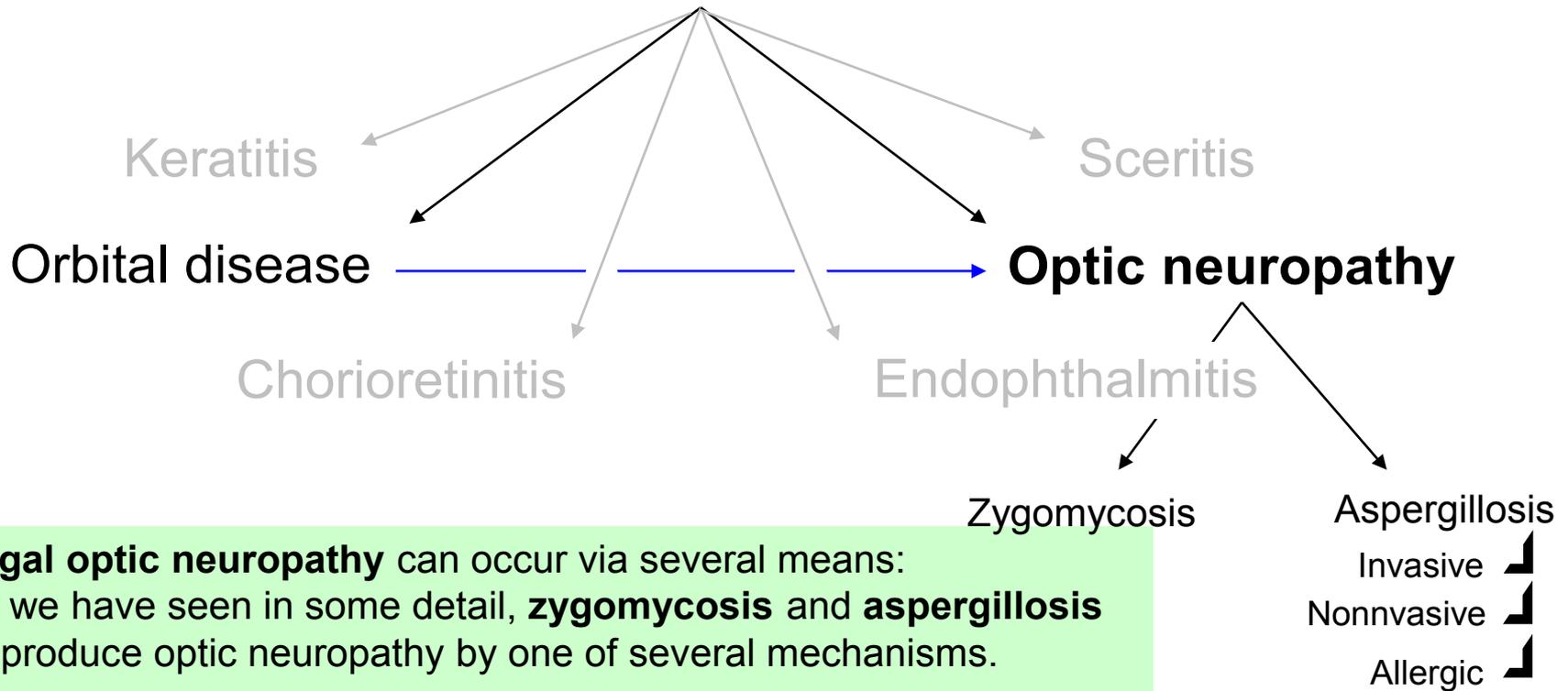


Fungal optic neuropathy can occur via several means:

Common Ocular Fungal Pathogens



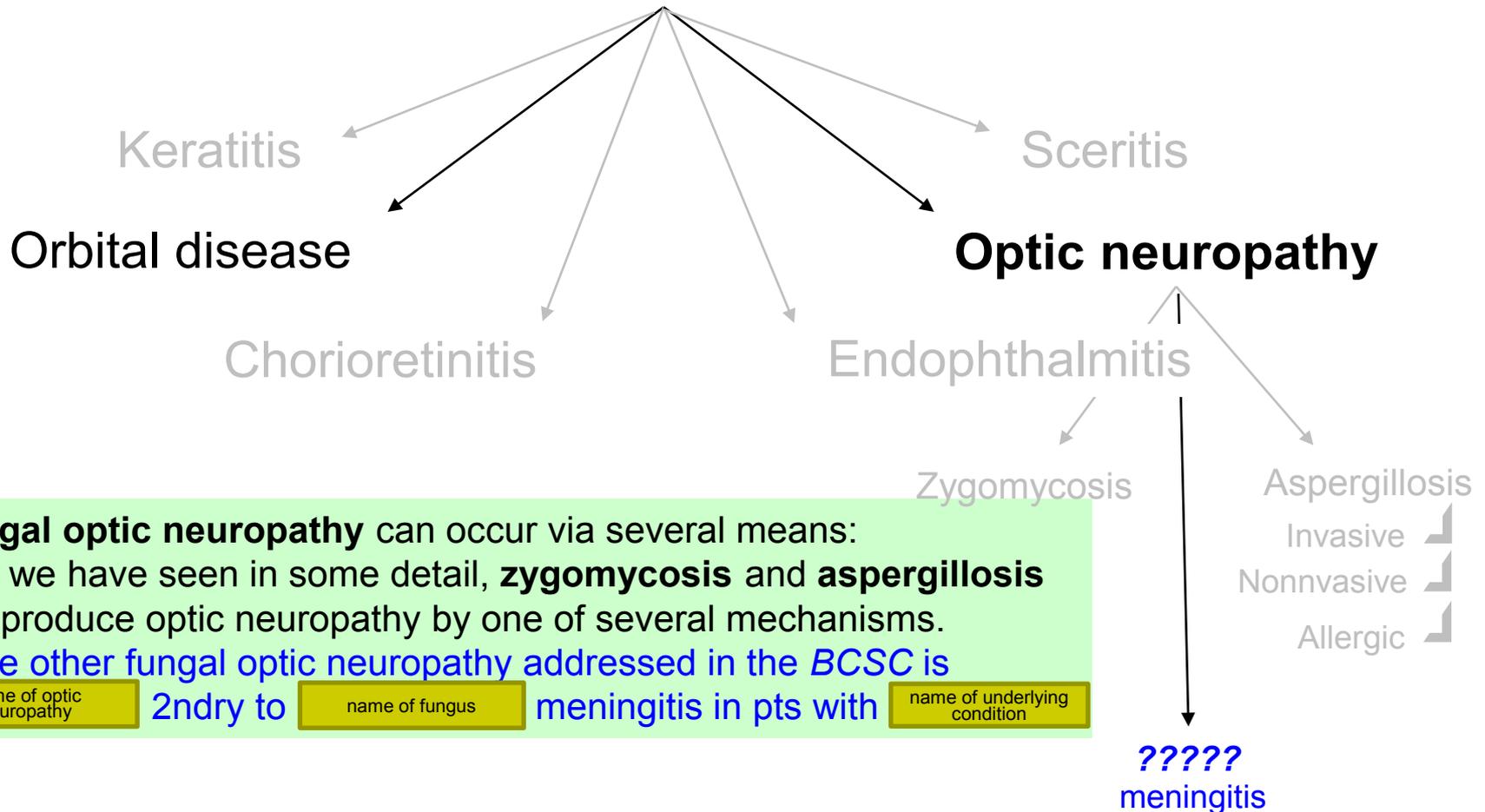
Fungal pathogenic conditions



Common Ocular Fungal Pathogens



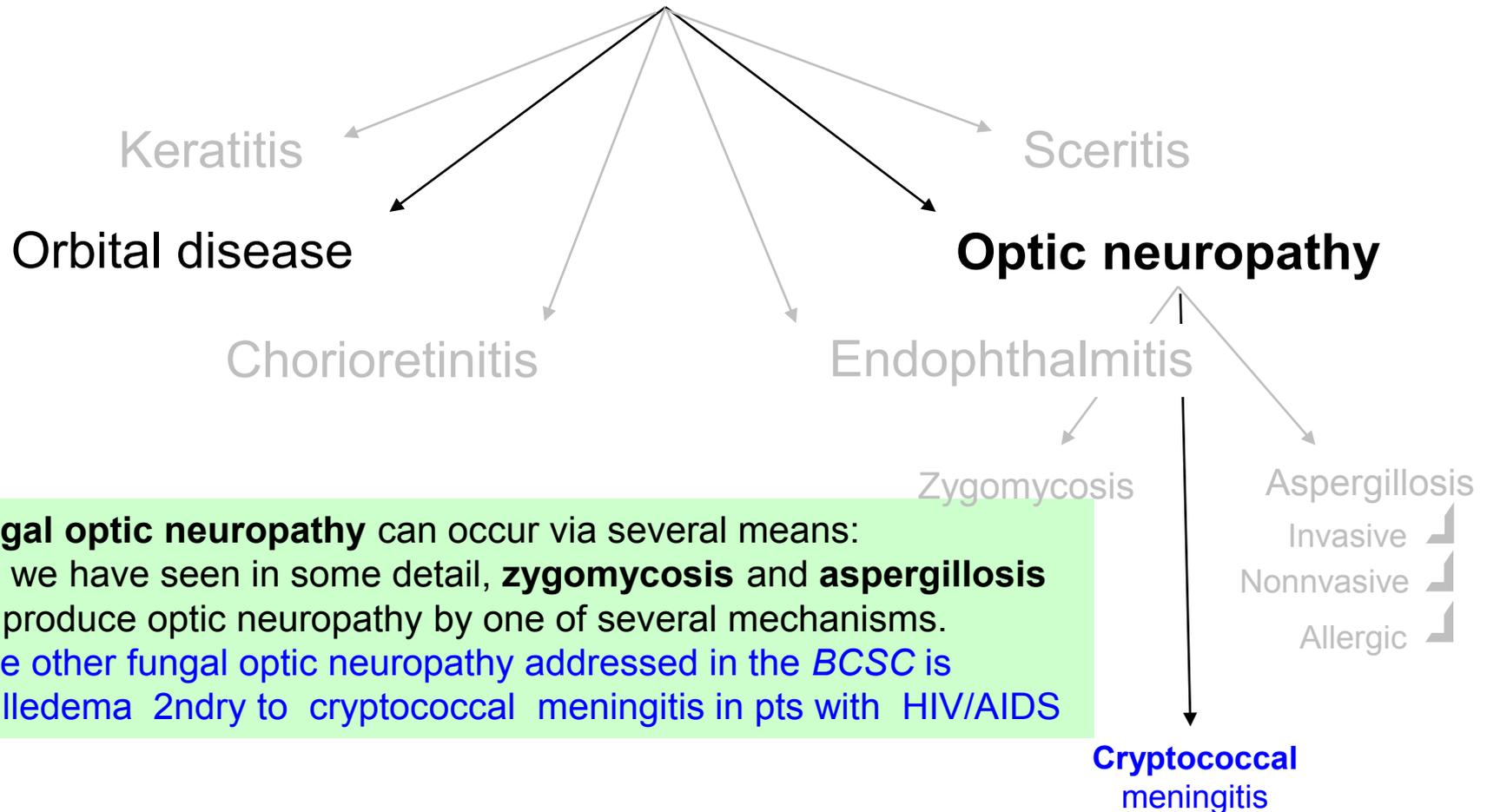
Fungal pathogenic conditions

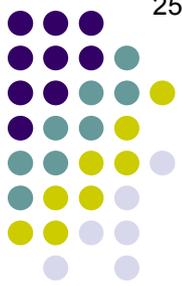


Common Ocular Fungal Pathogens

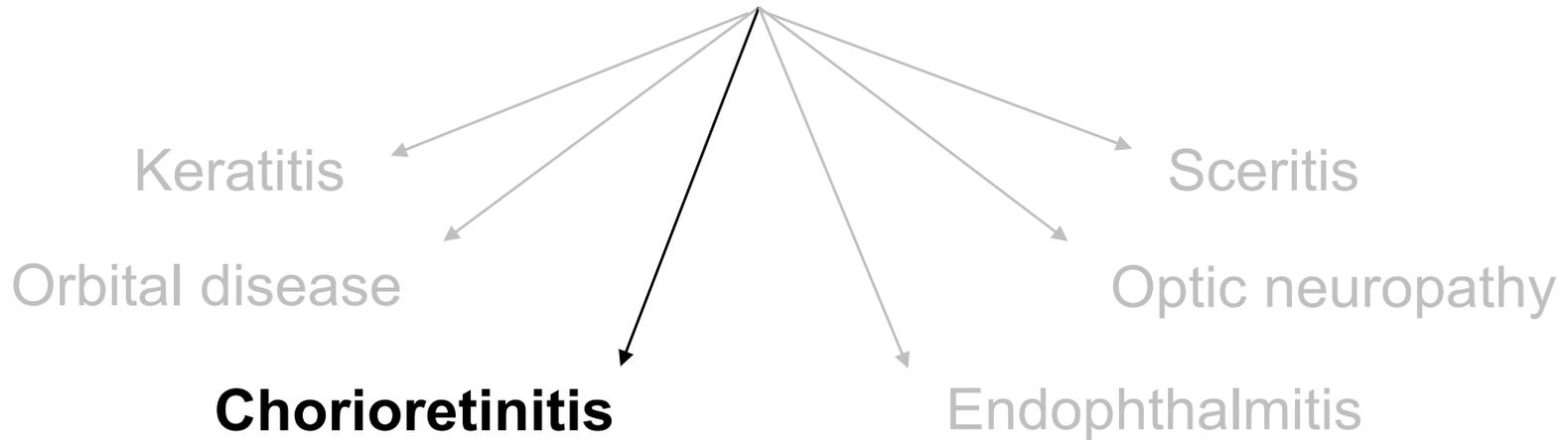


Fungal pathogenicic conditions





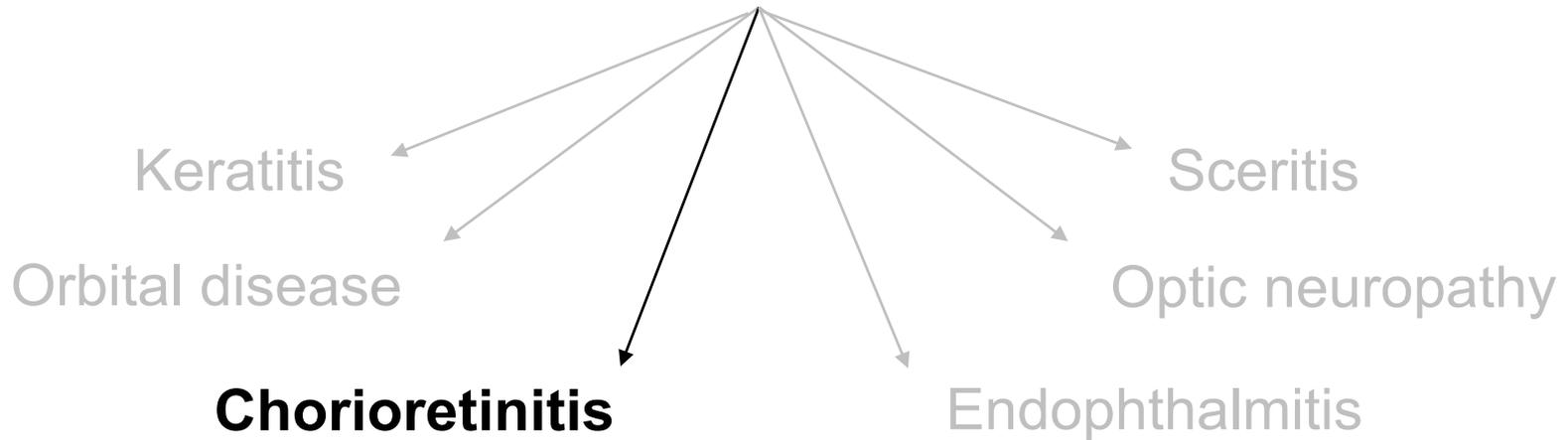
Fungal pathogenicic conditions



Is fungal chorioretinitis a common, or rare entity?



