How many HIV+ individuals are there in the US?

About 1 million!

What percent of HIV+ individuals are…

-- Women? 25%

-- African American? 50%

What percent of HIV+ individuals will have an ocular manifestation of the dz at some point?

About 75%!

Two meds commonly taken by HIV pts are notorious for causing uveitis in 1/4-1/3 of cases.

What are they?

-- Rifabutin--Cidofovir

Rifabutin-induced uveitis is more likely if another class of med is being taken concurrently.

What is it?

An azole antifungal

Cidofovir has what specific ocular side effect in about 10% of cases?

It lowers IOP
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Less likely
Ophthalmic HIV manifestations

A basic anatomic division

HIV and the Eye
HIV and the Eye

Ophthalmic HIV manifestations

A basic anatomic division

Adnexa → Eye
Ophthalmic HIV manifestations

Adnexa

Eye

A basic anatomic division

Eyelids

Conj

A basic anatomic division
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa
- Eyelids
- Conj

Eye
- A basic anatomic division

A basic anatomic division
Ophthalmic HIV manifestations

Adnexa
- Eyelids
- Conj

Eye
- Anterior segment
- Posterior segment

A basic anatomic division
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa

Eyelids

--?

Conj

--?

--?

Eye

Anterior segment

Posterior segment

Manifestations commonly (but not exclusively) associated with HIV
**HIV and the Eye**

**Ophthalmic HIV manifestations**

- Adnexa
  - Eyelids
    - --**HZO** *(Herpes zoster ophthalmicus)*
    - --**Molluscum**
    - --**Kaposi sarcoma**
  - Conj
- Eye
  - Anterior segment
  - Posterior segment
Ophthalmic HIV manifestations

Adnexa

Eyelids
--HZO
--Molluscum
--Kaposi sarcoma

Conj

Eye

Anterior segment

Posterior segment

What underlying commonality do these three conditions share?
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All three are secondary to…
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All three are secondary to...a viral infection
**HIV and the Eye**

**Ophthalmic HIV manifestations**

- **Adnexa**
  - Eyelids
    - HZO (specific virus)
    - Molluscum (virus family)
    - Kaposi sarcoma (specific virus)
  - Conj

- **Eye**
  - Anterior segment
  - Posterior segment

---

What underlying commonality do these three conditions share?
All three are secondary to... a **viral infection**
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa

Eyelids
- HZO - VZV
- Molluscum - Poxvirus
- Kaposi sarcoma - Herpesvirus type 8

Conj

Eye

Anterior segment

Posterior segment

What is the implicated virus for each?

What underlying commonality do these three conditions share? All three are secondary to a viral infection.
In what fundamental way does HZO differ from Molluscum & Kaposi?
Ophthalmic HIV manifestations

**Adnexa**

- Eyelids
  - HZO
  - Molluscum
  - Kaposi sarcoma

**Eye**

- Conj

**In what fundamental way does HZO differ from Molluscum & Kaposi?**

HZO is a dermatitis whereas Molluscum and Kaposi are neoplasms.
**HIV and the Eye**

**Ophthalmic HIV manifestations**

- **Adnexa**
  - Eyelids
    - **HZO**
    - **Molluscum**
    - **Kaposi sarcoma**
  - Conj
    - Is a... **dermatitis**
    - Are... **neoplasms**

**Eye**

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Ophthalmic HIV manifestations

**Adnexa**

Eyelids
- HZO
- Molluscum
- Kaposi sarcoma

**Eye**
- Posterior segment
- Anterior segment

Which of these adnexal manifestations of HIV is most common?

Molluscum contagiosum

Pt presents with a chronic follicular conjunctivitis that fails to respond to conventional treatment. Close inspection of the lid margin reveals a previously unnoticed molluscum lesion, the excision of which leads to resolution of the conjunctivitis.

What aspect of the presentation might lead you to consider whether a molluscum pt might be HIV+?

The extent and/or severity of the molluscum lesions.
Which of these adnexal manifestations of HIV is most common? Molluscum contagiosum
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What is the classic ophthalmic presentation (not HIV-related)?

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Molluscum contagiosum lesion of eyelid
Molluscum contagiosum lesion of eyelid with conjunctivitis
**HIV and the Eye**

**Ophthalmic HIV manifestations**

**Adnexa**

- Eyelids
  - HZO
  - **Molluscum**
  - Kaposi sarcoma

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Ophthalmic HIV manifestations

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**Fill-in-the-blanks with respect to ocular molluscum presentation in AIDS vs non-AIDS pts:**

<table>
<thead>
<tr>
<th></th>
<th>Laterality</th>
<th>Numerosity</th>
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<tr>
<td><strong>Non-AIDS pts</strong></td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td><strong>AIDS pts</strong></td>
<td>?</td>
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</tbody>
</table>
Ophthalmic HIV manifestations

**Adnexa**
- Eyelids
  - HZO
  - Molluscum
  - Kaposi sarcoma

**Ophthalmic HIV**

**Eyelids**

**Conj Posterior segment**

**HZO**

**Molluscum**

**Kaposi sarcoma**

---

**Ocular Molluscum**

**HIV and the Eye**

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<td>Non-AIDS pts</td>
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</tr>
<tr>
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Molluscum contagiosum in AIDS pt
Ophthalmic HIV manifestations

Adnexa

Eyelids
--HZO
--Molluscum
--Kaposi sarcoma

Eye

What percent of HIV pts will develop HZO?

~10%

HZO is fairly common—what factor should make you worry the pt might be HIV+?

Age. Most non-HIV related HZO cases occur in individuals older than 60. If a pt in his/her 40s or younger presents with HZO, consider HIV.
Ophthalmic HIV manifestations

Adnexa

Eye

Eyelids
---HZO
---Molluscum
---Kaposi sarcoma

Posterior segment

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Ophthalmic HIV manifestations

Adnexa

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--HZO
--Molluscum
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HZO in AIDS pt
**Ophthalmic HIV manifestations**

**Adnexa**

- Eyelids
  - HZO
  - Molluscum

**Eye**

**Posterior segment**

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*We have HZO listed as an eyelid manifestation. What other adnexal structures can it strike?*
Ophthalmic HIV manifestations

Adnexa

Eyelids
– HZO
– Molluscum
– Kaposi sarcoma

Eye

Posterior segment

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Ophthalmic HIV manifestations

Adnexa

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Ophthalmic HIV manifestations

Adnexa

Eyelids

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As a palsy, with new-onset diplopia
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa

Eye

Posterior segment

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**HIV and the Eye**

**Ophthalmic HIV manifestations**

- **Adnexa**
  - **Eyelids**
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- **Eye**
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As a palsy, with new-onset diplopia.

**How common is EOM palsy in HIV+ HZO pts?**
Very—as many as 1/3 will develop it.
**Ophthalmic HIV manifestations**

**Adnexa**

- Eyelids
  - HZO
- Molluscum
- Kaposi sarcoma

**Eye**

- Anterior segment
- Conjunction-posterior segment

---

**HZO**

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- What is the mechanism of EOM palsy?
  - It is usually a cranial neuropathy due to vasculitic process.

- How does EOM involvement manifest clinically?
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**HIV and the Eye**

**Ophthalmic HIV manifestations**

- **Adnexa**
  - Eyelids
    - HZO
  - Molluscum
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**Eye**

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Ophthalmic HIV manifestations

Adnexa

Eye

Eyelids
--HZO

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Which cranial nerve is most commonly affected?

How does EOM involvement manifest clinically?
As a palsy, with new-onset diplopia

What is the mechanism of EOM palsy?
Cranial neuropathy

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How does EOM involvement manifest clinically? As a palsy, with new-onset diplopia.

Which cranial nerve is most commonly affected? CN3.

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What is Kaposi sarcoma?

A highly vascular tumor usually of the skin or mucous membranes

What percent of HIV+ pts will develop Kaposi's of the lid or conj?

~5%

Does it require treatment?

Not unless it is causing discomfort and/or disfigurement via a mass effect
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Kaposi’s sarcoma in AIDS pt
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Ophthalmic HIV manifestations

Adnexa

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Ophthalmic HIV manifestations

Adnexa

Eyelids
-- HZO
-- Molluscum
-- Kaposi sarcoma

Conj
-- ?
-- ?

Eye

Anterior segment

Posterior segment

HIV and the Eye

Manifestations commonly (but not exclusively) associated with HIV
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa

Eyelids
--HZO
--Molluscum
--Kaposi sarcoma

Conj
--Conj microvasculopathy
--SCC

Eye

Anterior segment

Posterior segment

(SCC = squamous-cell carcinoma)
What is conj microvasculopathy?

- Changes in vessel caliber (ie, dilation and constriction)
- Microaneurysms
- Comma sign

What is comma sign?