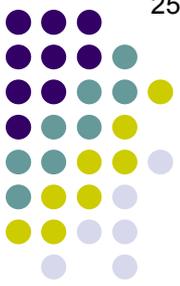
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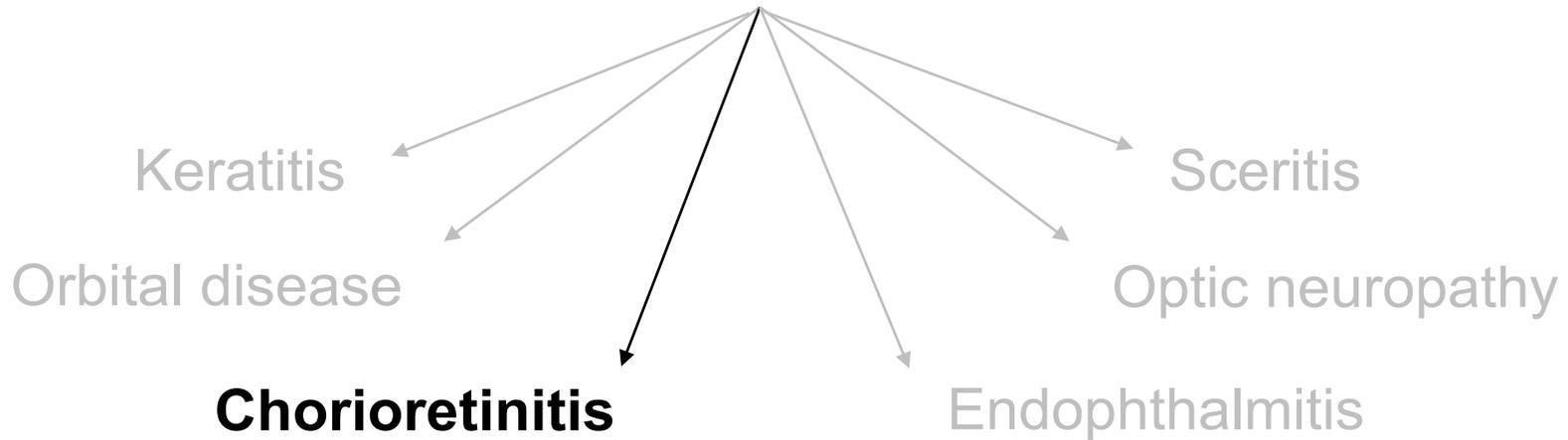
Is fungal chorioretinitis a common, or rare entity?

It is quite rare

Common Ocular Fungal Pathogens



Fungal pathogenic **ic conditions**

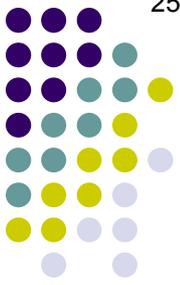


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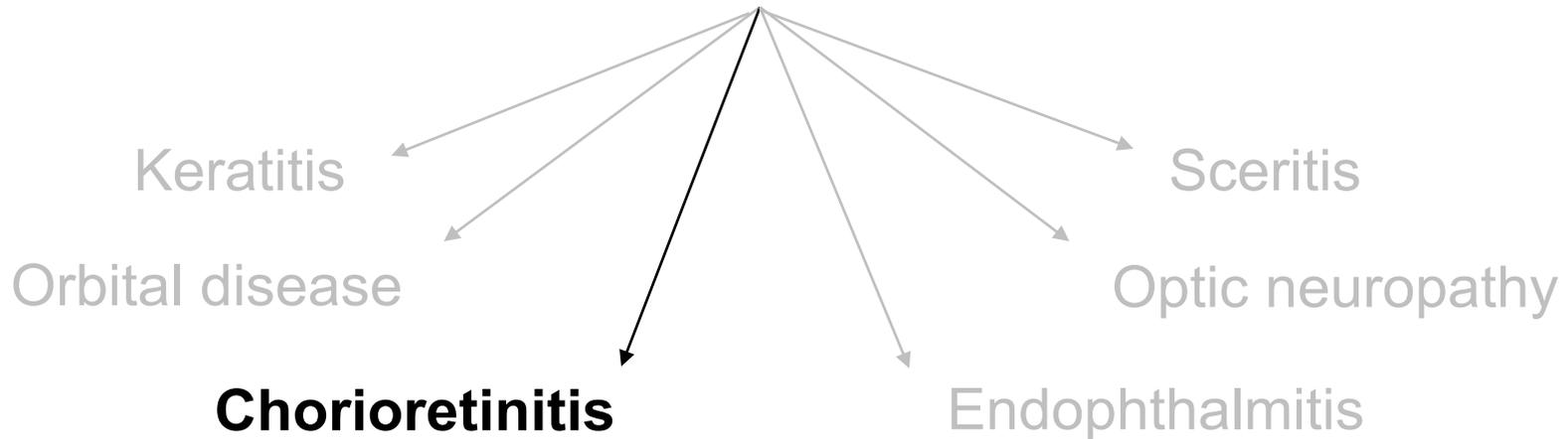
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It occurs almost exclusively in one sort of pt—what sort is that?

Common Ocular Fungal Pathogens



Fungal pathogenic **ic conditions**



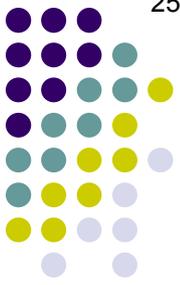
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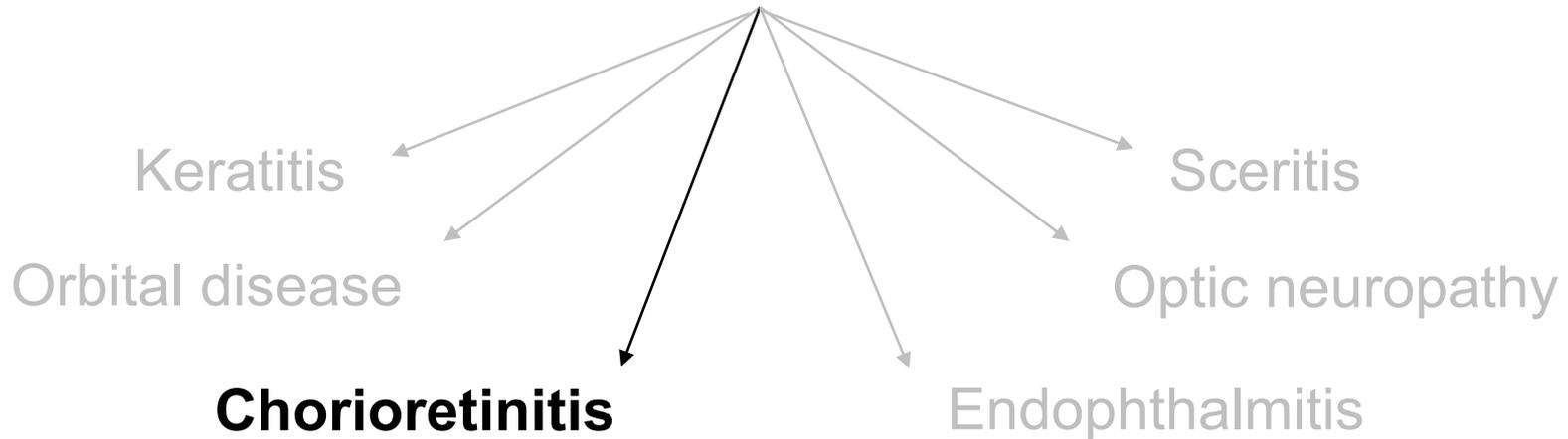
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Debilitated via AIDS, malignancy, steroids, chronic illness, etc

Common Ocular Fungal Pathogens



Fungal pathogenic **ic conditions**



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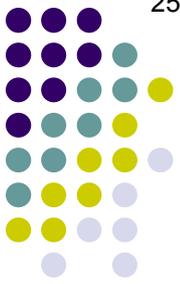
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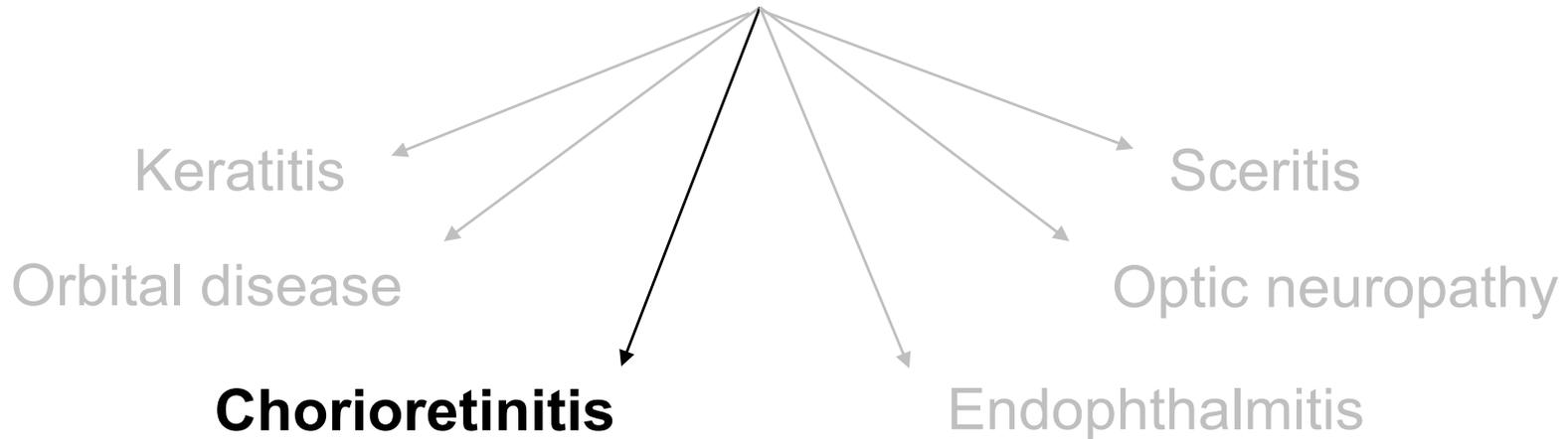
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Common Ocular Fungal Pathogens



Fungal pathogenic **ic conditions**



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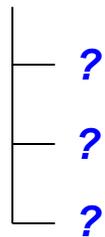
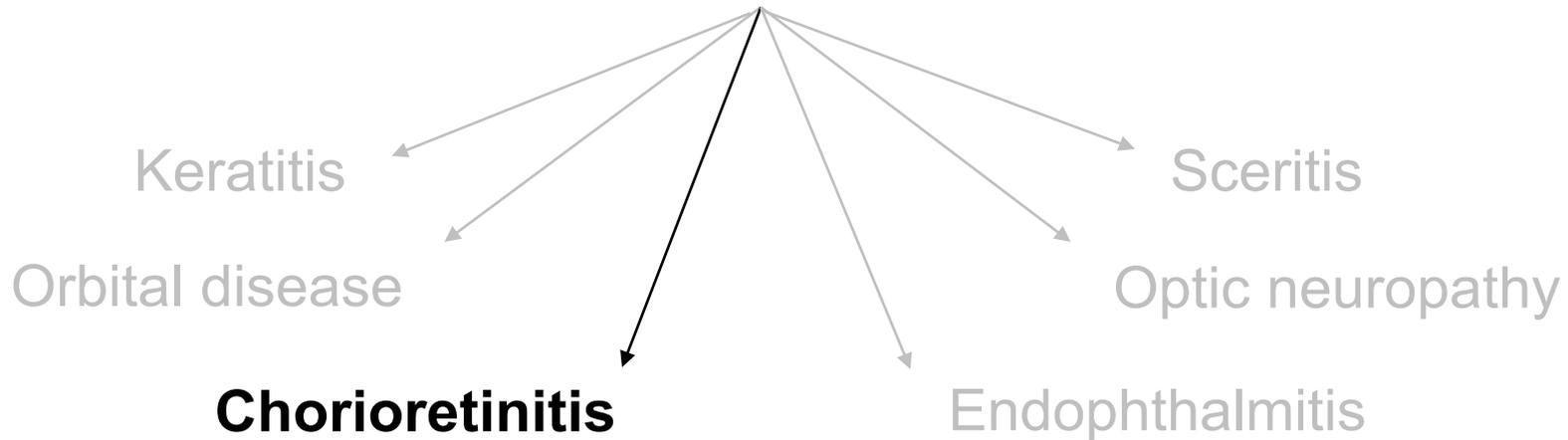
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Fungemia, ie, hematogenous spread from elsewhere

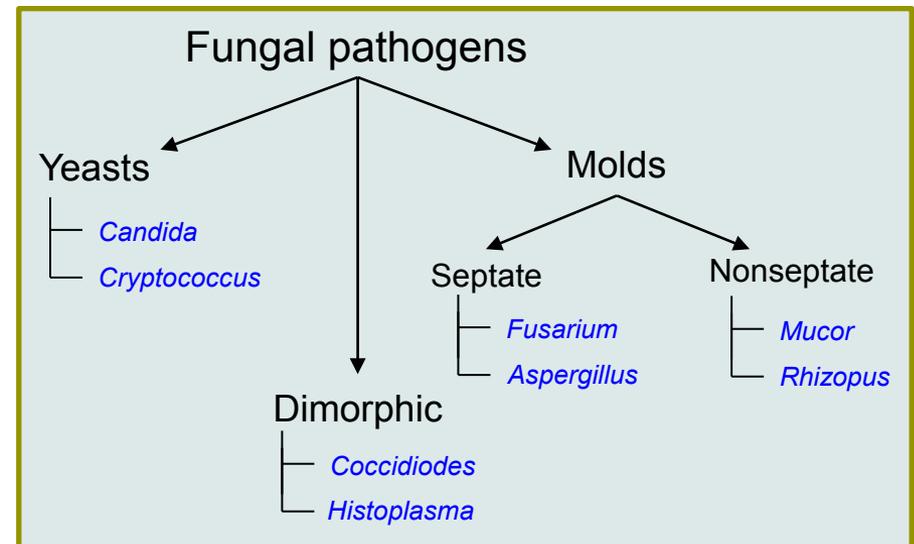
Common Ocular Fungal Pathogens



Fungal pathogenic conditions



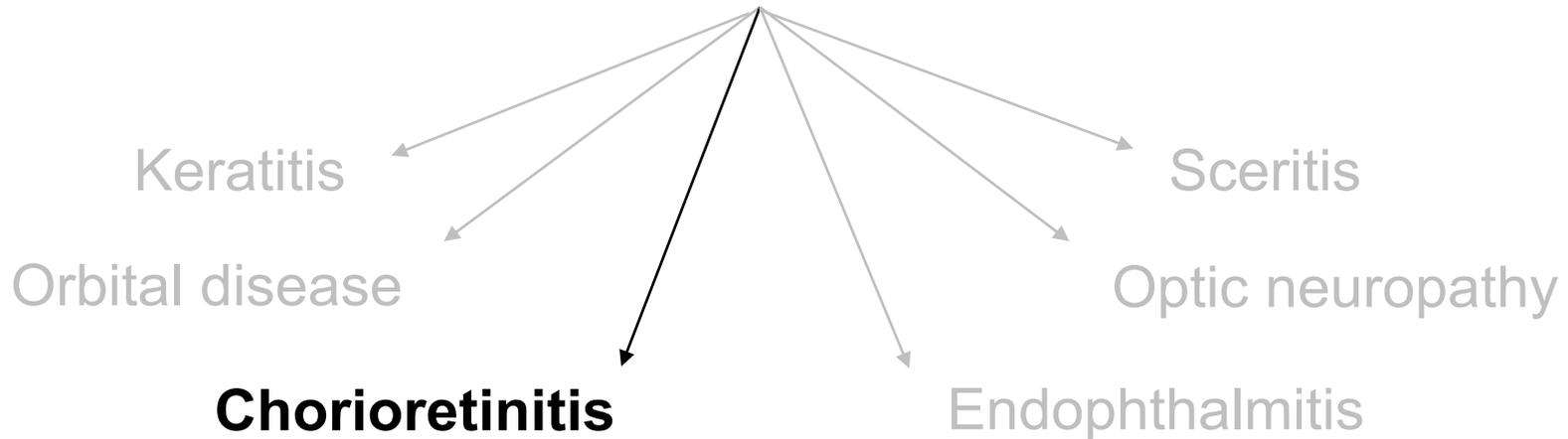
Which three species are responsible for the majority of fungal chorioretinitis cases?



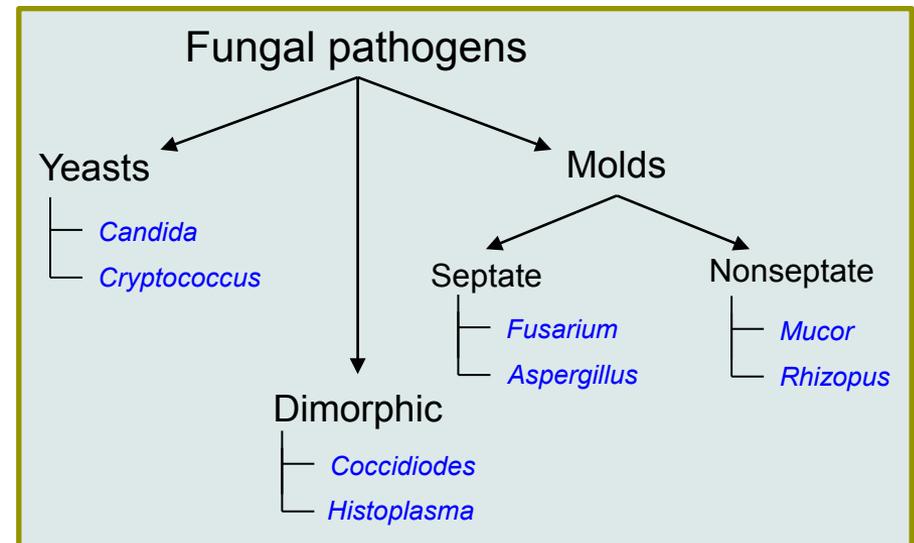
Common Ocular Fungal Pathogens



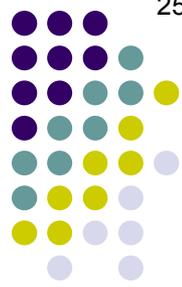
Fungal pathogenic conditions



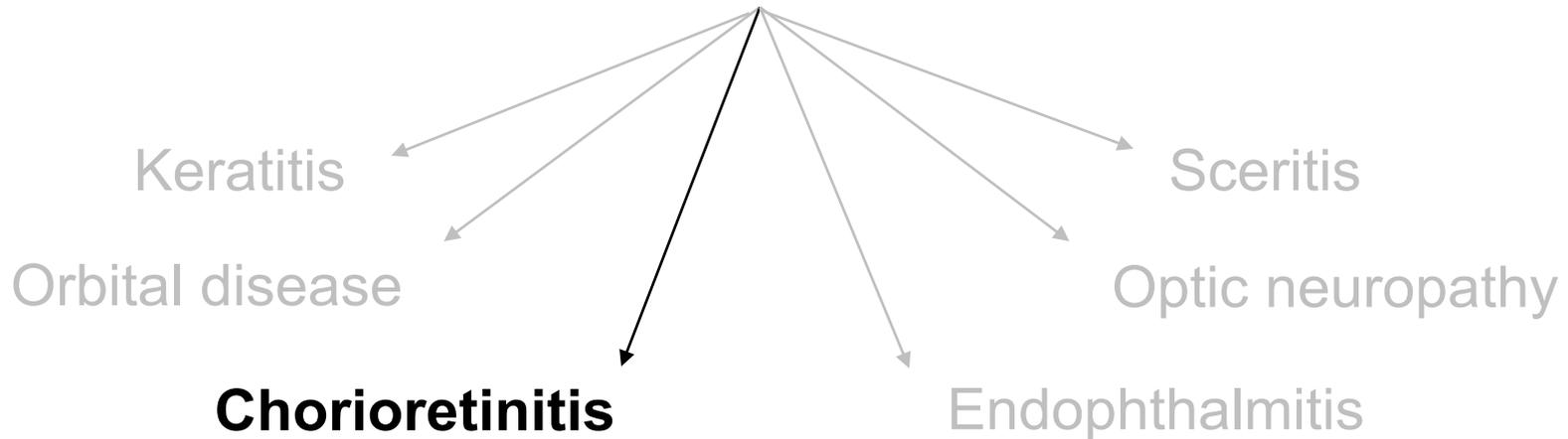
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Common Ocular Fungal Pathogens



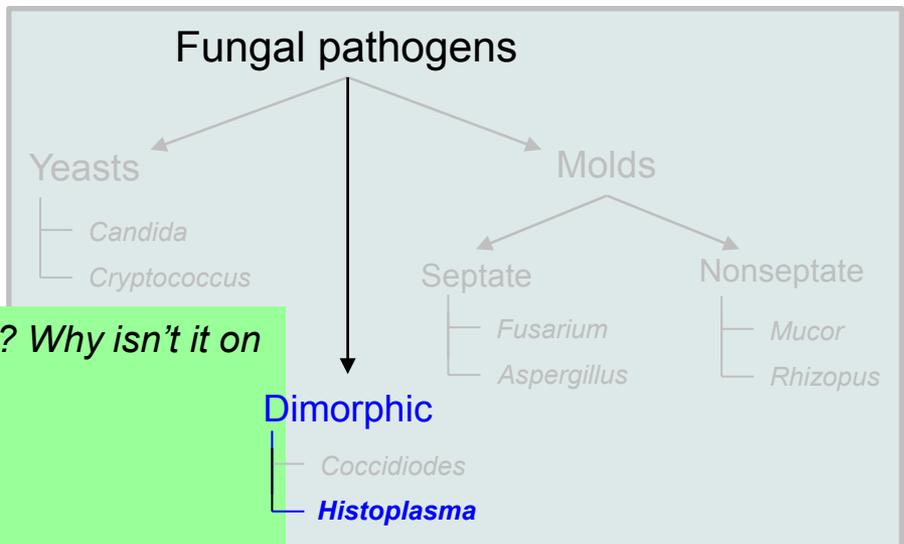
Fungal pathogenic conditions



- *Candida*
- *Aspergillus*
- *Cryptococcus*

Histoplasma?

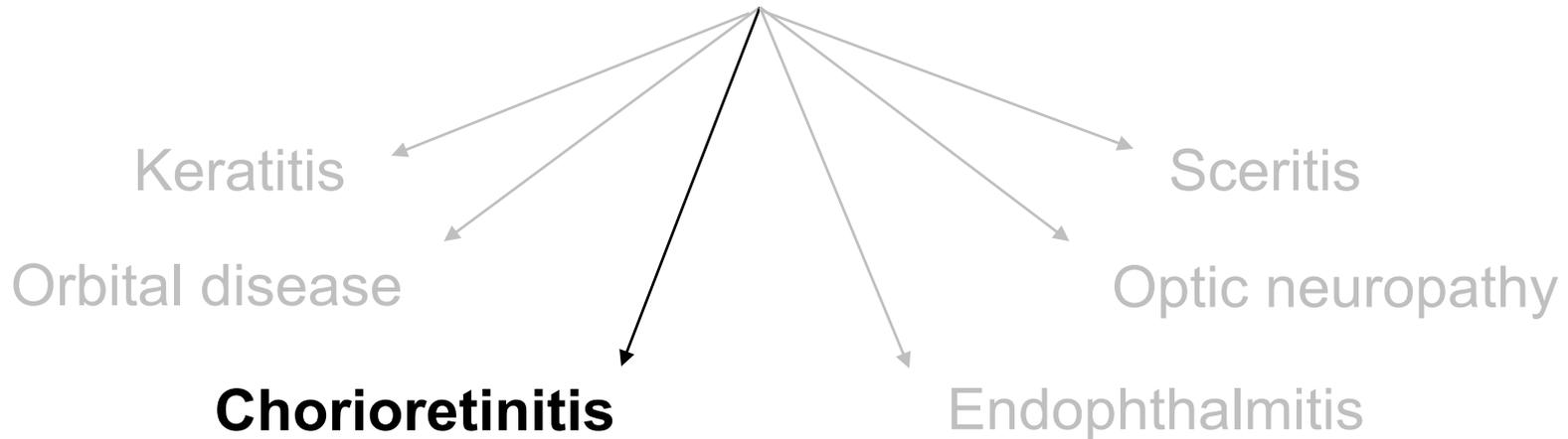
Which three species are most common for the
 What about *Histoplasma*, the causative agent in POHS? Why isn't it on this list?



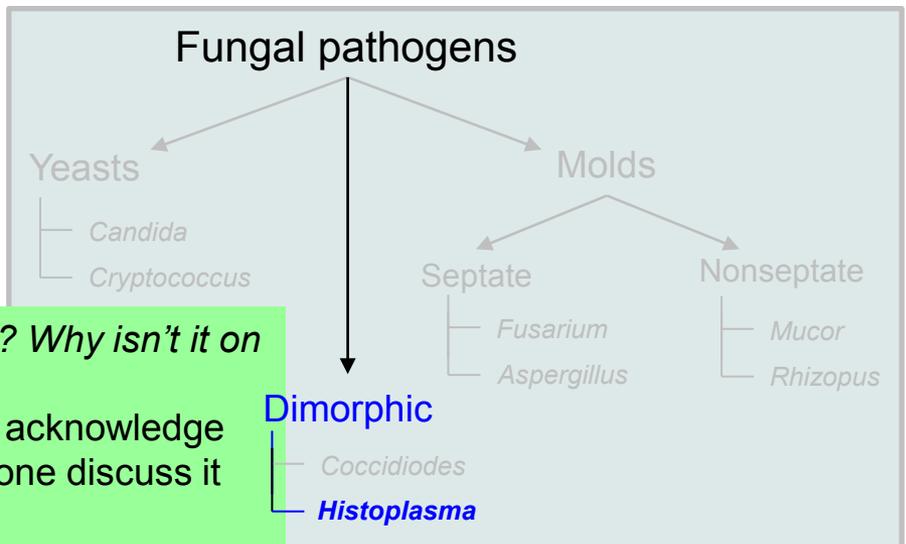
Common Ocular Fungal Pathogens



Fungal pathogenic conditions



- *Candida*
- *Aspergillus*
- *Cryptococcus*
- ***Histoplasma?***



What about *Histoplasma*, the causative agent in POHS? Why isn't it on this list?

Good question. The *Path*, *Uveitis*, and *Retina* books all acknowledge POHS is a chorioretinitis caused by *Histoplasma*, but none discuss it alongside other causes of fungal chorioretinitis.

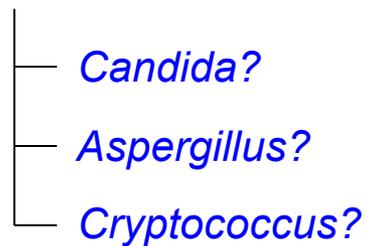
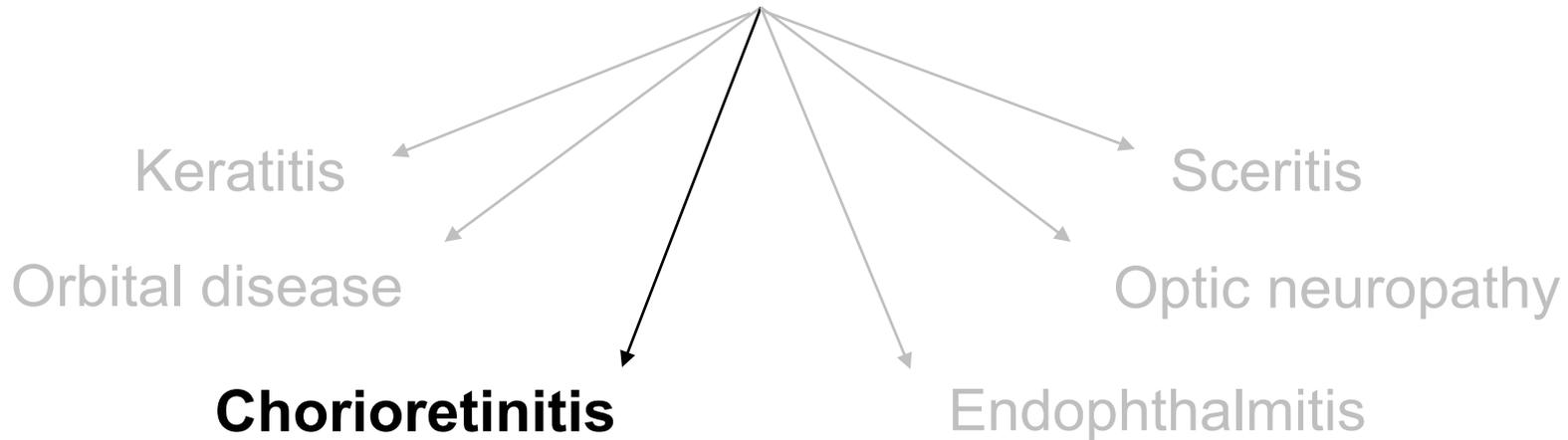
Dimorphic

- *Coccidioides*
- ***Histoplasma***

Common Ocular Fungal Pathogens

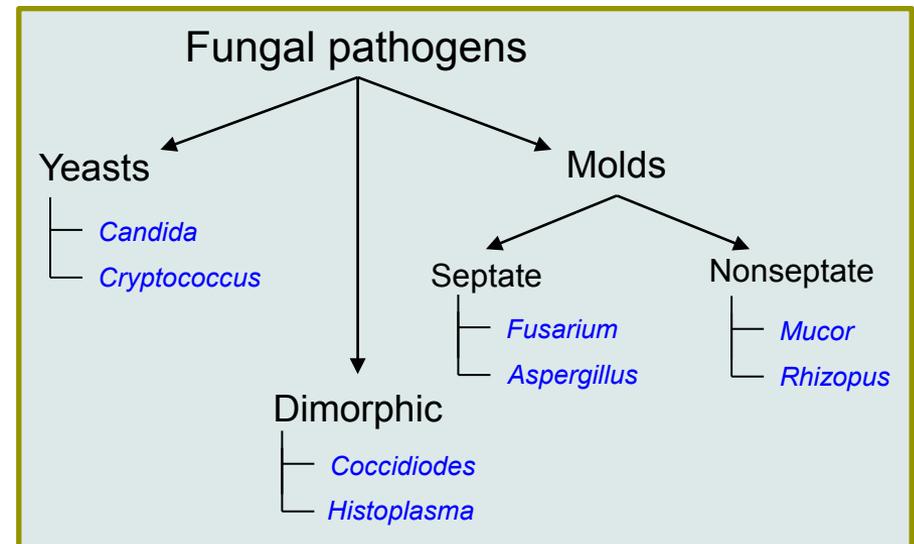


Fungal pathogenic conditions

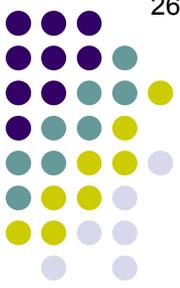


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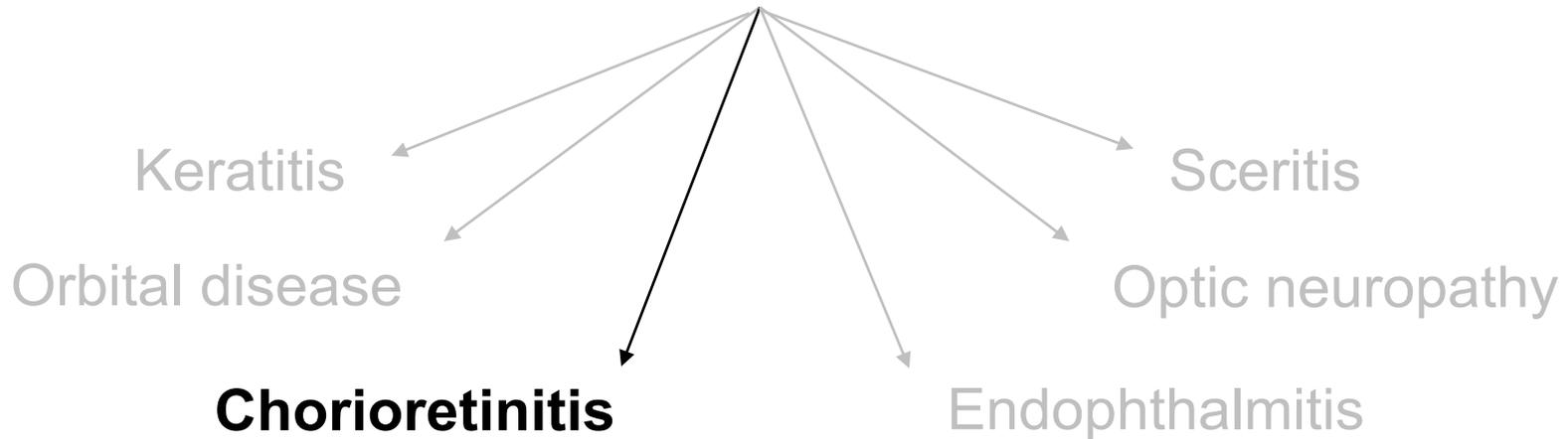
Of the three, which is the most common?