Discrete short segments of perfused venules; their curved configuration is reminiscent of a comma.
What is conj microvasculopathy?
A general term for a constellation of changes commonly seen in the conj vasculature of HIV+ individuals.
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Ophthalmic HIV manifestations

**Adnexa**
- Eyelids
  - HZO
  - Molluscum
- Conj
  - **Conj microvasculopathy**
  - SCC

**Eye**
- Anterior segment
- Posterior segment

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Conjunctival microvasculopathy in AIDS pt: Comma sign
**HIV and the Eye**

**Ophthalmic HIV manifestations**

- **Adnexa**
  - Eyelids
    - HZO
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  - Conj
    -- Conj microvasculopathy
    -- SCC
- **Eye**
  - Anterior segment
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Sickle cell

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Are conj microaneurysms and caliber changes found in sickle dz too?
Yes
**HIV and the Eye**

**Ophthalmic HIV manifestations**

- **Adnexa**
  - Eyelids
    - HZO
    - Molluscum
    - K
  - Conj
    -- **Conj microvasculopathy**
    -- SCC

- **Eye**
  - Anterior segment
  - Posterior segment

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**comma sign**
Discrete short segments of perfused venules, their curved configuration is reminiscent of a comma
What two factors should increase one’s concern that a pt with SCC of the conj might also have AIDS?
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Ophthalmic HIV manifestations

**Adnexa**
- Eyelids
  - HZO
  - Molluscum
  - Kaposi sarcoma
- Conj
  - Conj microvasculopathy
  - SCC

**Eye**
- Anterior segment
- Posterior segment

What two factors should increase one’s concern that a pt with SCC of the conj might also have AIDS?

-- If the individual is from region of a continent
-- If the individual is less than age
What two factors should increase one’s concern that a pt with SCC of the conj might also have AIDS?
--If the individual is from sub-Saharan Africa
--If the individual is less than 50 years old
Squamous cell carcinoma of conj
Ophthalmic HIV manifestations

**Adnexa**
- Eyelids
  - HZO
  - Molluscum
  - Kaposi sarcoma

**Eye**
- Conj
  - Conj microvasculopathy
  - SCC
- Anterior segment
- Posterior segment

**What manifestations are these?**
Ophthalmic HIV manifestations

**Adnexa**
- Eyelids
  - HZO
  - Molluscum
  - Kaposi sarcoma
- Conj
  - Conj microvasculopathy
  - SCC

**Eye**
- Anterior segment
  - KCS (Keratoconjunctivitis sicca)
  - Infectious keratitis
  - Iridocyclitis
- Posterior segment
Ophthalmic HIV manifestations

Adnexa
  - Eyelids
    -- HZO
    -- Molluscum
    -- Kaposi sarcoma
  - Conj
    -- Conj microvasculopathy
    -- SCC

Eye
  - Anterior segment
    -- KCS
    -- Infectious keratitis
    -- Iridocyclitis
  - Posterior segment

How common are anterior segment manifestations in HIV?
How common are anterior segment manifestations in HIV? They are present in about 1/2 of cases.
**What percent of HIV+ individuals will develop keratoconjunctivitis sicca?**
What percent of HIV+ individuals will develop keratoconjunctivitis sicca?

~20
What percent of HIV+ individuals will develop keratoconjunctivitis sicca? 
~20

What is the underlying problem?

Aqueous-phase deficiency secondary to inflammatory damage to the lacrimal glands
What percent of HIV+ individuals will develop keratoconjunctivitis sicca?
~20

What is the underlying problem?
Aqueous-phase deficiency secondary to inflammatory damage to the lacrimal glands
What sorts of bugs cause keratitis in HIV+ pts?
(Hint: 3 are general categories, and are not limited to HIV+ pts; one is a specific bug found almost exclusively in HIV-associated keratitis)
What sorts of bugs cause keratitis in HIV+ pts? (Hint: 3 are general categories, and are not limited to HIV+ pts; one is a specific bug found almost exclusively in HIV-associated keratitis)
Ophthalmic HIV manifestations

Adnexa
- Eyelids
  -- HZO
  -- Molluscum
  -- Kaposi sarcoma

Conj
- Conj microvasculopathy
- SCC

Eye
- Anterior segment
  -- KCS
  -- Infectious keratitis
  -- Iridocyclitis
- Posterior segment

HIV and the Eye

Which two viruses are most commonly implicated in viral keratitis associated with HIV infection?

Viral
- Bacterial
- Fungal
- Microsporidia
Which two viruses are most commonly implicated in viral keratitis associated with HIV infection?
VZV and HSV
Does being HIV+ convey an increased risk of bacterial keratitis?
Does being HIV+ convey an increased risk of bacterial keratitis? In and of itself, probably not. However, the associated immunodeficiency, coupled with HIV-induced KCS and other factors, probably places HIV+ individuals at increased risk.
Ophthalmic HIV manifestations

Adnexa

Eyelids
--HZO
--Molluscum
--Kaposi sarcoma

Conj
--Conj microvasculopathy
--SCC

Eye

Anterior segment

Conj microvasculopathy
--KCS
--Infectious keratitis
--Iridocyclitis

Posterior segment

Does being HIV+ convey an increased risk of fungal keratitis?

Viral
Bacterial
Fungal
Microsporidia
Does being HIV+ convey an increased risk of fungal keratitis?
Probably…but not definitely
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa
- Eyelids
  -- HZO
  -- Molluscum
  -- Kaposi sarcoma
- Conj
  -- Conj microvasculopathy
  -- SCC

Eye
- Anterior segment
  -- Conj microvasculopathy
  -- KCS
  -- Infectious keratitis
    -- Viral
    -- Bacterial
    -- Fungal
    -- Microsporidia
- Posterior segment

Does being HIV+ convey an increased risk of fungal keratitis? Probably…but not definitely

What about the hx would suggest that a pt with fungal keratitis might have an underlying HIV infection?
Ophthalmic HIV manifestations

Adnexa
- Eyelids
  -- HZO
  -- Molluscum
  -- Kaposi sarcoma

Conj
- Conj microvasculopathy
- SCC
- Conj microvasculopathy
- SCC

Eye
- Anterior segment
  -- Infectious keratitis
  -- Iridocyclitis
- Posterior segment

Does being HIV+ convey an increased risk of fungal keratitis? Probably…but not definitely

What about the hx would suggest that a pt with fungal keratitis might have an underlying HIV infection?
Absence of the ‘usual’ risk factors for fungal keratitis—trauma (typically involving vegetative material) or topical steroid use
Ophthalmic HIV manifestations

**Adnexa**
- Eyelids
  - HZO
  - Molluscum
  - Kaposi sarcoma
- Conj
  - Conj microvasculopathy
  - SCC

**Eye**
- Anterior segment
  - KCS
  - Infectious keratitis
    - Viral
    - Bacterial
    - Fungal
    - Microsporidia
- Posterior segment

What sort of bug is microsporidia?
**What sort of bug is microsporidia?**

Once thought to be a protozoan, recent DNA analysis indicates microsporidia is more closely related to fungi. For our purposes, it’s an obligate intracellular parasite.
What sort of bug is microsporidia? Once thought to be a protozoan, recent DNA analysis indicates microsporidia is more closely related to fungi. For our purposes, it’s an obligate intracellular parasite.

What other opportunistic fungus was previously (mis)classified as a protozoan? Pneumocystis is notorious for causing pneumonia in AIDS pts. Is it a known ocular pathogen as well? Yes—it causes choroiditis.
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa
- Eyelids
  -- HZO
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Viral
- Bacterial

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Pneumocystis
Ophthalmic HIV manifestations

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What is the full name of this species?
Pneumocystis jiroveci
What is P. carinii?
P. carinii was used until researchers realized that different species had different hosts. P. jiroveci infects humans, whereas P. carinii infects rats.

What other opportunistic fungus was previously (mis)classified as a protozoan?
Pneumocystis
Pneumocystis is notorious for causing pneumonia in AIDS pts. Is it a known ocular pathogen?
Yes—it causes conjunctivitis

What is the typical presentation in HIV+ pts?
An epithelial keratopathy
What is the treatment?
Topical fumagillin
**HIV and the Eye**

**Ophthalmic HIV manifestations**

- **Adnexa**
  - Eyelids
    - HZO
    - Molluscum
    - Kaposi sarcoma
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Once thought to be a protozoan, recent DNA analysis indicates microsporidia is more closely related to fungi. For our purposes, it’s an obligate intracellular parasite.

**What is the full name of this species?**
*Pneumocystis jiroveci* (or *jirovecii*)

**What other opportunistic fungus was previously (mis)classified as a protozoan?**
*Pneumocystis*

*Pneumocystis* is notorious for causing pneumonia in AIDS pts. Is it a known ocular pathogen as well?

Yes—it causes chorioretinitis and microvasculopathy.

**Pneumocystis**

*Pneumocystis jiroveci* is an opportunistic fungus that can cause pneumonia in AIDS pts. It was previously (mis)classified as a protozoan. **What is the full name of this species?**

*Pneumocystis jiroveci* (or *jirovecii*)

*Pneumocystis* is a common mistake. *P. carinii* was used until researchers realized that different species had different hosts. *P. jiroveci* infects humans, whereas *P. carinii* infects rats.
**Ophthalmic HIV manifestations**

**Adnexa**
- Eyelids
  - HZO
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**What sort of bug is microsporidia?**
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**What is the full name of this species?**
*Pneumocystis jiroveci* (or *jirovecii*)

**P jiroveci? I thought it was *P carinii*. What gives?**
*Pneumocystis* is the species that causes pneumonia in AIDS. It is not an ocular pathogen. Yes—it causes coughing and shortness of breath.

**What other opportunistic fungus was previously (mis)classified as a protozoan?**
Pneumocystis

Pneumocystis is notorious for causing pneumonia in AIDS. Is it a known ocular pathogen as well?