Common Ocular Fungal Pathogens

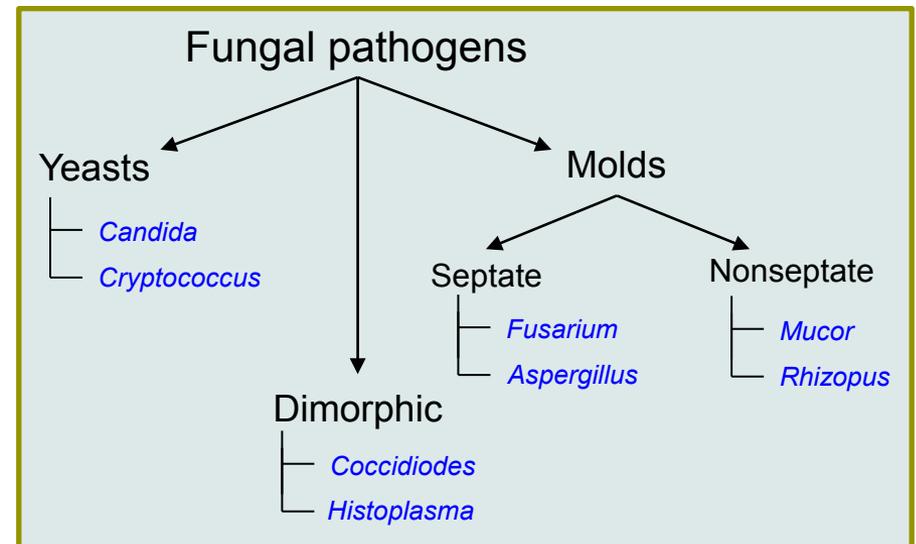


Fungal pathogenic conditions



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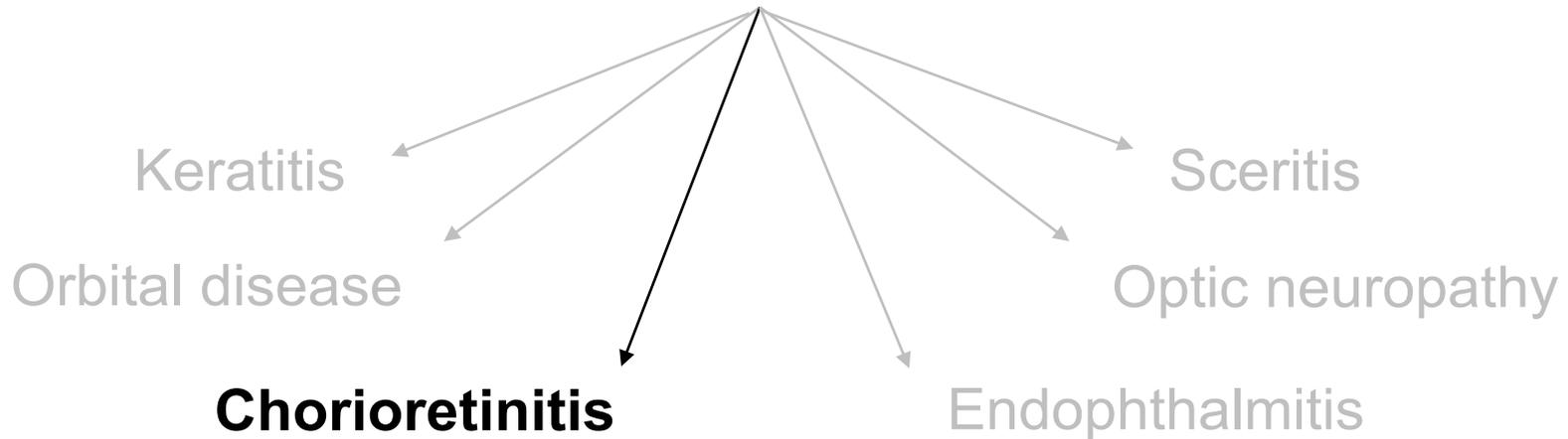
Of the three, which is the most common?
Candida



Common Ocular Fungal Pathogens



Fungal pathogenic conditions



Chorioretinitis

- Candida**
- Aspergillus
- Cryptococcus

Generally speaking, who is at risk for *Candida* chorioretinitis?

Which three species are responsible for the majority of fungal chorioretinitis cases?

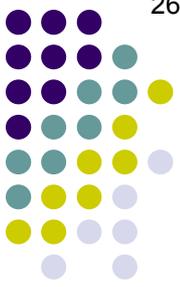
Of the three, which is the most common? *Candida*

Septate

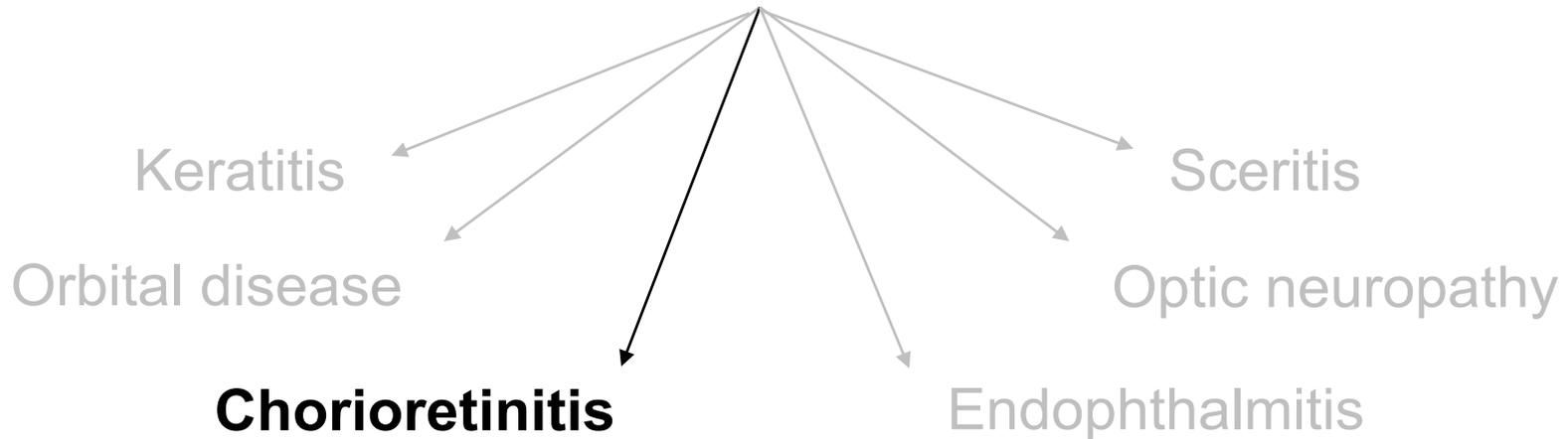
Mucor

Rhizopus

Common Ocular Fungal Pathogens



Fungal pathogenic conditions



- Candida**
- Aspergillus
- Cryptococcus

Generally speaking, who is at risk for *Candida chorioretinitis*?
Hospitalized, debilitated individuals

Which three species are responsible for the majority of fungal chorioretinitis cases?

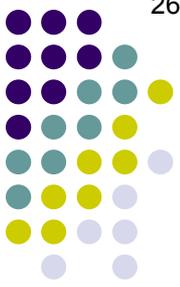
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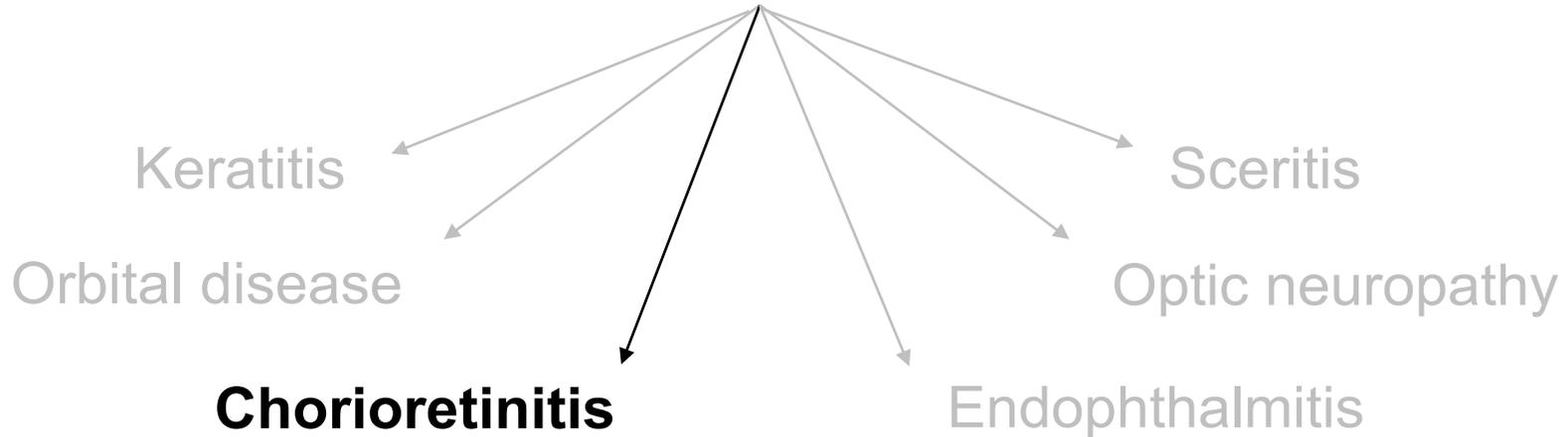
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Common Ocular Fungal Pathogens



Fungal pathogenic conditions



- Candida**
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- Cryptococcus

Generally speaking, who is at risk for Candida chorioretinitis?
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Is there anything in particular that puts them at risk?

--?

--?

--?

Which three species are responsible for the majority of fungal chorioretinitis cases?

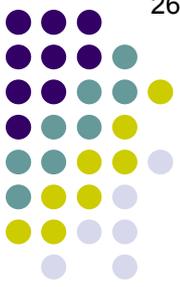
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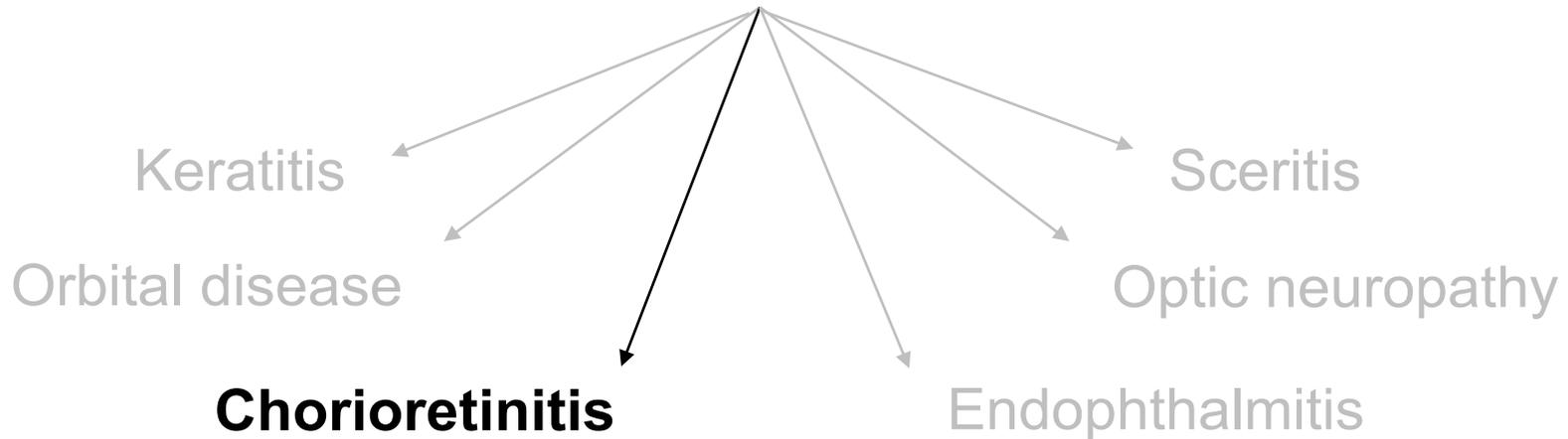
Mucor

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Common Ocular Fungal Pathogens



Fungal pathogenic conditions



- Candida**
- Aspergillus
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Generally speaking, who is at risk for Candida chorioretinitis?
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--Hx major GI surgery
--Chronic lines/catheters

--Systemic antibiotics (think sepsis pt)

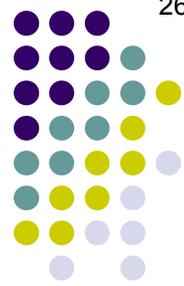
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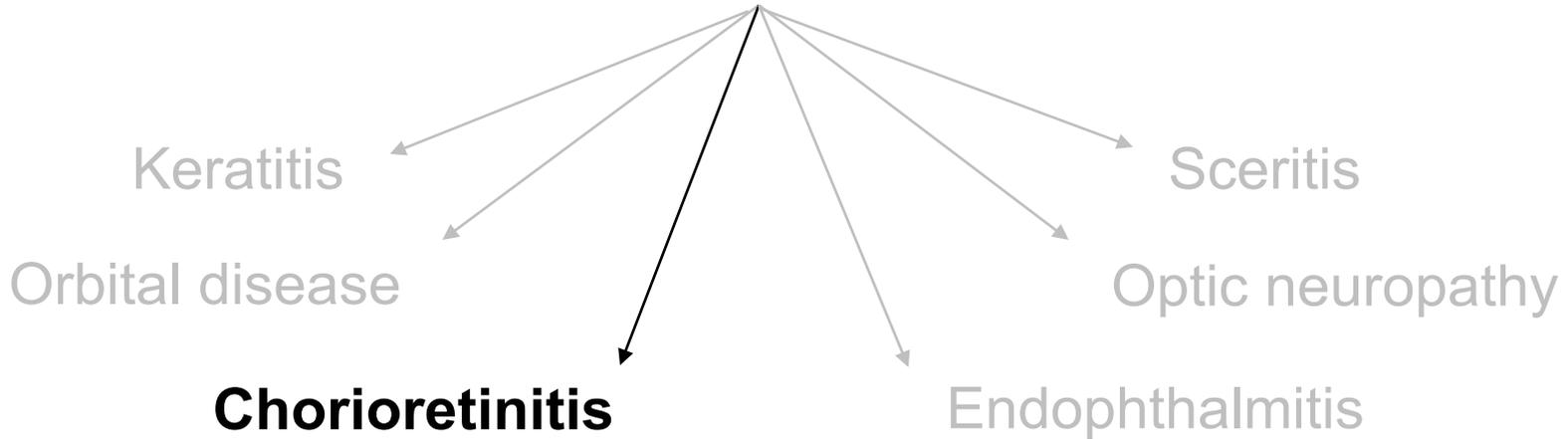
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Rhizopus



Common Ocular Fungal Pathogens

Fungal pathogenic conditions



Chorioretinitis

- Candida**
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Generally speaking, who is at risk for Candida chorioretinitis?
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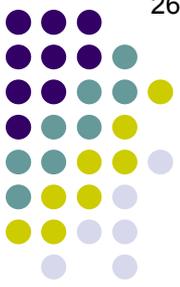
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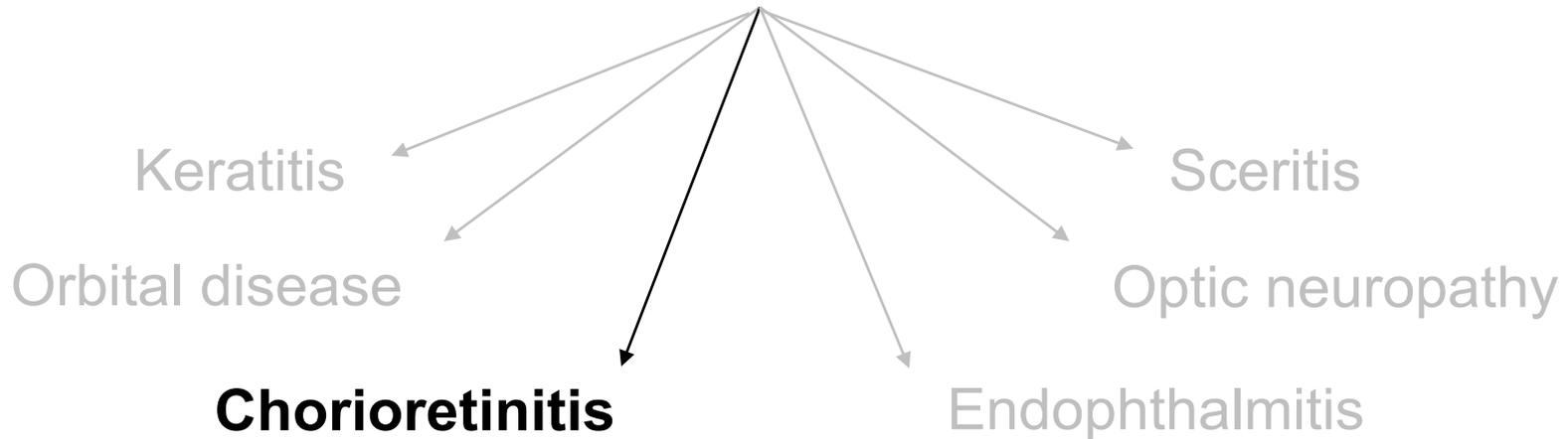
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Common Ocular Fungal Pathogens



Fungal pathogenic conditions



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How about being immunocompromised?

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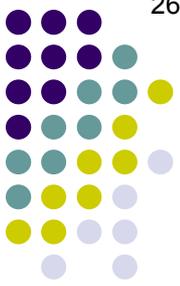
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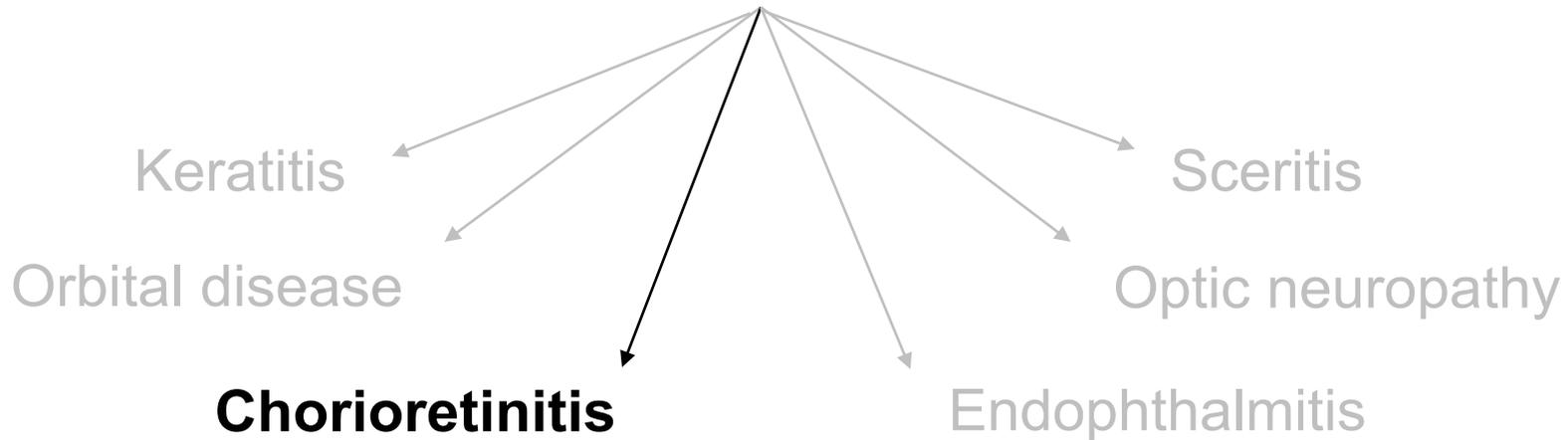
Mucor

Rhizopus

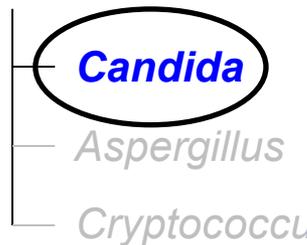
Common Ocular Fungal Pathogens



Fungal pathogenic conditions



Chorioretinitis



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- Hx major GI surgery
- Chronic lines/catheters (Classic story: Pt s/p GI surgery is NPO and receiving TPN)
- Systemic antibiotics (think sepsis pt)

How about being immunocompromised?

This does not seem to be a risk factor (eg, HIV/AIDS is **not** a risk factor for *Candida* chorioretinitis)

Which three species are responsible for the majority of fungal chorioretinitis cases?

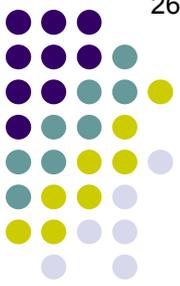
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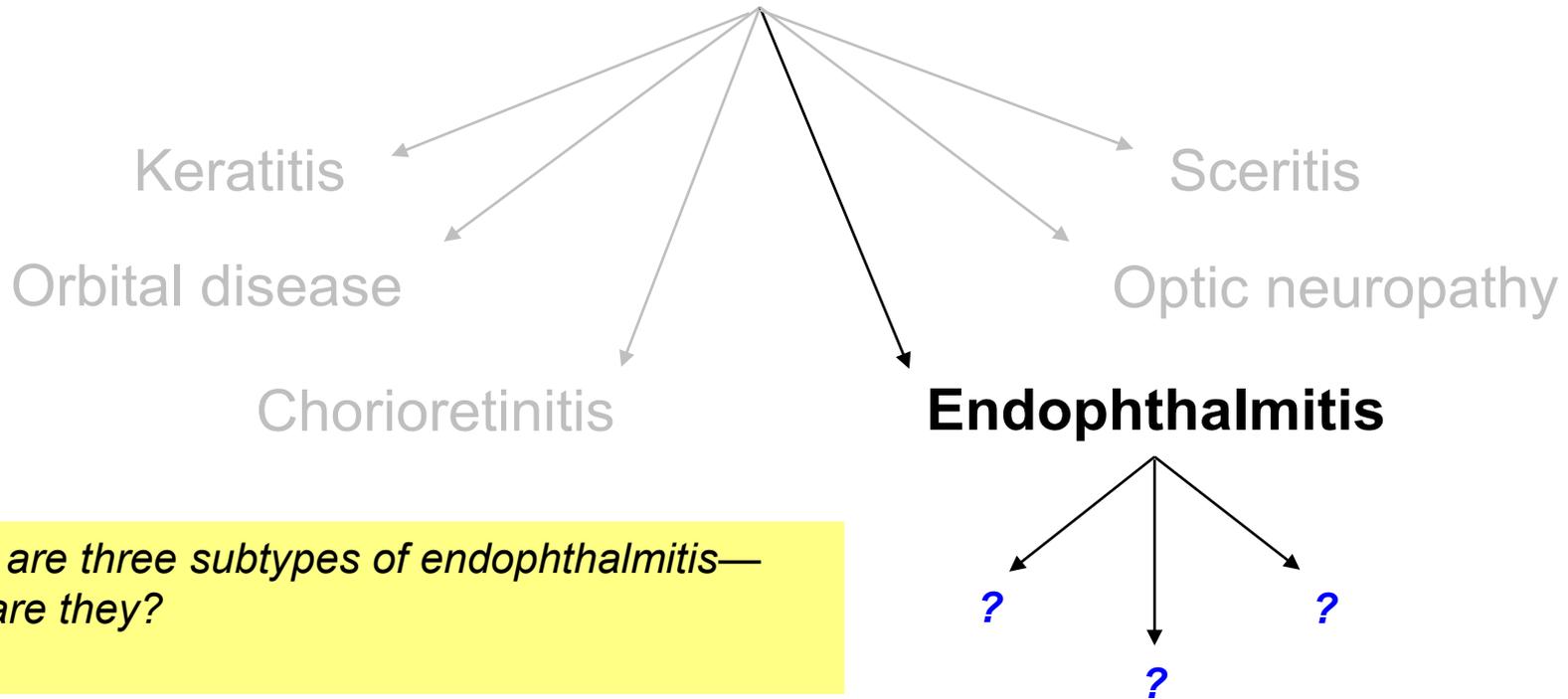
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Common Ocular Fungal Pathogens

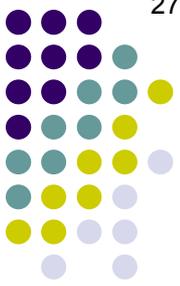


Fungal pathogenic conditions

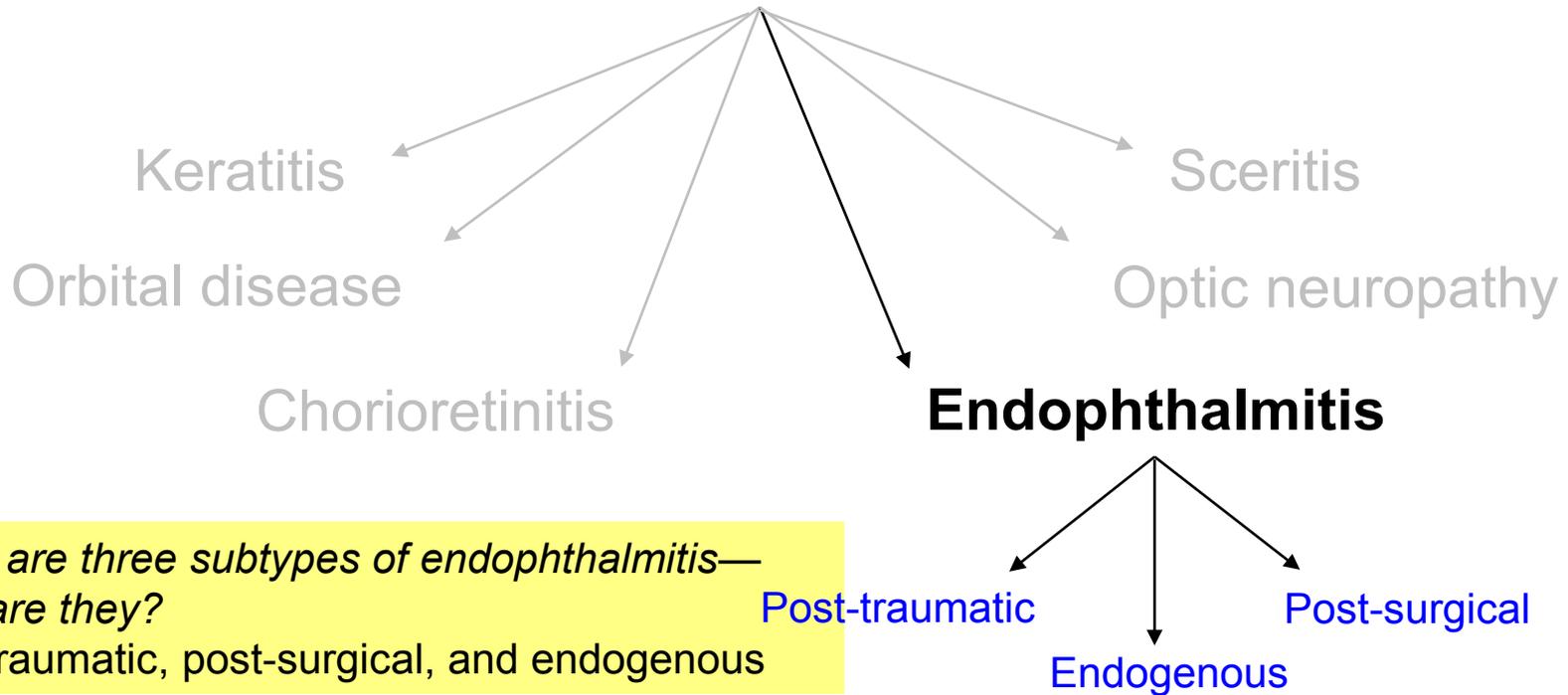


*There are three subtypes of endophthalmitis—
what are they?*

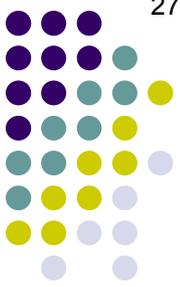
Common Ocular Fungal Pathogens



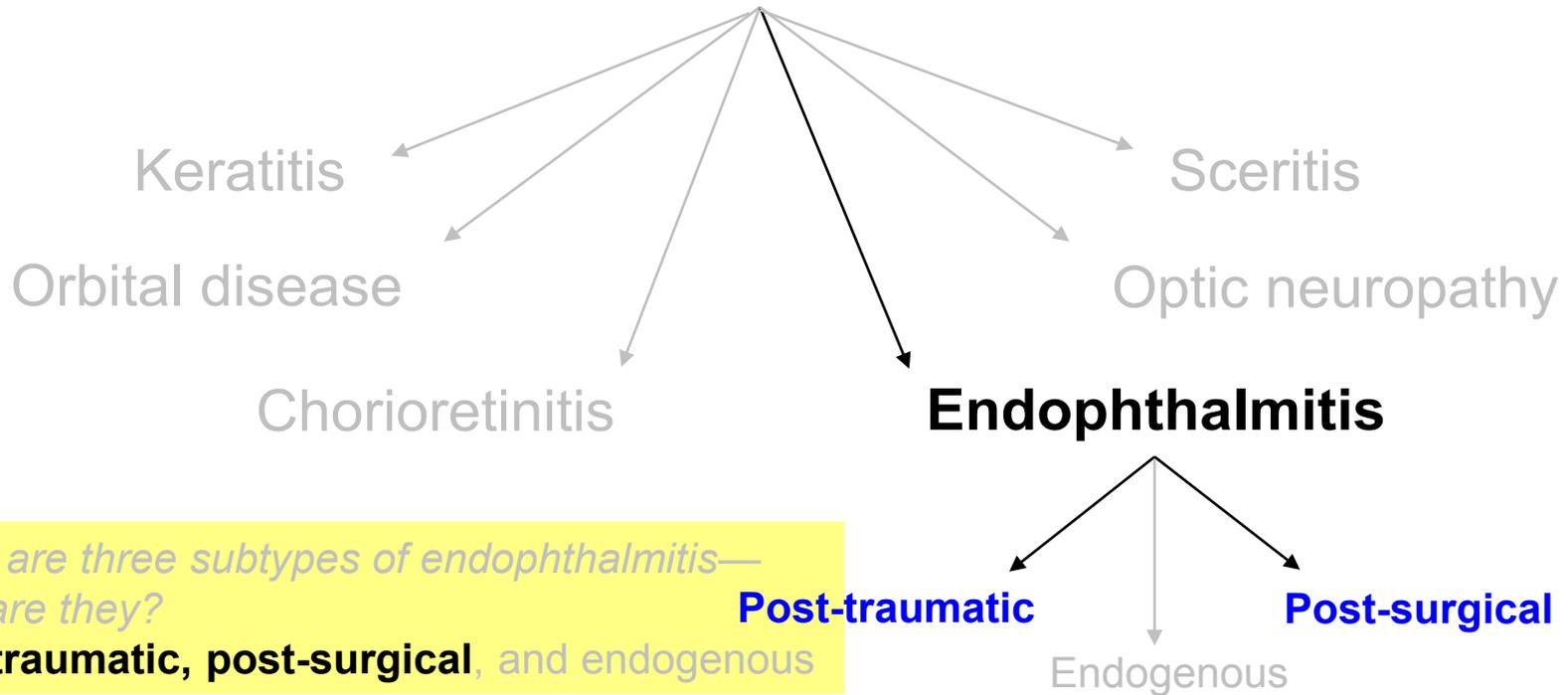
Fungal pathogenicic conditions



Common Ocular Fungal Pathogens



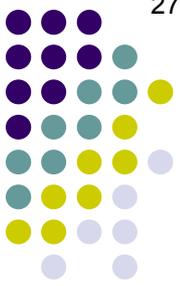
Fungal pathogenic conditions



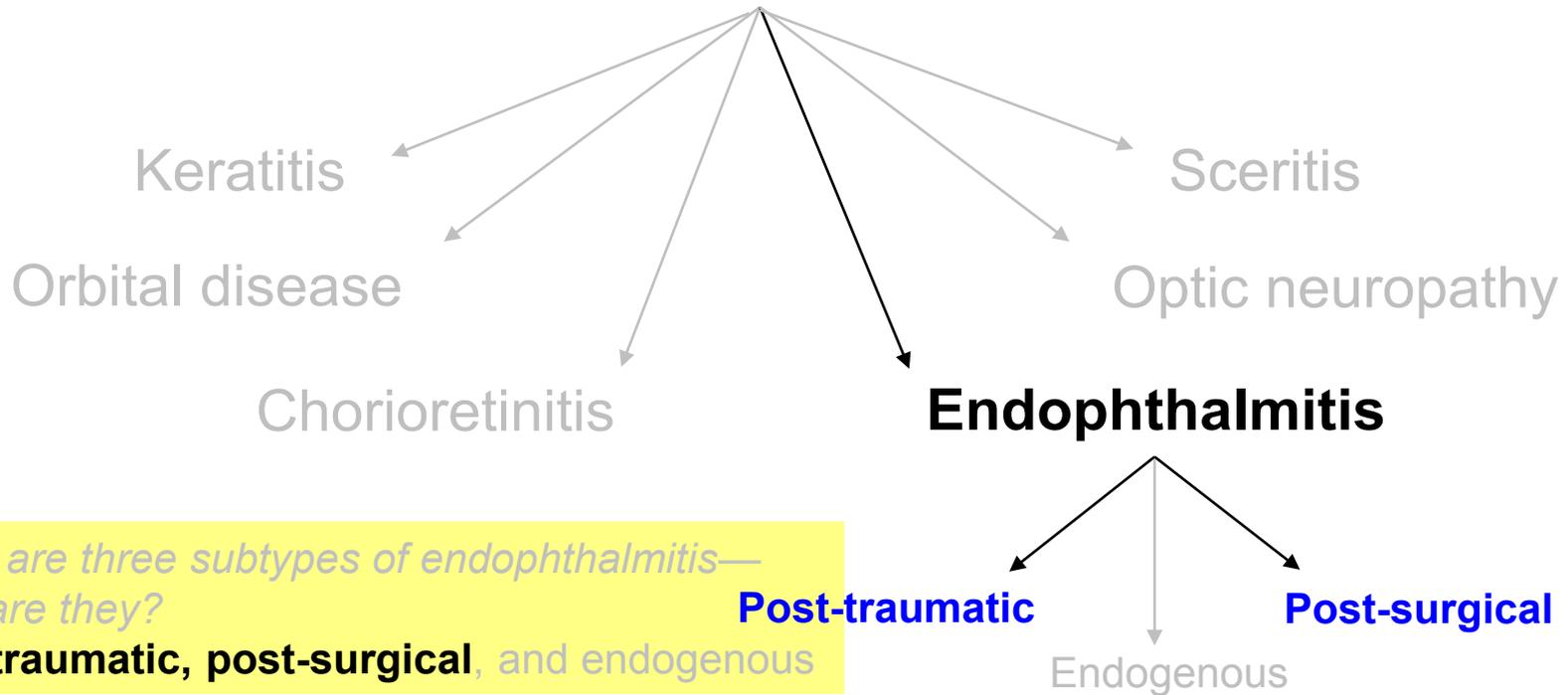
There are three subtypes of endophthalmitis—
what are they?
Post-traumatic, post-surgical, and endogenous

Are post-traumatic and/or post-surgical endophthalmitis common entities?