Yes—it causes coughing and shortness of breath.
Ophthalmic HIV manifestations

**Adnexa**
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  - HZO
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  - Kaposi sarcoma
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What is the typical presentation in HIV+ pts?
**HIV and the Eye**

**Ophthalmic HIV manifestations**

- **Adnexa**
  - Eyelids
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    - Kaposi sarcoma
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    - SCC

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  - Anterior segment
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Topical fumagillin
Ophthalmic HIV manifestations

Adnexa
- Eyelids
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  -- Conj microvasculopathy
  -- SCC

Eye
- Anterior segment
  -- KCS
  -- Infectious keratitis
  -- Iridocyclitis
- Posterior segment

In general, iridocyclitis in HIV is secondary to one of two sorts of events. What are they?
In general, iridocyclitis in HIV is secondary to one of two sorts of events. What are they?
Two meds commonly taken by HIV pts are notorious for causing uveitis in 1/4-1/3 of cases. What are they?

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Two meds commonly taken by HIV pts are notorious for causing uveitis in 1/4-1/3 of cases. What are they?
--Rifabutin
--Cidofovir
Two meds commonly taken by HIV pts are notorious for causing uveitis in 1/4-1/3 of cases. What are they?

- Rifabutin
- Cidofovir

Rifabutin-induced uveitis is more likely if another class of med is being taken concurrently. What is it?
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa
- Eyelids
  -- HZO
  -- Molluscum
  -- Kaposi sarcoma
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Eye
- Anterior segment
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  -- Infectious keratitis
  -- Iridocyclitis

Posterior segment

Two meds commonly taken by HIV pts are notorious for causing uveitis in 1/4-1/3 of cases. What are they?
- Rifabutin
- Cidofovir

Rifabutin-induced uveitis is more likely if another class of med is being taken concurrently. What is it?
- An azole antifungal
Two meds commonly taken by HIV pts are notorious for causing uveitis in 1/4-1/3 of cases. What are they?

- Rifabutin
- Cidofovir

Cidofovir has another ocular side effect (not necessarily a bad thing) in about 10% of cases—what is it?

- It lowers IOP

Under what circumstances would it be a bad thing?

If the combination of (Cidofovir-induced) uveitis + ocular hypotension led to hypotony maculopathy
**HIV and the Eye**

**Ophthalmic HIV manifestations**

**Adnexa**
- Eyelids
  - HZO
  - Molluscum
  - Kaposi sarcoma

**Eye**
- Anterior segment
  - Conj
    - Conj microvasculopathy
    - SCC
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Ophthalmic HIV manifestations

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It lowers IOP

Under what circumstances would it be a bad thing?

If the combination of (Cidofovir-induced) uveitis + ocular hypotension led to hypotony maculopathy
With which posterior-segment infections is a **mild** iridocyclitis commonly associated in HIV+ pts?

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With which posterior-segment infections is a mild iridocyclitis commonly associated in HIV+ pts?

-- CMV
-- VZV
With which posterior-segment infections is a mild iridocyclitis commonly associated in HIV+ pts?
--CMV
--VZV

With which posterior-segment infections is a severe iridocyclitis commonly associated in HIV+ pts?
With which posterior-segment infections is a **mild** iridocyclitis commonly associated in HIV+ pts?
--CMV
--VZV

With which posterior-segment infections is a **severe** iridocyclitis commonly associated in HIV+ pts?
--Toxoplasmosis
--TB
--Syphilis
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa

Eyelids
--HZO
--Molluscum
--Kaposi sarcoma

Conj
--Conj microvasculopathy
--SCC

Eye

Anterior segment
--KCS
--Infectious keratitis
--Iridocyclitis

Posterior segment

Secondary to...
Not 2° to...

What manifestations are these?
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa

Eyelids
--HZO
--Molluscum
--Kaposi sarcoma

Conj
--Conj microvasculopathy
--SCC

Anterior segment
--KCS
--Infectious keratitis
--Iridocyclitis

Eye

Posterior segment

Secondary to... opportunistic infection

Not 2o to... opportunistic infection

N OT an anatomic division
How common are posterior segment manifestations in HIV?
How common are posterior segment manifestations in HIV? They are present in at least 1/2 of cases.
Ophthalmic HIV manifestations

**Adnexa**
- Eyelids
  -- HZO
  -- Molluscum
  -- Kaposi sarcoma
- Conj
  -- Conj microvasculopathy
  -- SCC

**Eye**
- Anterior segment
  -- KCS
  -- Infectious keratitis
  -- Iridocyclitis
- Posterior segment
  -- Secondary to opportunistic infection
  -- Not 2° to opportunistic infection

What general class of manifestations are these?
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa
- Eyelids
  -- HZO
  -- Molluscum
  -- Kaposi sarcoma
- Conj
  -- Conj microvasculopathy
  -- SCC

Eye
- Anterior segment
  -- KCS
  -- Infectious keratitis
  -- Iridocyclitis
  Secondary to opportunistic infection
  -- Infectious chorioretinitis
  -- Necrotizing retinitis
- Posterior segment
  Not 2o to opportunistic infection

What general class of manifestations are these?
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa

Eyelids
--HZO
--Molluscum
--Kaposi sarcoma

Conj
--Conj microvasculopathy
--SCC

Eye

Anterior segment
--KCS
--Infectious keratitis
--Iridocyclitis

Posterior segment

Secondary to opportunistic infection
--Infectious chorioretinitis
--Necrotizing retinitis

Not 2° to opportunistic infection

Infectious chorioretinitis

(Name four general classes of infectious agents)
Ophthalmic HIV manifestations

Adnexa

Eyelids
--HZO
--Molluscum
--Kaposi sarcoma

Conj
--Conj microvasculopathy
--SCC

Anterior segment
--KCS
--Infectious keratitis
--Iridocyclitis

Eye

Posterior segment

Secondary to opportunistic infection
--Infectious chorioretinitis
--Necrotizing retinitis

Not 2° to opportunistic infection

Infectious chorioretinitis

Viral
Bacterial
Fungal
Parasitic
Which of these is the most common cause of infectious retinitis/choroiditis in AIDS pts?
**Ophthalmic HIV manifestations**

**Adnexa**
- Eyelids
  - HZO
  - Molluscum
  - Kaposi sarcoma
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  - Conj microvasculopathy
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- Anterior segment
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- Posterior segment
  - Secondary to opportunistic infection
  - Infectious chorioretinitis
  - Necrotizing retinitis

**Infectious chorioretinitis**
- Viral
- Bacterial
- Fungal
- Parasitic

---

*Which of these is the most common cause of infectious retinitis/choroiditis in AIDS pts?*

Viral pathogens
**Ophthalmic HIV manifestations**

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- Eyelids
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- Conj
  - Conj microvasculopathy
  - SCC

**Eye**
- Anterior segment
  - KCS
  - Infectious keratitis
  - Iridocyclitis

**Posterior segment**
- Secondary to opportunistic infection
  - Infectious chorioretinitis
  -- Necrotizing retinitis
- Not 2° to opportunistic infection

**Infectious chorioretinitis**
- Viral
  --?
  --?
  
  Name three specific viruses (two are grouped together)

- Bacterial
- Fungal
- Parasitic
Ophthalmic HIV manifestations

HIV and the Eye

Adnexa
- Eyelids
  -- HZO
  -- Molluscum
  -- Kaposi sarcoma

Conj
- Conj microvasculopathy
- SCC

Anterior segment
- KCS
- Infectious keratitis
- Iridocyclitis

Eye

Posterior segment
- Secondary to opportunistic infection
  -- Infectious chorioretinitis
  -- Necrotizing retinitis
- Not 2° to opportunistic infection

Infectious chorioretinitis
- Viral
  -- CMV
  -- VZV/HSV
- Bacterial
- Fungal
- Parasitic
Which is the most common viral cause (and #1 cause overall)?
Which is the most common viral cause (and #1 cause overall)?

**CMV retinitis** is the most common cause of posterior-segment infection among HIV+ individuals, and the leading cause of vision loss in this population as well.
**HIV and the Eye**

**Ophthalmic HIV manifestations**

- **Adnexa**
  - Eyelids
    - HZO
    - Molluscum
    - Kaposi sarcoma
  - Conj
    - Conj microvasculopathy
    - SCC

- **Eye**
  - **Conj Posterior segment**
    - Fungal
    - Parasitic
    - Infectious keratitis
    - Iridocyclitis
  - **Anterior segment**
    - KCS
    - Infectious keratitis
    - Iridocyclitis
  - **Posterior segment**
    - Secondary to opportunistic infection
    - Not 2o to opportunistic infection
  - Neutrofilling retinitis

**Infectious chorioretinitis**

**CMV retinitis** is the most common cause of posterior-segment infection among HIV+ individuals, and the leading cause of vision loss in this population as well.

How severe is the vision loss in CMV retinitis?

- Left untreated, it will progress slowly but relentlessly to NLP.
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa
- Eyelids
  -- HZO
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  -- Kaposi sarcoma
- Conj
  -- Conj microvasculopathy
  -- SCC

Eye
- Posterior segment
  - Secondary to opportunistic infection
  - Not 2° to opportunistic infection

Infectious chorioretinitis
- Viral
  -- CMV
  -- VZV/HSV
- Bacterial
- Fungal
- Parasitic

How severe is the vision loss in CMV retinitis?
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Which is the most common viral cause (and #1 cause overall)?
CMV retinitis is the most common cause of posterior-segment infection among HIV+ individuals, and the leading cause of vision loss in this population as well.
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa

- Eyelids
  - HZO
  - Molluscum
  - Kaposi sarcoma

Eye

- Conj
  - CMV
  - SCC
- Posterior segment
  - NEC
  - Infectious keratitis
  - Iridocyclitis

Infectious chorioretinitis

Viral
  - CMV
  - VZV/HSV

Bacterial

Fungal

Parasitic

Secondary to opportunistic infection

Not 2° to opportunistic infection

What is the time frame for progression to NLP?

Weeks to months

How severe is the vision loss in CMV retinitis?

Left untreated, it will progress slowly to NLP

Which is the most common viral cause (and #1 cause overall)?

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HIV and the Eye

Ophthalmic HIV manifestations

Adnexa
- Eyelids
  -- HZO
  -- Molluscum
  -- Kaposi sarcoma
- Conj
  -- C
  -- S
- Posterior segment
  -- Infectious keratitis
  -- Iridocyclitis

Eye
- Anterior segment
  -- Infectious chorioretinitis

Infectious chorioretinitis
- Viral
  -- CMV
  -- VZV/HSV
- Bacterial
- Fungal
- Parasitic

Secondary to opportunistic infection
- Neutrophilic retinitis

Not secondary to opportunistic infection

What is the time frame for progression to NLP?
- Weeks to months

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Anterior segment
- KCS
- Infectious keratitis
- Iridocyclitis

Posterior segment

- Secondary to opportunistic infection
- Not 2° to opportunistic infection

Infectious chorioretinitis

By how much is CMV the most common posterior-segment opportunistic infection?

Which is the most common viral cause (and #1 cause overall)?

**CMV retinitis** is the most common cause of posterior-segment infection among HIV+ individuals, and the leading cause of vision loss in this population as well.
Ophthalmic HIV manifestations

**Eye**

- **Anterior segment**
  - KCS
  - Infectious keratitis
  - Iridocyclitis

- **Conj**
  - Conj microvasculopathy
  - SCC

- **Posterior segment**
  - Secondary to opportunistic infection
  - Infectious chorioretinitis

**Adnexa**

- Eyelids
  - HZO
  - Molluscum
  - Kaposi sarcoma
- Conj

**Infectious chorioretinitis**

*By how much is CMV the most common posterior-segment opportunistic infection?*
By a mile. CMV accounts for up to 90% of all posterior-segment infections in AIDS.

*Which is the most common viral cause (and #1 cause overall)?*
**CMV retinitis** is the most common cause of posterior-segment infection among HIV+ individuals, and the leading cause of vision loss in this population as well.
HIV and the Eye

Ophthalmic HIV manifestations

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Eye

Posterior segment

- Infectious chorioretinitis
  - CMV retinitis
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Which is the most common viral cause (and #1 cause overall)? **CMV retinitis** is the most common cause of posterior-segment infection among HIV+ individuals, and the leading cause of vision loss in this population as well.

How common is CMV retinitis among AIDS pts? It will arise in about 1/3 of these pts.
**HIV and the Eye**

**Ophthalmic HIV manifestations**

- **Adnexa**
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  - Posterior segment
    - Secondary to opportunistic infection
      - Infectious chorioretinitis
      - VZV/HSV
    - Not 2° to opportunistic infection

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**HIV and the Eye**

**Ophthalmic HIV manifestations**

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**HIV+ individuals, and the leading cause of vision loss in this population as well.**
Ophthalmic HIV manifestations

HIV and the Eye

Adnexa
- Eyelids
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Conj
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Viral

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**‘Crumbled cheese and ketchup’**

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Does either type present with pain?

Pain?

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**Viral**

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</table>

<table>
<thead>
<tr>
<th>Red eye?</th>
<th>Posterior Type</th>
<th>Peripheral Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>?</td>
<td></td>
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</tr>
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</table>

By how much is CMV the most common posterior-segment opportunistic infection?
By a mile. CMV accounts for up to 90% of all posterior-segment infections in AIDS pts.

How common is latent CMV infection in the population at large?
Very—estimates range from 40-100%

HIV and the Eye

How common is CMV retinitis among AIDS pts?
It will arise in about 1/3 of these pts.
**HIV and the Eye**

**How does CMV retinitis present?**
If the initial lesion is macular or affects the ONH, the pt might c/o decreased vision. However, if the lesion is peripheral, the pt might note only floaters, or be asymptomatic.

**What about its appearance on DFE?**
There are two classic presentations:

<table>
<thead>
<tr>
<th>Location</th>
<th>Posterior Type</th>
<th>Peripheral Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macula</td>
<td></td>
<td>Periphery</td>
</tr>
<tr>
<td>Hemorrhages present?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Pattern of spread</td>
<td></td>
<td>A slowly advancing 'fire line'</td>
</tr>
<tr>
<td>Classic description</td>
<td>Crumbled cheese and ketchup</td>
<td>‘Brushfire’</td>
</tr>
<tr>
<td>Pain?</td>
<td>NO</td>
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</tr>
<tr>
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How is CMV retinitis managed?

With ganciclovir (in various forms) and/or foscarnet

Are these meds curative?

No—they suppress viral replication, but do not eliminate the infection

Does that mean pts must receive long-term suppressive therapy?

It used to. However, because HAART can facilitate successful reconstitution of the host immune system, anti-CMV maintenance therapy is unnecessary so long as the CD4 count remains elevated.

Infectious chorioretinitis

Viral

--CMV

--VZV/HSV

Bacterial

Fungal

Parasitic

Secondary to opportunistic infection

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--Necrotizing retinitis

Not 2° to opportunistic infection
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Conj microvasculopathy
--KCS

--Infectious keratitis

--Iridocyclitis

Kaposi sarcoma

HZO

Molluscum

Eyelids

Anterior segment

Conj

KCS

Infectious keratitis

Iridocyclitis

--Microvasculopathy

--SCC

Posterior segment

Eye

HIV and the Eye

Ophthalmic HIV manifestations

Adnexa Eye

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Conj--Conj microvasculopathy--SCC

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**For what routes of administration is ganciclovir available?**

1. Intravenous
2. PO (as valganciclovir)
3. Intravitreal injection
4. Intravitreal implant

(Two route categories)

---

**Infectious chorioretinitis**

- Viral
  - CMV
  - VZV/HSV
- Bacterial
- Fungal
- Parasitic

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**Anterior segment**

- Conj microvasculopathy
- SCC

**Posterior segment**

- HZO
- Molluscum
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1) Provides treatment for both eyes
2) Covers systemic involvement

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Ophthalmic HIV manifestations

- Adnexa Eye
  - Eyelids
  - Anterior segment
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- Posterior segment
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**Infectious chorioretinitis**

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**HIV and the Eye**

Ophthalmic HIV manifestations

--Adnexa Eye

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**Secondary to opportunistic infection**

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Infectious chorioretinitis

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**Anterior**

- Eyelids
- Anterior segment

**Conj**

- Conj microvasculopathy
- SCC

**Posterior**

- HZO
- Molluscum
- Kaposi sarcoma

---

2° to opportunistic infection

---

Infectious keratitis
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**Adnexa Eye**

Eyelids

Anterior segment

Conj Posterior segment

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SCC

Ophthalmic HIV manifestations

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HIV and the Eye

Conj microvasculopathy

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Ophthalmic HIV manifestations

Adnexa Eye

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HIV and the Eye

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**What are the risks associated with injections and/or surgery?**
1. Endophthalmitis
2. RD
3. Vitreous hemorrhage

**HIV and the Eye**

- Adnexa Eye
  - Eyelids
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  - HZO
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- **Ophthalmic HIV manifestations**
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What is the risk of developing CMV retinitis in the untreated fellow eye?

Very high. In one study of the ganciclovir implant, 50% of pts developed CMV retinitis in the fellow eye within 6 months, whereas the risk was only ~10% if the pt received intravenous treatment.

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Eye

HIV and the Eye

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Speaking of reconstituting the host immune system in a pt with a hx of CMV retinitis, what problem can result?

So-called immune recovery uveitis (IRU)

What is the relationship between IRU and CMV retinitis?
For some reason, only eyes that have or had CMV retinitis can develop IRU

How does it present?
As an anterior and/or intermediate uveitis with decreased vision

How common is it?
~10% of CMV retinitis pts who successfully undergo immune-system reconstitution will experience it

What factors place a pt at greater risk of developing IRU?
--Experiencing an increase in their CD4 count of at least 50, with the total surpassing 100
--Hx of extensive CMV retinitis (the greater the retinal area infected, the
--Hx of cidofovir use
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So-called **immune recovery uveitis (IRU)**
HIV and the Eye

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**HIV and the Eye**

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**HIV and the Eye**

**Ophthalmic HIV manifestations**

Adnexa Eye

Eyelids

Anterior segment

Conj

Posterior segment

--HZO

--Molluscum

--Kaposi sarcoma

**HIV and the Eye**

--KCS

--Infectious keratitis

--Iridocyclitis

Secondary to opportunistic infection

Not secondary to opportunistic infection

--Infectious chorioretinitis

**Viral**

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*What is the cause of the decreased vision?*
CME +/- an ERM

*Does the CME respond well to topical or sub-Tenon’s steroids?*
No

*How about intravitreal steroids?*
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What is another cause of decreased vision in CMV retinitis? Rhegmatogenous retinal detachment secondary to infection-induced retinal breaks.

Is RD common in CMV retinitis pts? Pre-HAART it was—estimates ran as high as 50%. It is vastly lower in pts treated with HAART and anti-CMV meds, however.