Common Ocular Fungal Pathogens



Fungal pathogenic conditions



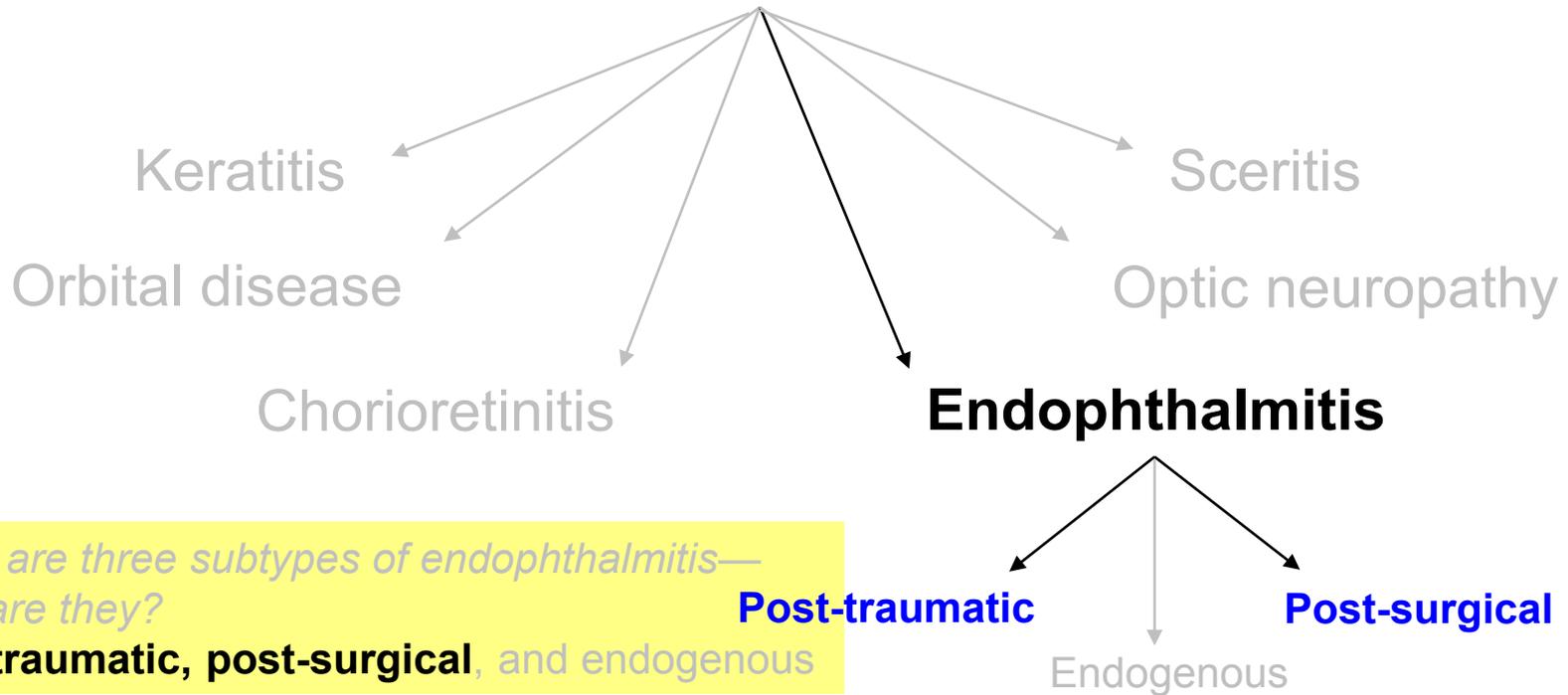
Are post-traumatic and/or post-surgical endophthalmitis common entities?

Not in the US, no

Common Ocular Fungal Pathogens



Fungal pathogenic conditions



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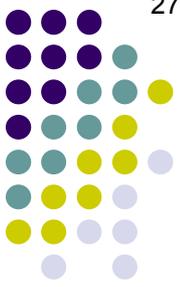
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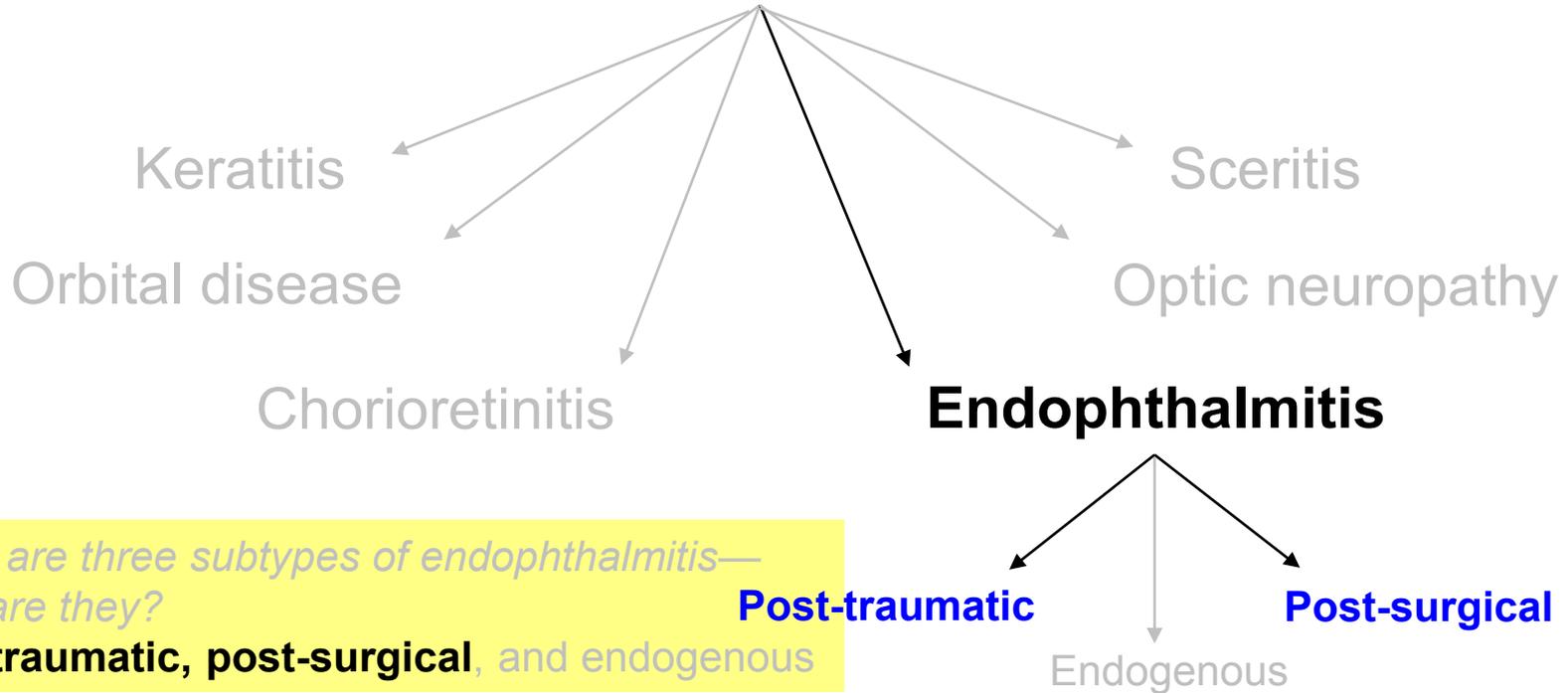
Not in the US, no

There is a country where fully 20% of post-surgical and post-traumatic endophthalmitis cases are fungal—which one?

Common Ocular Fungal Pathogens



Fungal pathogenic conditions



*There are three subtypes of endophthalmitis—
what are they?*

Post-traumatic, post-surgical, and endogenous

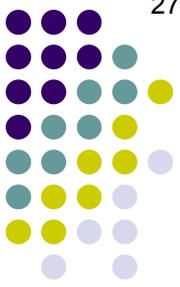
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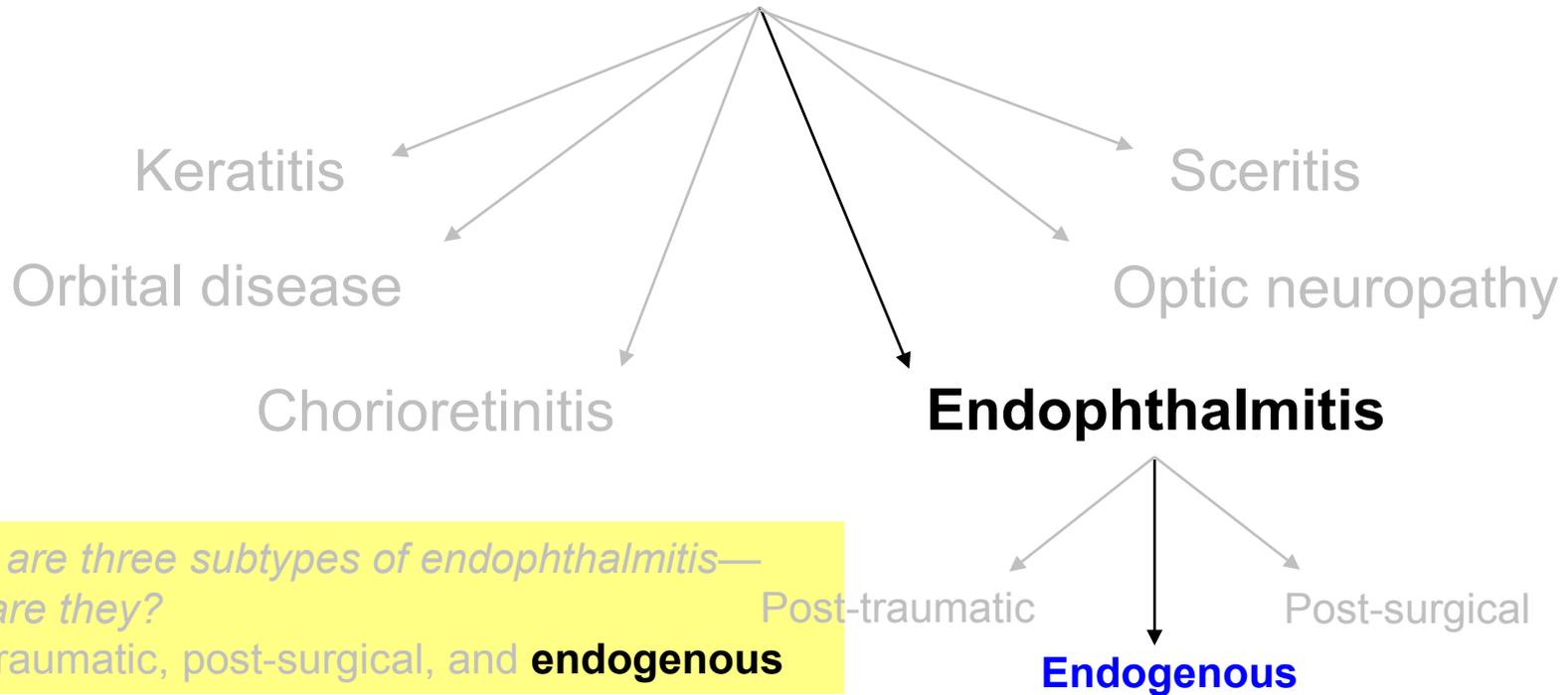
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India

Common Ocular Fungal Pathogens

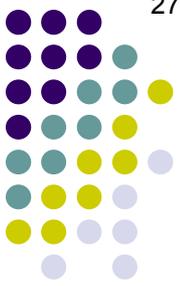


Fungal pathogenic conditions

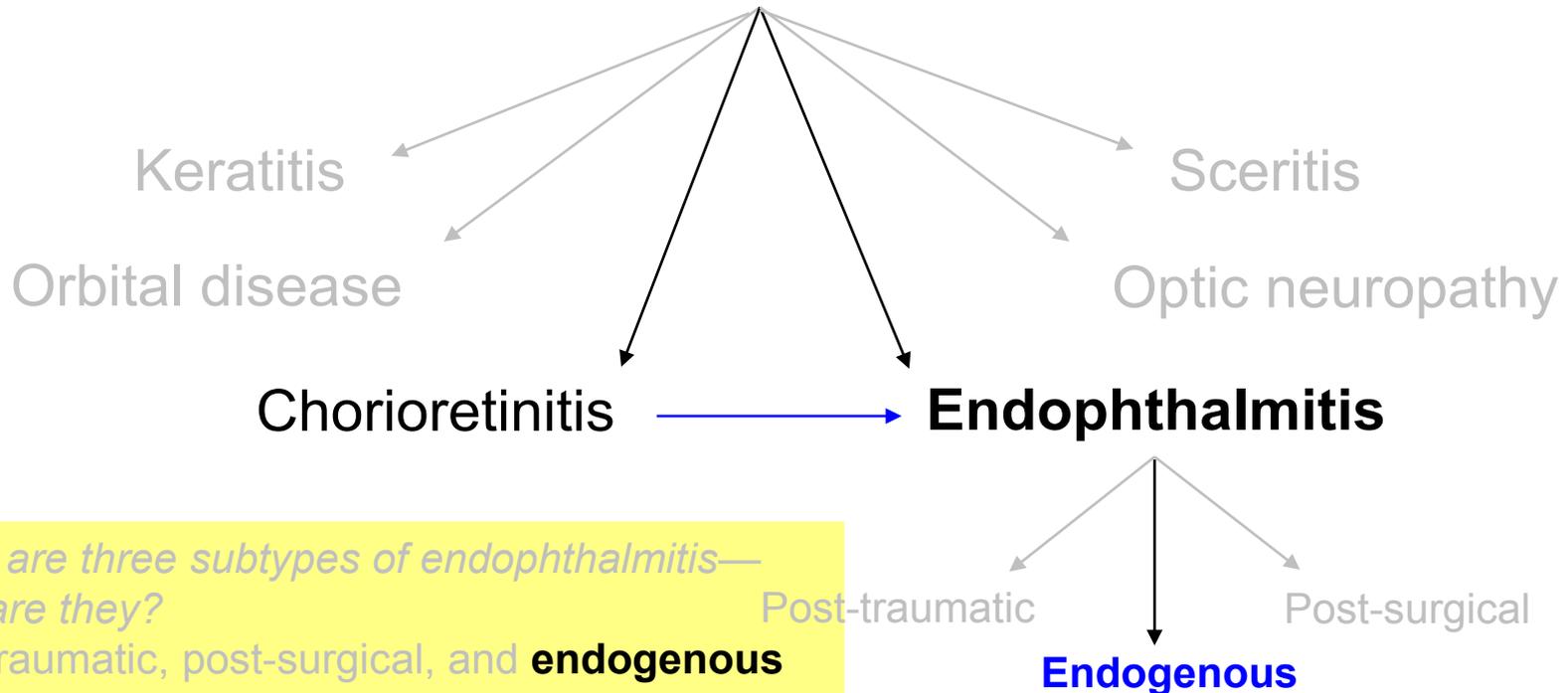


How does endogenous endophthalmitis come to happen, ie, what's the mechanism?