What factors place a pt at greater risk of developing IRU? --Experiencing an increase in their CD4 count of at least 50, with the total surpassing 100
--Hx of extensive CMV retinitis (the greater the retinal area infected, the greater the risk)
--Hx of cidofovir use
Ophthalmic HIV manifestations

Adnexa

Eyelids
  --HZO
  --Molluscum
  --Kaposi sarcoma

Conj
  --Conj microvasculopathy
  --SCC

Posterior segment

Anterior segment
  --KCS
  --Infectious keratitis
  --Iridocyclitis

Infectious chorioretinitis

Viral
  --CMV
  --VZV/HSV

Bacterial

Fungal

Parasitic

Secondary to opportunistic infection
  --Infectious chorioretinitis
  --Necrotizing retinitis

Not 2° to opportunistic infection

With what dreaded condition is posterior-segment VZV/HSV infection associated?
Ophthalmic HIV manifestations

Adnexa
- Eyelids
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Posterior segment
- Secondary to opportunistic infection
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Infectious chorioretinitis
- Viral
  -- CMV
  -- VZV/HSV
- Bacterial
- Fungal
- Parasitic

With what dreaded condition is posterior-segment VZV/HSV infection associated? **Necrotizing retinitis**, a subject we will address in detail shortly.
Ophthalmic HIV manifestations

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Infectious chorioretinitis

Viral
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Bacterial
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Fungal

Parasitic

Name two specific bacteria
HIV and the Eye

Ophthalmic HIV manifestations

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Infectious chorioretinitis
- Viral
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  -- VZV/HSV
- Bacterial
  -- Syphilis
  -- TB
- Fungal
- Parasitic
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Is bacterial chorioretinitis a common opportunistic infection in HIV+ pts?
HIV and the Eye

Ophthalmic HIV manifestations

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Is bacterial chorioretinitis a common opportunistic infection in HIV+ pts?
No. Mycobacterial infection is particularly uncommon.
HIV and the Eye

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What aspect of the presentation should make you suspect a chorioretinitis is bacterial?
**HIV and the Eye**

**Ophthalmic HIV manifestations**

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**Infectious chorioretinitis**

**Is bacterial chorioretinitis a common opportunistic infection in HIV+ pts?**
No. Mycobacterial infection is particularly uncommon.

**What aspect of the presentation should make you suspect a chorioretinitis is bacterial?**
If it is unresponsive to appropriate antiviral/fungal/parasitic therapy
Ocular syphilis in AIDS pts can present with a clinical picture similar to what white-dot syndrome?

Acute syphilitic posterior placoid chorioretinopathy (ASPPC)

APMPPE has a classic FA pattern—what is it?

'Blocks early, stains late'

Does FA in ASPPC demonstrate the same pattern?

Yes

Are there any factors in the clinical history to push you toward one or the other?

Yes—ASPPC patients are immunocompromised, whereas APMPPE patients aren’t.
Ocular syphilis in AIDS pts can present with a clinical picture similar to what white-dot syndrome?

Acute posterior multifocal placoid pigment epitheliopathy (APMPPE)
Ocular syphilis in AIDS pts can present with a clinical picture similar to what white-dot syndrome? Acute posterior multifocal placoid pigment epitheliopathy (APMPPE)

By what name is the lookalike ocular syphilitic condition known?
Ocular syphilis in AIDS pts can present with a clinical picture similar to what white-dot syndrome?
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  -- Kaposi sarcoma

Eye

Infectious chorioretinitis
- Viral
  -- CMV
  -- VZV/HSV
- Bacterial
  -- Syphilis
  -- TB

Ocular syphilis in AIDS pts can present with a clinical picture similar to what white-dot syndrome?
Acute posterior multifocal placoid pigment epitheliopathy (APMPPE)

By what name is the lookalike ocular syphilitic condition known?
Acute syphilitic posterior placoid chorioretinopathy (ASPPC)

APMPPE has a classic FA pattern--what is it?

'Blocks early, stains late'

Yes

Are there any factors in the clinical history to push you toward one or the other?
Yes—ASPPC patients are immunocompromised, whereas APMPPE patients aren't.
Ophthalmic HIV manifestations

Adnexa
- Eyelids
  - HZO
  - Molluscum
  - Kaposi sarcoma
- Conj
  - Conj microvasculopathy
  - SCC
- Infectious cl

Infectious cl
- Viral
  - CMV
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FA in APMPPE: ‘Blocks early, stains late’
**Ophthalmic HIV manifestations**

### Adnexa
- **Eyelids**
  - Herpes zoster ophthalmicus (HZO)
  - Molluscum
  - Kaposi sarcoma

### Conj
- **Conj microvasculopathy**
- **SCC**

### Infectious chorioretinitis
- **Viral**
  - CMV
  - VZV/HSV
- **Bacterial**
  - Syphilis
  - TB

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'Blocks early, stains late'

**Does FA in ASPPC demonstrate the same pattern?**
**HIV and the Eye**

**Ophthalmic HIV manifestations**

**Adnexa**
- Eyelids
  - HZO
  - Molluscum
  - Kaposi sarcoma

**Eye**
- Conj
  - Conj microvasculopathy
  - SCC

**Infectious disease**
- Viral
  - CMV
  - VZV/HSV
- Bacterial
  - Syphilis
  - TB

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Infectious chorioretinitis

Necrotizing chorioretinitis

Ophthalmic HIV manifestations

Adnexa

Eyelids
--HZO
--Molluscum
--Kaposi sarcoma

Conj
--Conj microvasculopathy
--SCC

Infectious chorioretinitis

Viral
--CMV
--VZV/HSV

Bacterial
--Syphilis
--TB

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Eye
**HIV and the Eye**

**Ophthalmic HIV manifestations**

- **Adnexa**
  - **Eyelids**
    - HZO
    - Molluscum
    - Kaposi sarcoma
  - **Conj**
    - Conj microvasculopathy
    - SCC

- **Infectious**
  - **Viral**
    - CMV
    - VZV/HSV
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HIV and the Eye

Ophthalmic HIV manifestations

Adnexa
- Eyelids
  -- HZO
  -- Molluscum
  -- Kaposi sarcoma
- Conj
  -- Conj microvasculopathy
  -- SCC

Eye
- Anterior segment
  -- KCS
  -- Infectious keratitis
  -- Iridocyclitis
- Posterior segment
  -- Secondary to opportunistic infection
    -- Infectious chorioretinitis
    -- Necrotizing retinitis
  -- Not 2° to opportunistic infection

Infectious chorioretinitis
- Viral
  -- CMV
  -- VZV/HSV
- Bacterial
  -- Syphilis
  -- TB
- Fungal
  -- ?
  -- Name two specific fungi
- Parasitic
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa
- Eyelids
  -- HZO
  -- Molluscum
  -- Kaposi sarcoma
- Conj
  -- Conj microvasculopathy
  -- SCC

Eye
- Posterior segment
  - Secondary to opportunistic infection
    -- Infectious chorioretinitis
    -- Necrotizing retinitis
  - Not 2o to opportunistic infection

Anterior segment
- KCS
- Infectious keratitis
- Iridocyclitis

Infectious chorioretinitis
- Viral
  -- CMV
  -- VZV/HSV
- Bacterial
  -- Syphilis
  -- TB
- Fungal
  -- Histoplasmosis
  -- Pneumocystis
- Parasitic
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa

- Eyelids
  -- HZO
  -- Molluscum
  -- Kaposi sarcoma

conj:

- Conj microvasculopathy
- SCC

Anterior segment

- KCS
- Infectious keratitis
- Iridocyclitis

Eye

Posterior segment

Secondary to opportunistic infection

- Infectious chorioretinitis
  -- Necrotizing

Not 2º to opportunistic infection

Infectious chorioretinitis

- Viral
  -- CMV
  -- VZV/HSV

- Bacterial
  -- Syphilis
  -- TB

- Fungal
  -- Histoplasmosis

- Parasitic
  -- Pneumocystis

Is histoplasma chorioretinitis common?
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa
- Eyelids
  -- HZO
  -- Molluscum
  -- Kaposi sarcoma
- Conj
  -- Conj microvasculopathy
  -- SCC

Eye
- Anterior segment
  -- KCS
  -- Infectious keratitis
  -- Iridocyclitis
- Posterior segment
  -- Infectious chorioretinitis
    -- Secondary to opportunistic infection
      -- Infectious chorioretinitis
        -- Necrotizing

- Not 2° to opportunistic infection

Infectious chorioretinitis
- Viral
  -- CMV
  -- VZV/HSV
- Bacterial
  -- Syphilis
  -- TB
- Fungal
  -- Histoplasmosis
- Parasitic
  -- Pneumocystis

Is histoplasma chorioretinitis common?
No
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa
- Eyelids
  -- HZO
  -- Molluscum
  -- Kaposi sarcoma

Conj
- Conj microvasculopathy
- SCC

Anterior segment
- KCS
- Infectious keratitis
- Iridocyclitis

Posterior segment
- Secondary to opportunistic infection
- Not 2o to opportunistic infection

Infectious chorioretinitis
- Viral
  -- CMV
  -- VZV/HSV
- Bacterial
  -- Syphilis
  -- TB
- Fungal
  -- Histoplasmosis
  -- Pneumocystis

How does pneumocystis choroiditis present on DFE?
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa

Eyelids
--HZO
--Molluscum
--Kaposi sarcoma

Conj
--Conj microvasculopathy
--SCC

Eye

Anterior segment
--KCS
--Infectious keratitis
--Iridocyclitis

Posterior segment

Secondary to opportunistic infection

Not 2° to opportunistic infection

Infectious chorioretinitis

How does pneumocystis chorioiditis present on DFE?
With deep, creamy-yellow choroidal lesions

Viral
--CMV
--VZV/HSV

Bacterial
--Syphilis
--TB

Fungal
--Histoplasmosis
--Pneumocystis
Pneumocystis choroiditis in AIDS
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa
- Eyelids
  -- HZO
  -- Molluscum
  -- Kaposi sarcoma

Conj
- Conj microvasculopathy
- SCC

Infectious chorioretinitis
- Viral
  -- CMV
  -- VZV/HSV
- Bacterial
  -- Syphilis
  -- TB
- Fungal
  -- Histoplasmosis
  -- Pneumocystis

Eye
- Anterior segment
  -- KCS
  -- Infectious keratitis
  -- Iridocyclitis

Posterior segment
- Secondary to opportunistic infection
- Not 2° to opportunistic infection

How does pneumocystis choroiditis present on DFE?
With deep, creamy-yellow choroidal lesions

Why is it critical to correctly diagnose this condition?
Infectious chorioretinitis

Viral
--CMV
--VZV/HSV

Bacterial
--Syphilis
--TB

Fungal
--Histoplasmosis
--Pneumocystis

Secondary to opportunistic infection

Infectious keratitis

Iridocyclitis

KCS

Kaposi sarcoma

HZO

Molluscum

Ophthalmic HIV manifestations

Adnexa

Eyelids
--HZO
--Molluscum
--Kaposi sarcoma

Conj
--Conj microvasculopathy
--SCC

Posterior segment

Eye

Secondary to opportunistic infection

Not 2° to opportunistic infection

How does pneumocystis choroiditis present on DFE?
With deep, creamy-yellow choroidal lesions

Why is it critical to correctly diagnose this condition?
Ocular dz is indicative of systemic infection, which is potentially life-threatening
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa

Eyelids
--HZO
--Molluscum
--Kaposi sarcoma

Conj
--Conj microvasculopathy
--SCC

Eye

Anterior segment
--KCS
--Infectious keratitis
--Iridocyclitis

Posterior segment

Secondary to opportunistic infection
--Infectious chorioretinitis
--Necrotizing retinitis

Infectious chorioretinitis

Viral
--CMV
--VZV/HSV

Bacterial
--Syphilis
--TB

Fungal
--Histoplasmosis
--Pneumocystis

Parasitic
--?

Not 2° to opportunistic infection

Name one specific parasite
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa

Eyelids
--HZO
--Molluscum
--Kaposi sarcoma

Conj
--Conj microvasculopathy
--SCC

Eye

Anterior segment
--KCS
--Infectious keratitis
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Posterior segment

Secondary to opportunistic infection
--Infectious chorioretinitis
--Necrotizing retinitis

Not 2° to opportunistic infection

Infectious chorioretinitis

Viral
--CMV
--VZV/HSV

Bacterial
--Syphilis
--TB

Fungal
--Histoplasmosis
--Pneumocystis

Parasitic
--Toxoplasmosis
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa
- Eyelids
- Coni

How common is ocular toxoplasmosis in HIV+ pts?

Eye
- Anterior segment
  - KCS
  - Infectious keratitis
  - Iridocyclitis

- Posterior segment
  - Secondary to opportunistic infection
    - Infectious chorioretinitis
    - Necrotizing retinitis
  - Not 2o to opportunistic infection

Parasitic
- Toxoplasmosis

Viral
- CMV
- VZV/HSV

Bacterial
- Syphilis

Fungal
- TB
- Toxoplasmosis
- Histoplasmosis
- Pneumocystis
How common is ocular toxoplasmosis in HIV+ pts? Not very—only ~1% of HIV+ individuals will develop it.
**Adnexa**

- Eyelids
- Coni

**Eye**

- Anterior segment
  - KCS
  - Infectious keratitis
  - Iridocyclitis

- Posterior segment
  - Secondary to opportunistic infection
    - Infectious chorioretinitis
      - Necrotizing retinitis
  - Not 2° to opportunistic infection

---

**HIV and the Eye**

**Ophthalmic HIV manifestations**

- How common is ocular toxoplasmosis in HIV+ pts? Not very—only ~1% of HIV+ individuals will develop it.

*The classic description regarding the DFE appearance of toxoplasma retinitis (in non-HIV pts) is of a…*
**How common is ocular toxoplasmosis in HIV+ pts?**

Not very—only ~1% of HIV+ individuals will develop it.

**The classic description regarding the DFE appearance of toxoplasma retinitis (in non-HIV pts) is of a… ‘Headlight in the fog’**

---

**Infectious chorioretinitis**

- CMV
- VZV/HSV
- Syphilis
- TB
- Toxoplasmosis
- Histoplasmosis
- Pneumocystis

---

**Secondary to opportunistic infection**

- Infectious chorioretinitis
  - Necrotizing retinitis

---

**Parasitic**

- Toxoplasmosis
Toxoplasma chorioretinitis in immunocompetent host
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa

Eyelids
Coni

Eye

Anterior segment
--KCS
--Infectious keratitis
--Iridocyclitis

Posterior segment

Secondary to opportunistic infection
--Infectious chorioretinitis
--Necrotizing retinitis

Not 2° to opportunistic infection

How common is ocular toxoplasmosis in HIV+ pts?
Not very—only ~1% of HIV+ individuals will develop it

The classic description regarding the DFE appearance of toxoplasma retinitis (in non-HIV pts) is of a… ‘Headlight in the fog’

What aspect of the infection correlates with…
--the ‘headlight’:
--the ‘fog’:

 Parasitic
--Toxoplasmosis
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa

Evelids

Coni

Eye

Anterior segment

--KCS

--Infectious keratitis

--Iridocyclitis

Posterior segment

Secondary to opportunistic infection

--Infectious chorioretinitis

--Necrotizing retinitis

Not 2\textsuperscript{o} to opportunistic infection

Parasitic

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Not very—only \textasciitilde{}1\% of HIV+ individuals will develop it

The classic description regarding the DFE appearance of toxoplasma retinitis (in non-HIV pts) is of a…
‘Headlight in the fog’

What aspect of the infection correlates with…
--the ‘headlight’: The large yellow retinal lesion
--the ‘fog’: A dense overlying vitritis
Ophthalmic HIV manifestations

**HIV and the Eye**

**Anterior segment**
- KCS
- Infectious keratitis
- Iridocyclitis

**Posterior segment**
- Secondary to opportunistic infection
  - Infectious chorioretinitis
    -- Necrotizing retinitis
- Parasitic
  -- Toxoplasmosis

**Adnexa**
- Eyelids
- Conj

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**What aspect of the infection correlates with…**
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**In what way might the presentation of toxo retinitis in an HIV+ pt deviate from the classic description?**
By the absence of 'fog'—a pt who is profoundly immunocompromised might be unable to generate a significant vitritis
**HIV and the Eye**

**Ophthalmic HIV manifestations**

- **Adnexa**
  - Eyelids
  - Conj

- **Eye**
  - Anterior segment
    - KCS
    - Infectious keratitis
    - Iridocyclitis
  - Posterior segment
    - Secondary to opportunistic infection
      - Infectious chorioretinitis
    - Necrotizing retinitis
    - Toxoplasmosis

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Toxoplasma chorioretinitis in AIDS pt
Ophthalmic HIV manifestations

In what ways does the management of toxo retinitis differ in the immunocompromised population?
--In immunocompetent pts, toxo retinitis needs treatment only if the lesion is threatening the
macula, ONH or a major vessel, or in cases of severe vitritis. However, in immunocompromised pts,
lesions are treated regardless of the severity of vitritis.

By the absence of ‘fog’—a pt who is profoundly immunocompromised might be unable to generate a
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By the absence of ‘fog’—a pt who is profoundly immunocompromised might be unable to generate a
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Speaking of comparing/contrasting toxo retinitis in immunocompetent vs. immunocompromised hosts…
In what ways does the management of toxo retinitis differ in the immunocompromised population?
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Speaking of comparing/contrasting toxo retinitis in immunocompetent vs -compromised hosts…

In what way might the presentation of toxo retinitis in an HIV+ pt deviate from the classic description?
By the absence of ‘fog’—a pt who is profoundly immunocompromised might be unable to generate a significant vitritis.
**In what ways does the management of toxo retinitis differ in the immunocompromised population?**  
--In immunocompetent pts, toxo retinitis needs treatment only if the lesion is threatening the macula, ONH or a major vessel, or in cases of severe vitritis; whereas in immunocompromised pts, lesions are treated.

**In what way might the presentation of toxo retinitis in an HIV+ pt deviate from the classic description?**  
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**Speaking of comparing/contrasting toxo retinitis in immunocompetent vs -compromised hosts…**
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By the absence of ‘fog’—a pt who is profoundly immunocompromised might be unable to generate a significant vitritis.
HIV and the Eye

Ophthalmic HIV manifestations

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In what ways does the presentation of toxo retinitis in an HIV+ pt deviate from the classic description?
By the absence of ‘fog’—a pt who is profoundly immunocompromised might be unable to generate a significant vitritis

Speaking of comparing/contrasting toxo retinitis in immunocompetent vs -compromised hosts…

In what aspect of the infection correlates with…
--the ‘headlight’: The large yellow retinal lesion
--the ‘fog’: A dense overlying vitritis

Parasitic
--Toxoplasmosis

Secondary to opportunistic infection
--Infectious chorioretinitis
--Necrotizing retinitis

Not 2o to opportunistic infection

Viral
--CMV
--VZV/HSV

Bacterial
--Syphilis

Fungal
--TB
--Histoplasmosis
--Pneumocystis
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In what way might the presentation of toxo retinitis in an HIV+ pt deviate from the classic description?
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Speaking of comparing/contrasting toxo retinitis in immunocompetent vs -compromised hosts…

In what way might the presentation of toxo retinitis in an HIV+ pt deviate from the classic description?
By the absence of ‘fog’—a pt who is profoundly immunocompromised might be unable to generate a significant vitritis
Why do immunocompromised pts with toxo retinitis need brain imaging?