Common Ocular Fungal Pathogens



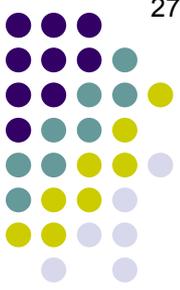
Fungal pathogenic conditions



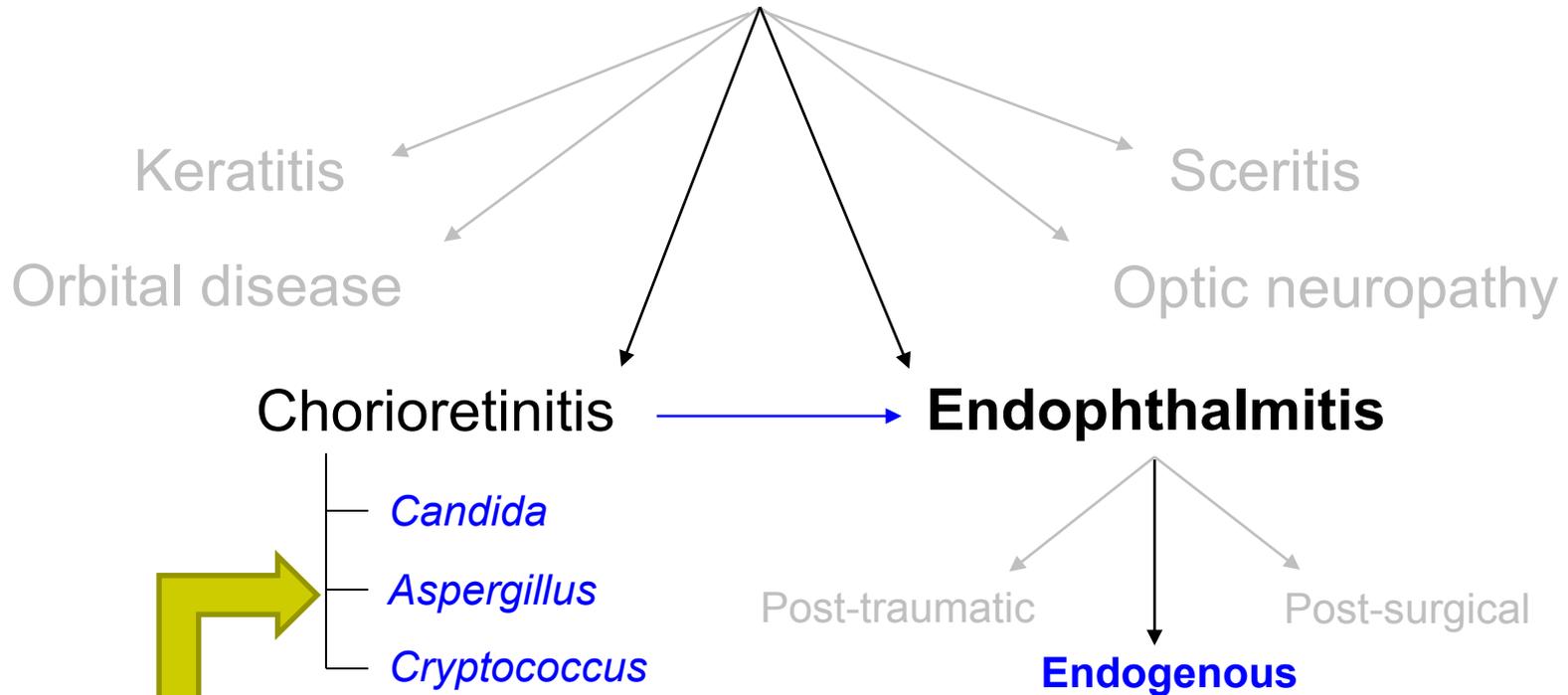
How does endogenous endophthalmitis come to happen, ie, what's the mechanism?

It develops when an endogenous chorioretinitis breaks through the ILM to enter the vitreous cavity

Common Ocular Fungal Pathogens



Fungal pathogenic conditions



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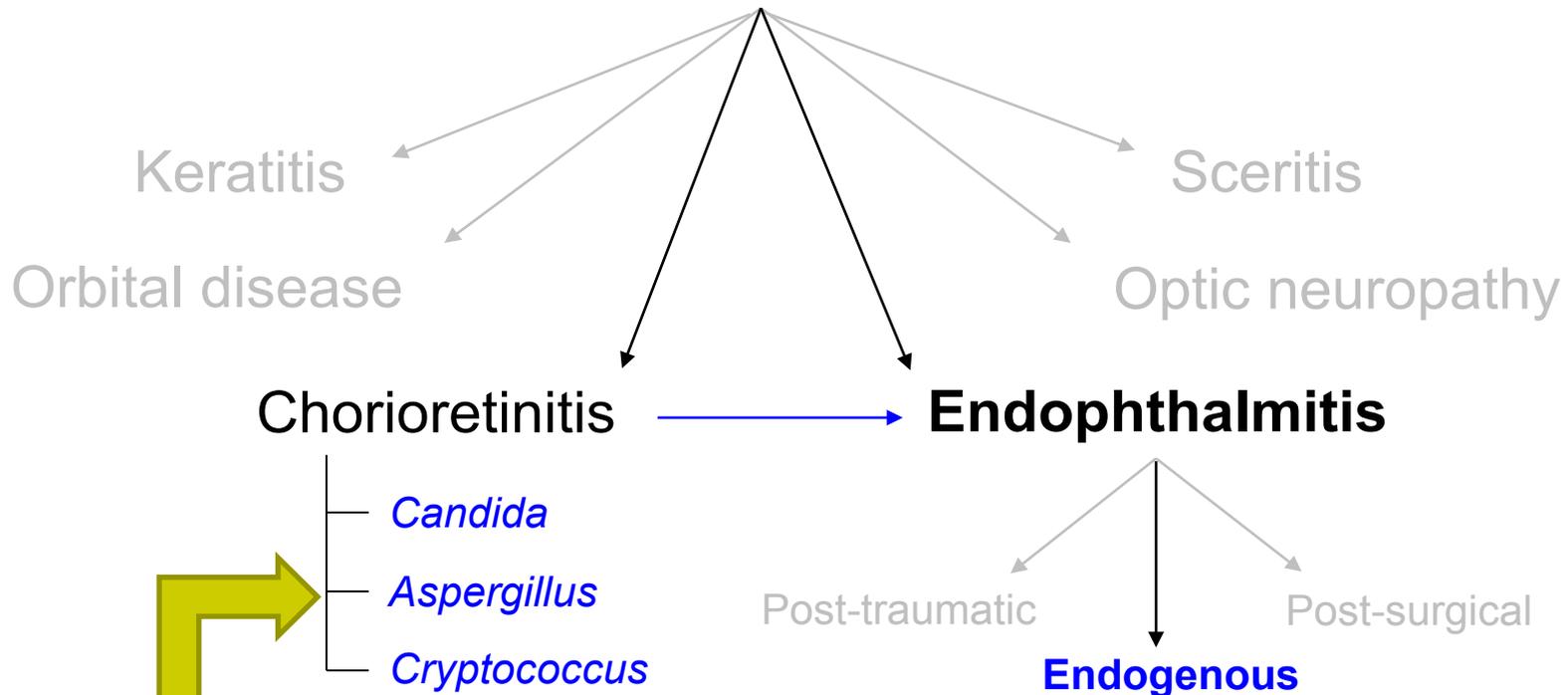
We said these are the common causes of endogenous chorioretinitis.

(No question yet—proceed)

Common Ocular Fungal Pathogens



Fungal pathogenic conditions

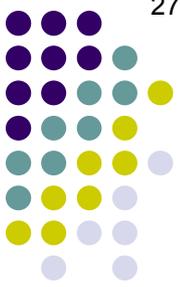


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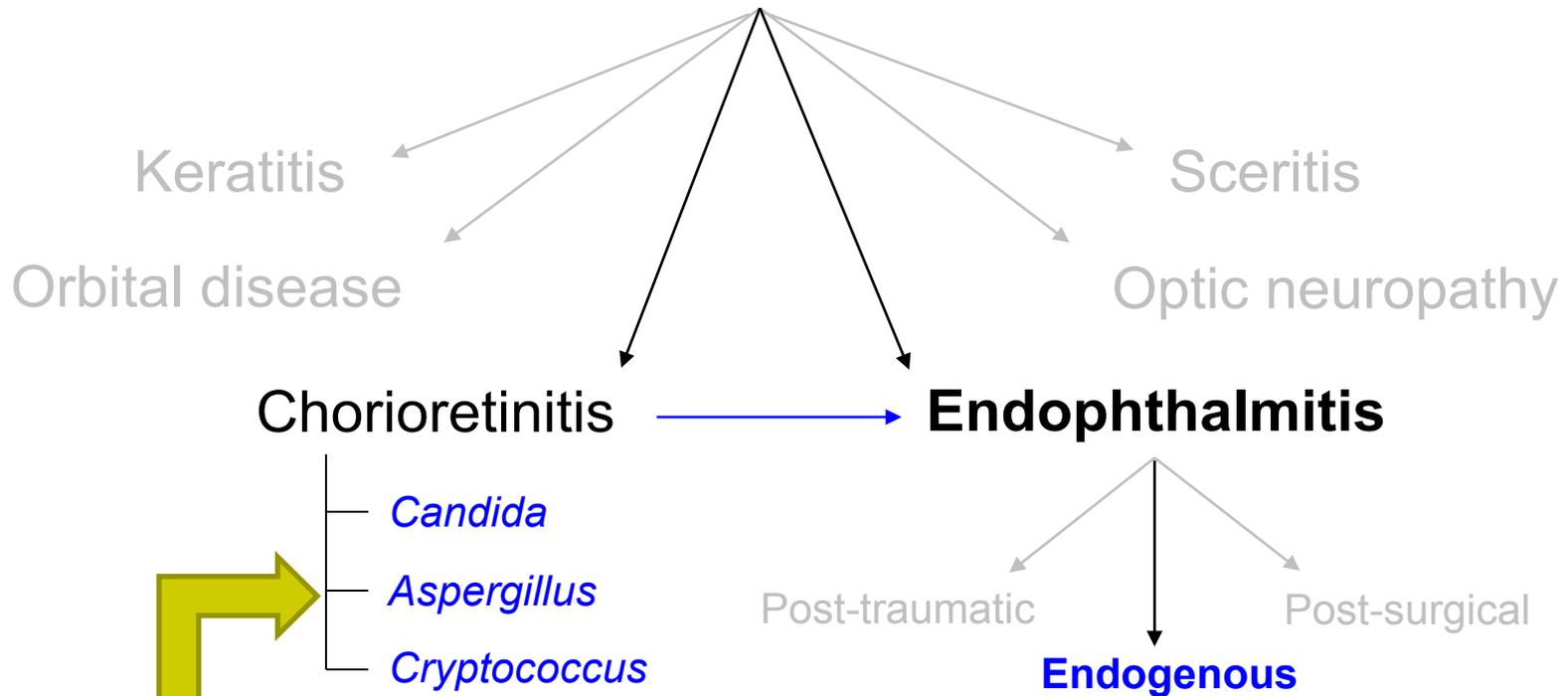
It develops when an endogenous chorioretinitis breaks through the ILM to enter the vitreous cavity

We said these are the common causes of endogenous chorioretinitis. It should follow that they are the common causes of endogenous fungal endophthalmitis. Are they?

Common Ocular Fungal Pathogens



Fungal pathogenic conditions



How does endogenous endophthalmitis come to happen, ie, what's the mechanism?

It develops when an endogenous chorioretinitis breaks through the ILM to enter the vitreous cavity

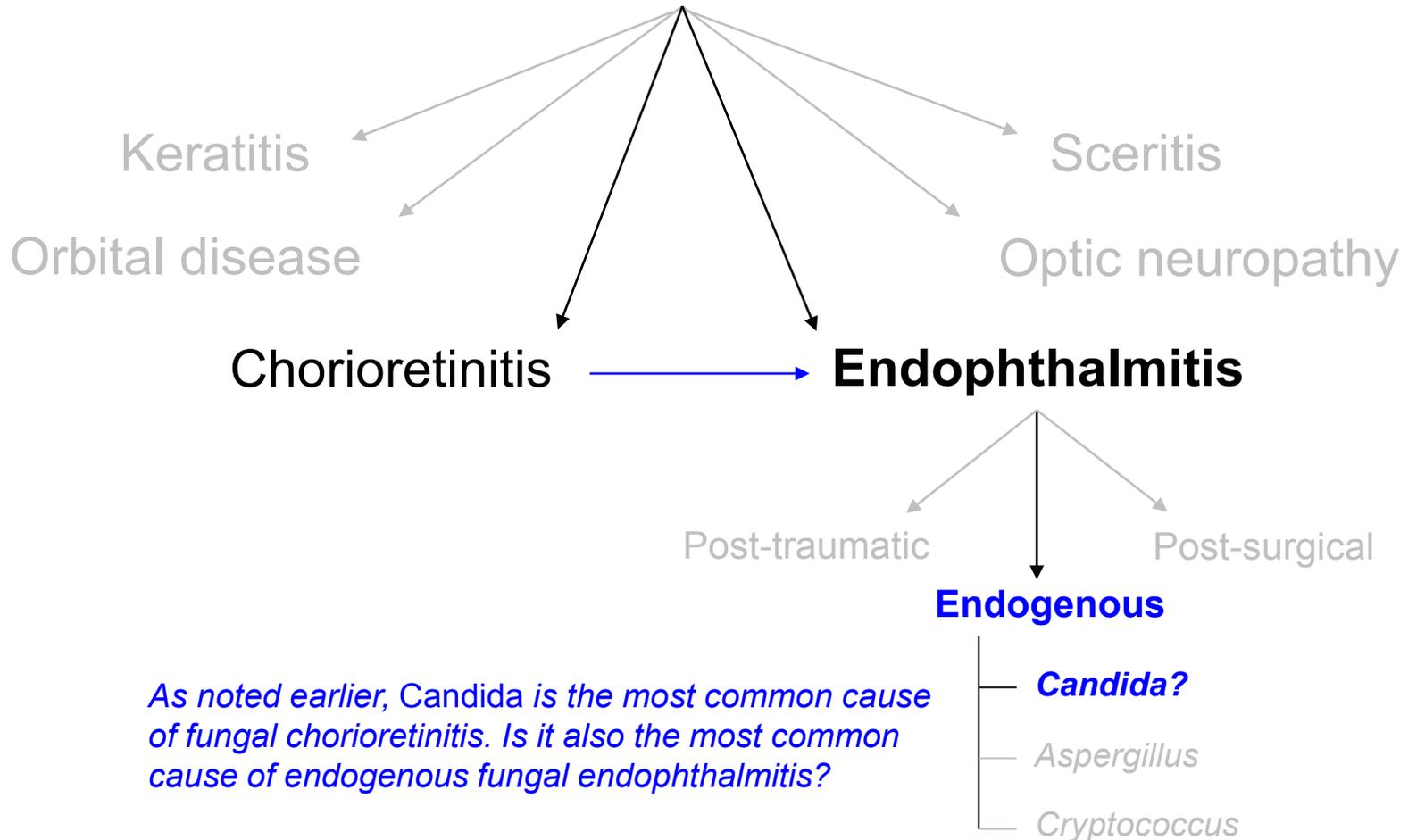
We said these are the common causes of endogenous chorioretinitis. It should follow that they are the common causes of endogenous fungal endophthalmitis. Are they?