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**Speaking of comparing/contrasting toxo retinitis in immunocompetent vs -compromised hosts…**

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**In what way might the presentation of toxo retinitis in an HIV+ pt deviate from the classic description?**

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By the absence of 'fog'—a pt who is profoundly immunocompromised might be unable to generate a significant vitritis.
Why do immunocompromised pts with toxo retinitis need brain imaging? To assess for CNS involvement.

In what way might the presentation of toxo retinitis in an HIV+ pt deviate from the classic description?

Speaking of comparing/contrasting toxo retinitis in immunocompetent vs -compromised hosts…

The classic description regarding the DFE appearance of toxoplasm retinitis is of a ‘Headlight in the fog’.

What aspect of the infection correlates with…

--the ‘headlight’: The large yellow retinal lesion
--the ‘fog’: A dense overlying vitritis

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By the absence of ‘fog’—a pt who is profoundly immunocompromised might be unable to generate a significant vitritis.

MR imaging of the brain

Why do immunocompromised pts with toxo retinitis need brain imaging?

To assess for CNS involvement.

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By the absence of ‘fog’—a pt who is profoundly immunocompromised might be unable to generate a significant vitritis.
Why do immunocompromised pts with toxo retinitis need brain imaging? To assess for CNS involvement

Is there a strong correlation between ocular and CNS toxo?

In what way might the presentation of toxo retinitis in an HIV+ pt deviate from the classic description?

By the absence of 'fog'—a pt who is profoundly immunocompromised might be unable to generate a significant vitritis

Speaking of comparing/contrast toxo retinitis in immunocompetent vs -compromised hosts...

MR imaging of the brain

Why do immunocompromised pts with toxo retinitis need brain imaging? To assess for CNS involvement

Is there a strong correlation between ocular and CNS toxo?

In what way might the presentation of toxo retinitis in an HIV+ pt deviate from the classic description?

By the absence of 'fog'—a pt who is profoundly immunocompromised might be unable to generate a significant vitritis

Speaking of comparing/contrast toxo retinitis in immunocompetent vs -compromised hosts...
Why do immunocompromised pts with toxo retinitis need brain imaging? To assess for CNS involvement.

Is there a strong correlation between ocular and CNS toxo? Yes—up to 50% of toxo retinitis pts will be found to have CNS involvement.

In what way might the presentation of toxo retinitis in an HIV+ pt deviate from the classic description? By the absence of 'fog'—a pt who is profoundly immunocompromised might be unable to generate a significant vitritis.

Speaking of comparing/contrasting toxo retinitis in immunocompetent vs -compromised hosts…

Ophthalmic HIV manifestations

Adnexa Eye
Eyelids Anterior segment
Conj Posterior segment--HZO--Molluscum--Kaposi sarcoma
---Conj microvasculopathy

HIV and the Eye
--KCS--Infectious keratitis--Iridocyclitis
--Secondary to opportunistic infection

Viral Bacterial Fungal Parasitic
--CMV--VZV/HSV--Syphilis--TB--Toxoplasmosis--Histoplasmosis--Pneumocystis

How common is ocular toxoplasmosis in HIV+ pts? Not very—only ~1% of HIV+ individuals will develop it.

The classic description regarding the DFE appearance of toxoplasma retinitis is of a...

'Headlight in the fog'

What aspect of the infection correlates with...

--the 'headlight': The large yellow retinal lesion
--the 'fog': A dense overlying vitritis

In what way might the presentation of toxo retinitis in an HIV+ pt deviate from the classic description?

By the absence of 'fog'—a pt who is profoundly immunocompromised might be unable to generate a significant vitritis.

MR imaging of the brain

Speaking of comparing/contrasting toxo retinitis in immunocompetent vs -compromised hosts…

Secondary to opportunistic infection

--Infectious chorioretinitis
--Necrotizing retinitis

Parasitic
--Toxoplasmosis

Infectious keratitis
--Iridocyclitis
--KCS

Not 2o to opportunistic infection
In what way might the presentation of toxoplasmosis retinitis in an HIV+ patient deviate from the classic description?

Speaking of comparing/contrasting toxoplasmosis retinitis in immunocompetent vs immunocompromised hosts...

Not very—only ~1% of HIV+ individuals will develop it.

The classic description regarding the DFE appearance of toxoplasma retinitis is of a...

'Headlight in the fog':
- The large yellow retinal lesion
- The 'headlight': The large yellow retinal lesion
- The 'fog': A dense overlying vitritis

In what way might the presentation of toxoplasmosis retinitis in an HIV+ patient deviate from the classic description?

By the absence of fog—a pt who is profoundly immunocompromised might be unable to generate a significant vitritis.

Why do immunocompromised pts with toxo retinitis need brain imaging?

To assess for CNS involvement.

Is there a strong correlation between ocular and CNS toxo?

Yes—up to 50% of toxo retinitis pts will be found to have CNS involvement.

Is contrast needed?

Yes.

What is the classic neuroimaging finding?

'Ring-enhancing lesions'

Will the lesions show up on CT with contrast?

Yes, but MR is the preferred modality.

Infectious chorioretinitis
- Necrotizing retinitis

Secondary to opportunistic infection
- Toxoplasmosis
- Indocyclitis
- Infectious keratitis
- Opportunistic infection

MR imaging of the brain
- CNS involvement
- Toxoplasmosis
- Infectious keratitis
- Indocyclitis
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Is contrast needed?
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By the absence of 'fog'—a pt who is profoundly immunocompromised might be unable to generate a significant vitritis

Speaking of comparing/contrasting toxo retinitis in immunocompetent vs -compromised hosts…

In what ways does the management of toxo retinitis differ in the immunocompromised population?
--In immunocompetent pts, toxo retinitis does not prompt imaging, whereas in immunocompromised pts, a finding of toxo retinitis should prompt MR imaging of the brain.

In what ways does the management of toxo retinitis differ in the immunocompromised population?
--In immunocompetent pts, toxo retinitis needs treatment only if the lesion is threatening the macula, ONH or a major vessel, or in cases of severe vitritis; whereas in immunocompromised pts, lesions are treated regardless of location, or severity of vitritis.

In what ways does the management of toxo retinitis differ in the immunocompromised population?
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What is the classic neuroimaging finding?
MR imaging of the brain

Speaking of comparing/contrasting toxo retinitis in immunocompetent vs -compromised hosts…

In what way might the presentation of toxo retinitis in an HIV+ pt deviate from the classic description?
By the absence of ‘fog’—a pt who is profoundly immunocompromised might be unable to generate a significant vitritis

How common is ocular toxoplasmosis in HIV+ pts?
Not very—only ~1% of HIV+ individuals will develop it

The classic description regarding the DFE appearance of toxoplasmosis retinitis is of a…
--the ‘headlight’: The large yellow retinal lesion
--the ‘fog’: A dense overlying vitritis

What aspect of the infection correlates with…
--the ‘headlight’: The large yellow retinal lesion
--the ‘fog’: A dense overlying vitritis

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‘Ring-enhancing lesions’

MR imaging of the brain

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To assess for CNS involvement.

**Is there a strong correlation between ocular and CNS toxo?**

Yes—up to 50% of toxo retinitis pts will be found to have CNS involvement.

**Is contrast needed?**

Yes.

**What is the classic neuroimaging finding?**

‘Ring-enhancing lesions’

**Will the lesions show up on CT with contrast?**

Yes, but MR is the preferred modality.