Indeed they are

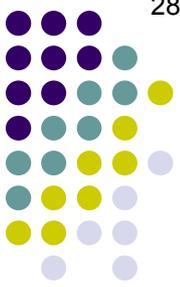
Common Ocular Fungal Pathogens



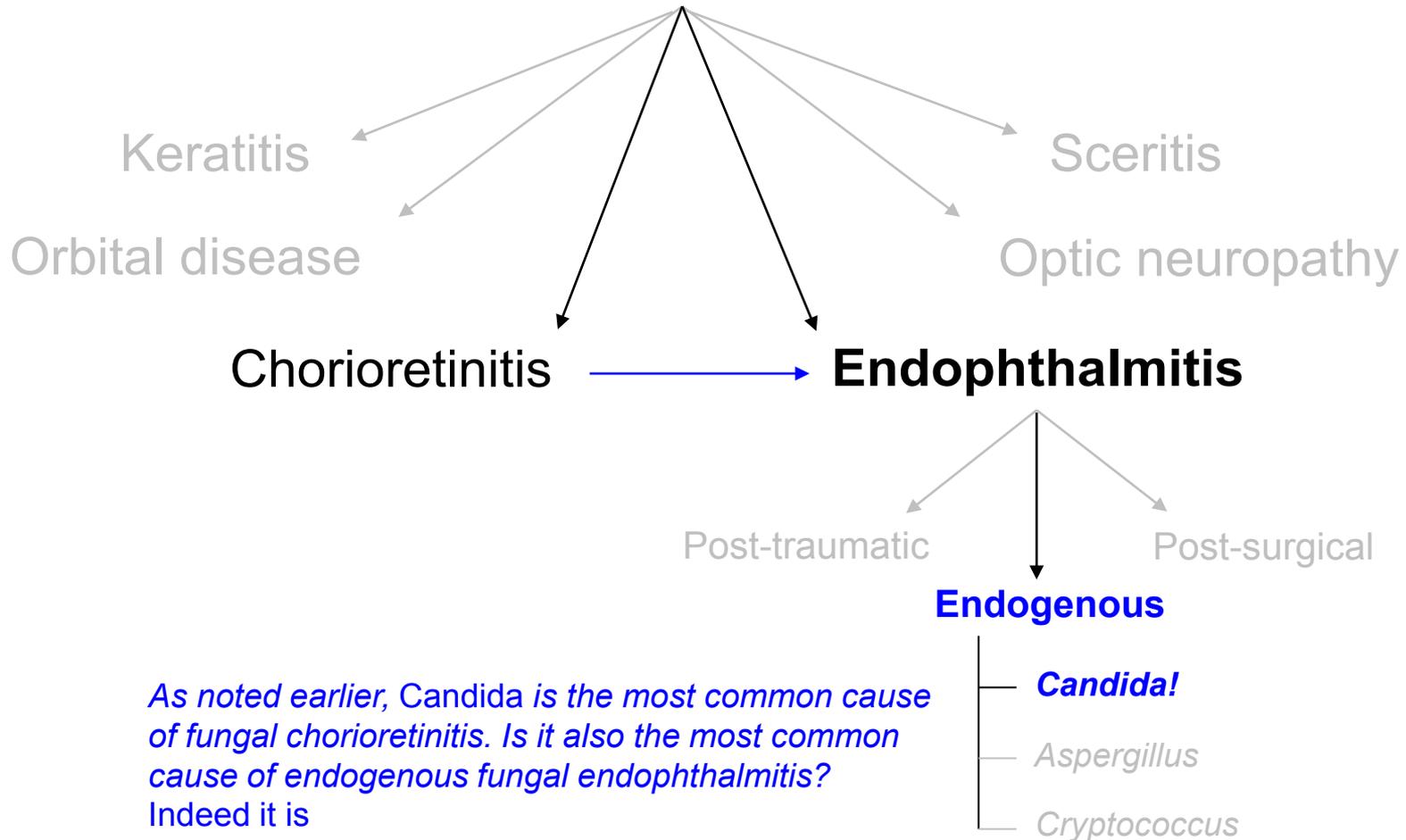
Fungal pathogenic conditions



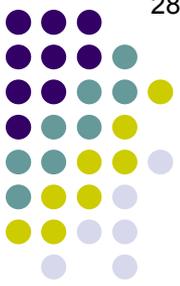
Common Ocular Fungal Pathogens



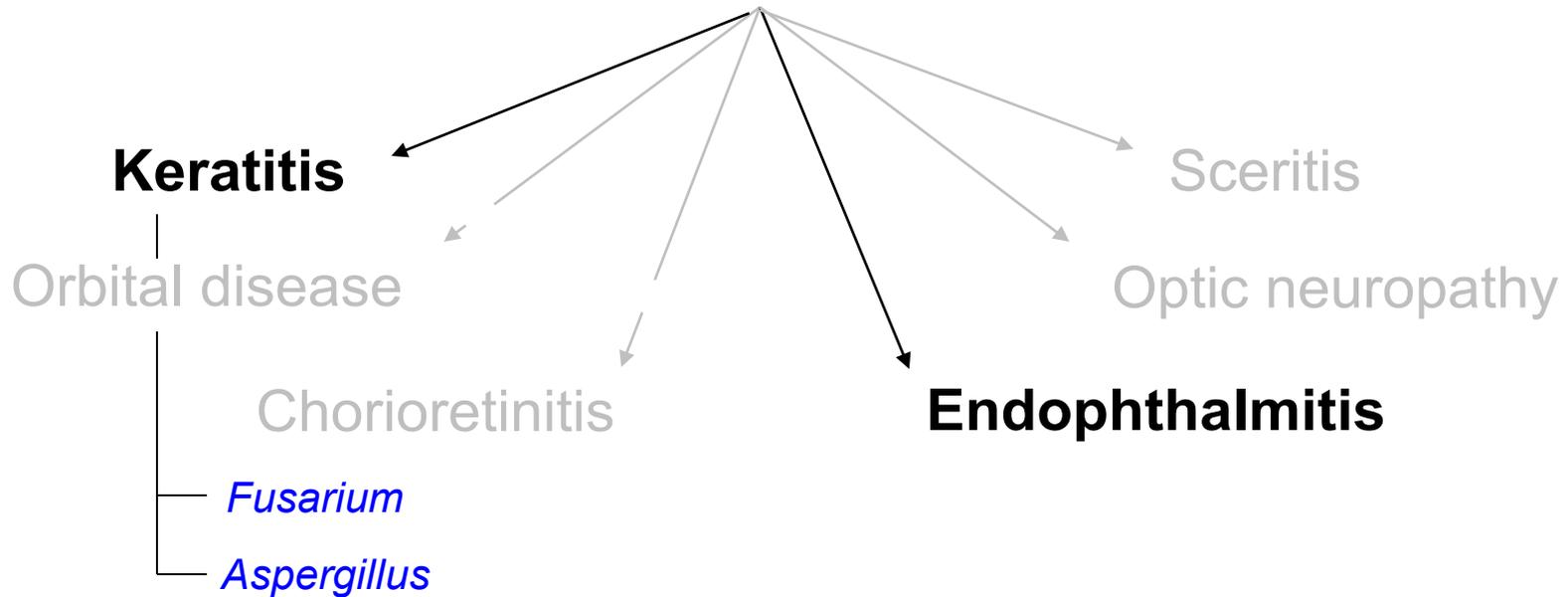
Fungal pathogenic conditions



Common Ocular Fungal Pathogens



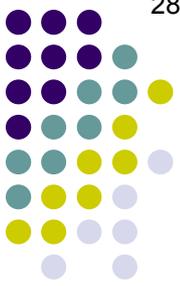
Fungal pathogenic conditions



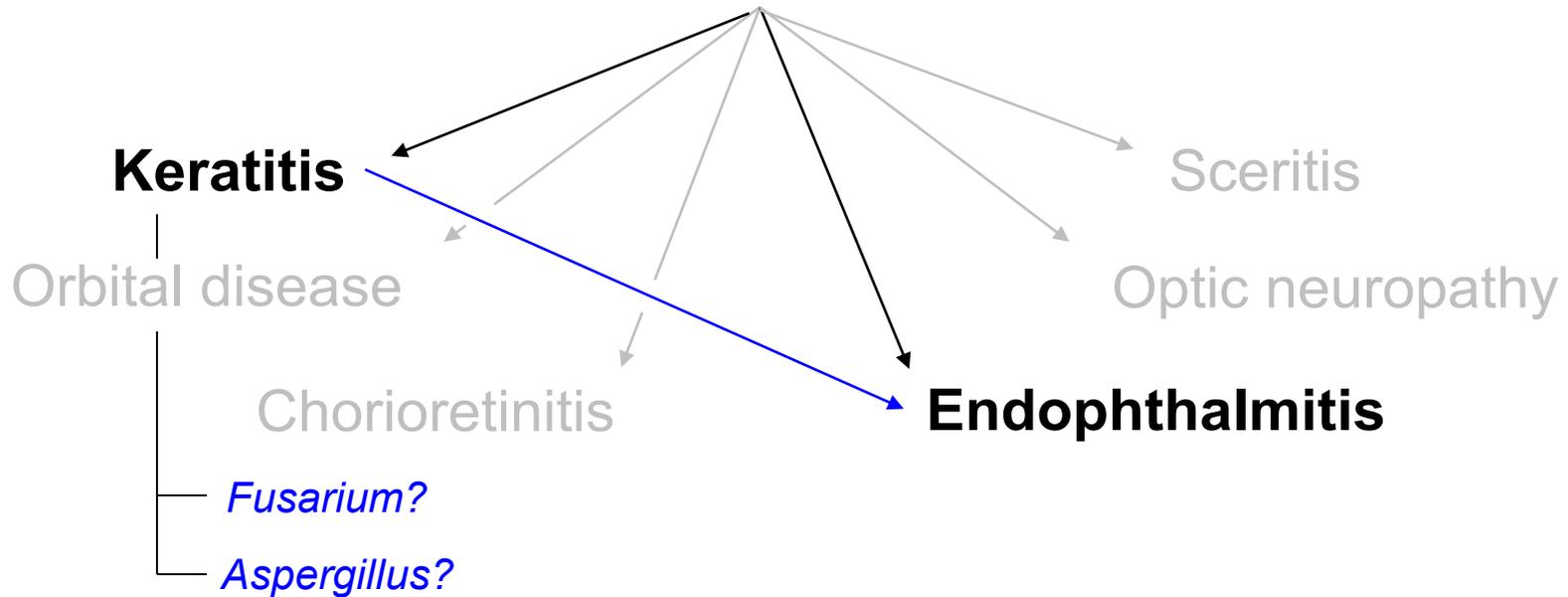
Recall that these are the two species responsible for most fungal keratitis cases.

(No question yet—proceed)

Common Ocular Fungal Pathogens

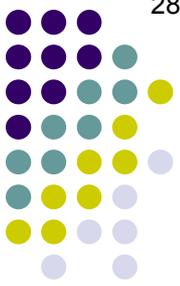


Fungal pathogenic conditions

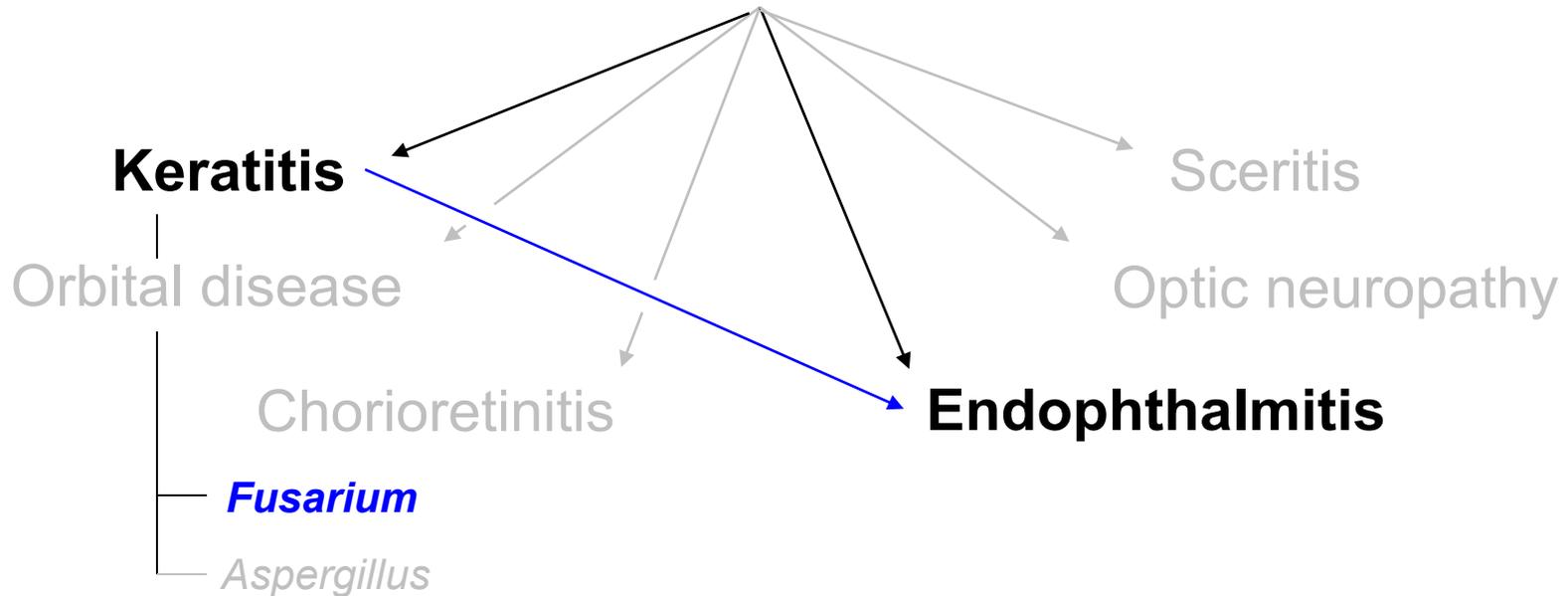


Recall that these are the two species responsible for most fungal keratitis cases. The *Retina* book goes out of its way to state that fungal keratitis can progress to endophthalmitis. It also indicates that one of these two pathogens is particularly likely to do so. Which one?

Common Ocular Fungal Pathogens



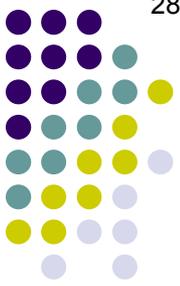
Fungal pathogenic conditions



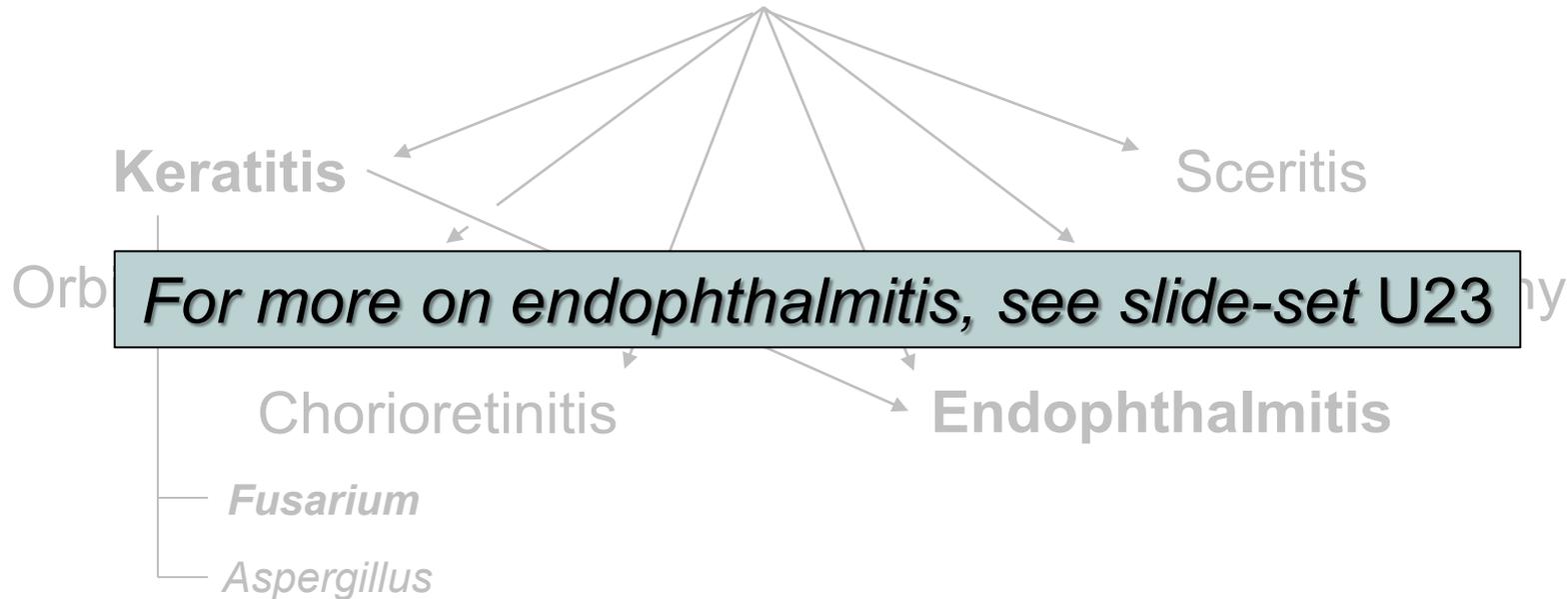
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Fusarium

Common Ocular Fungal Pathogens



Fungal pathogenic conditions



Recall that these are the two species responsible for most fungal keratitis cases. The *Retina* book goes out of its way to state that fungal keratitis can progress to endophthalmitis. It also indicates that one of these two pathogens is particularly likely to do so. Which one?

Fusarium