**MR imaging of the brain**

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**Speaking of comparing/contrasting toxo retinitis in immunocompetent vs -compromised hosts…**

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**In what way might the presentation of toxo retinitis in an HIV+ pt deviate from the classic description?**

By the absence of ‘fog’—a pt who is profoundly immunocompromised might be unable to generate a significant vitritis.
Ophthalmic HIV manifestations

Adnexa
- Eyelids
  -- HZO
  -- Molluscum
  -- Kaposi sarcoma

Conj
- Conj microvasculopathy
- SCC

Anterior segment
- KCS
- Infectious keratitis
- Iridocyclitis

Posterior segment
- Secondary to opportunistic infection
- Not second to opportunistic infection
  -- Infectious chorioretinitis
  -- Necrotizing retinitis

Necrotizing retinitis

What manifestations are these?
Ophthalmic HIV manifestations

**Adnexa**
- Eyelids
  - HZO
  - Molluscum
  - Kaposi sarcoma
- Conj
  - Conj microvasculopathy
  - SCC

**Eye**
- Anterior segment
  - KCS
  - Infectious keratitis
  - Iridocyclitis
- Posterior segment
  - Secondary to opportunistic infection
    - Infectious chorioretinitis
    - Necrotizing retinitis
  - Not 2° to opportunistic infection

Necrotizing retinitis

**HIV and the Eye**

ARN (Acute retinal necrosis)

PORN (Progressive outer retinal necrosis)
Ophthalmic HIV manifestations

Adnexa
- Eyelids
  -- HZO
  -- Molluscum
  -- Kaposi sarcoma
- Conj
  -- Conj microvasculopathy
  -- SCC

Eye
- Anterior segment
  -- KCS
  -- Infectious keratitis
  -- Iridocyclitis
- Posterior segment
  -- Secondary to opportunistic infection
    -- Infectious chorioretinitis
    -- Necrotizing retinitis
  -- Not 2° to opportunistic infection

Necrotizing retinitis
- ARN
- PORN

How, specifically, are HSV and VZV causally related to ARN and PORN?
**HIV and the Eye**

**Ophthalmic HIV manifestations**

- **Adnexa**
  - Eyelids
    - HZO
    - Molluscum
    - Kaposi sarcoma
  - Conj
    - Conj microvasculopathy
    - SCC
- **Eye**
  - Anterior segment
    - KCS
    - Infectious keratitis
    - Iridocyclitis
  - Posterior segment
    - Secondary to opportunistic infection
      - Infectious chorioretinitis
      - Necrotizing retinitis
    - Not 2° to opportunistic infection

**How, specifically, are HSV and VZV causally related to ARN and PORN?**

PORN is causally related to VZV, whereas ARN has been linked to both VZV and HSV.
Ophthalmic HIV manifestations

Adnexa
- Eyelids
  -- HZO
  -- Molluscum
  -- Kaposi sarcoma

Eye
- Conj
  -- Conj microvasculopathy
  -- SCC
- Anterior segment
  -- KCS
  -- Infectious keratitis
  -- Iridocyclitis
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  Secondary to opportunistic infection
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How, specifically, are HSV and VZV causally related to ARN and PORN?
PORN is causally related to VZV, whereas ARN has been linked to both VZV and HSV.

With which is ARN more likely to be associated?
How, specifically, are HSV and VZV causally related to ARN and PORN?

PORN is causally related to VZV, whereas ARN has been linked to both VZV and HSV.

With which is ARN more likely to be associated? VZV
How, specifically, are HSV and VZV causally related to ARN and PORN? PORN is causally related to VZV, whereas ARN has been linked to both VZV and *HSV*. With which is ARN more likely to be associated? VZV
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa

Eyelids
--HZO
--Molluscum
--Kaposi sarcoma

Conj
-- Conj microvasculopathy
-- SCC

Eye

Anterior segment
-- KCS
-- Infectious keratitis
-- Iridocyclitis

Conj microvasculopathy

Posterior segment

Secondary to opportunistic infection
-- Infectious chorioretinitis
-- Necrotizing retinitis

Not 2° to opportunistic infection

Necrotizing retinitis

ARN: VZV or HSV-1 and HSV-2
PORN: VZV only

How, specifically, are HSV and VZV causally related to ARN and PORN?
PORN is causally related to VZV, whereas ARN has been linked to both VZV and HSV. Both

With which is ARN more likely to be associated? VZV
**Ophthalmic HIV manifestations**

**HIV and the Eye**

- **Adnexa**
  - Eyelids
    - HZO
    - Molluscum
    - Kaposi sarcoma
  - Conj
    - Conj microvasculopathy
    - SCC

- **Eye**
  - Anterior segment
    - KCS
    - Infectious keratitis
    - Iridocyclitis
  - Posterior segment
    - Secondary to opportunistic infection
      - Infectious chorioretinitis
        - Necrotizing retinitis
    - Not 2º to opportunistic infection

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**VZV, HSV-1, HSV-2—is there any pattern regarding which is more likely in a given pt?**

**ARN, VZV or HSV-1 and HSV-2**

**PORN: VZV only**

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**How, specifically, are HSV and VZV causally related to ARN and PORN?**

PORN is causally related to VZV, whereas ARN has been linked to both VZV and HSV.

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**With which is ARN more likely to be associated? VZV**
Ophthalmic HIV manifestations

Adnexa
- Eyelids
  - HZO
  - Molluscum
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- Conj
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  - SCC
- Posterior segment
  - KCS
  - Infectious keratitis
docyclitis

Eye
- Anterior segment
  - Infectious keratitis
  - Necrotizing retinitis
  - ARN: VZV or HSV-1 and HSV-2
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How, specifically, are HSV and VZV causally related to ARN and PORN?
PORN is causally related to VZV, whereas ARN has been linked to both VZV and HSV.

With which is ARN more likely to be associated? VZV
Both conditions present with a necrotizing retinitis. In what key way do the presentations differ?
Both conditions present with a necrotizing retinitis. In what key way do the presentations differ? ARN is a panuveitis, and thus presents with a severe AC reaction and dense vitritis. In contrast, PORN demonstrates little (or no) AC and/or vitreous cell.
Both conditions present with a necrotizing retinitis. In what key way do the presentations differ?

**ARN is a panuveitis** and thus presents with a severe AC reaction and dense vitritis. In contrast, PORN demonstrates little (or no) AC and/or vitreous cell.

Other reported findings in ARN include vasculitis, choroiditis and papillitis.
**HIV and the Eye**

**Ophthalmic HIV manifestations**

**Adnexa**
- Eyelids
  - HZO
  - Molluscum
  - Kaposi sarcoma

**Eye**

**Conj**
- Conj microvasculopathy
- SCC

**Anterior segment**
- KCS
- Infectious keratitis
- Iridocyclitis

**Posterior segment**
- Secondary to opportunistic infection
  - Infectious chorioretinitis
  - Necrotizing retinitis
- Not 2° to opportunistic infection

**Necrotizing retinitis**

How do ARN and PORN present ophthalmoscopically?
How do ARN and PORN present ophthalmoscopically?
Both present in a broadly similar fashion. In early stages, focal areas of inflamed retina can be seen. In short time, these areas expand and coalesce into large areas of necrotic retina. Later, multiple posterior retinal breaks may develop, and rhegmatogenous RD soon follows.
Acute retinal necrosis
Progressive outer retinal necrosis
Ophthalmic HIV manifestations

**Adnexa**
- Eyelids
  - HZO
  - Molluscum
  - Kaposi sarcoma
- Conjunctiva
  - Conj microvasculopathy
  - SCC

**Eye**
- Anterior segment
  - KCS
  - Infectious keratitis
  - Iridocyclitis
- Posterior segment
  - Secondary to opportunistic infection
    - Infectious chorioretinitis
    - Necrotizing retinitis
  - Not secondary to opportunistic infection

**In what fundamental way do the early-stage lesions in ARN and PORN differ?**
Early retinal lesions in ARN are full-thickness, whereas early lesions in PORN involve the outer retina only—the inner retina is spared until late in the disease process.

**How do ARN and PORN present ophthalmoscopically?**
Both present in a broadly similar fashion. In early stages, focal areas of inflamed retina can be seen. In short time, these areas expand and coalesce into large areas of necrotic retina. Later, multiple posterior retinal breaks may develop, and rhegmatogenous RD soon follows.
**HIV and the Eye**

**Ophthalmic HIV manifestations**

Adnexa

- Eyelids
  -- HZO
  -- Molluscum
  -- Kaposi sarcoma

- Conj
  -- Conj microvasculopathy
  -- SCC

Eye

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Hence the name...

**Progressive outer retinal necrosis**
How do ARN and PORN present ophthalmoscopically? Both present in a broadly similar fashion. In early stages, focal areas of inflamed retina can be seen. In short time, these areas expand and coalesce into large areas of necrotic retina. Later, multiple posterior retinal breaks may develop, and rhegmatogenous RD soon follows.

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--ARN is much more likely to be associated with an overlying vitritis
--ARN is more likely to involve the retinal vessels, whereas PORN tends to spare them

In differentiating between ARN and PORN clinically, this distinction is not terribly useful.

Examples of other lesions, focal areas of inflamed retina can place into large areas of necrotic retina.
How do ARN and PORN present ophthalmoscopically?

Both present in a broadly similar fashion. In early stages, focal areas of inflamed retina can be seen. In short time, these areas expand and coalesce into large areas of necrotic retina. Later, multiple posterior retinal breaks may develop, and rhegmatogenous RD soon follows.

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HIV and the Eye
Ophthalmic HIV manifestations

Adnexa

Eyelids
--HZO
--Molluscum
--Kaposi sarcoma

Conj
--Conj microvasculopathy
--SCC

Anterior segment
--KCS
--Infectious keratitis
--Iridocyclitis

Eye

Posterior segment

Secondary to opportunistic infection
--Infectious

Not 2° to opportunistic infection

Necrotizing retinitis

--Infectious chorioretinitis
--Necrotizing retinitis

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Conj microvasculopathy
--SCC

In differentiating between ARN and PORN clinically, this distinction is not terribly useful. What are some clues to help distinguish between the two?

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**HIV and the Eye**

**Ophthalmic HIV manifestations**

**Adnexa**
- Eyelids
  - HZO
  - Molluscum
  - Kaposi sarcoma

**Conj**
- Conj microvasculopathy
- SCC

**Anterior segment**
- KCS
- Infectious keratitis
- Iridocyclitis

**Posterior segment**
- Secondary to opportunistic infection
  - Infectious chorioretinitis
  - Necrotizing retinitis
- Not 2° to opportunistic infection

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**Necrotizing retinitis**

**ARN**

**PORN**

**Is prophylactic laser retinopexy effective in reducing the risk of RD?**

Both present in a similar fashion. In early stages, focal areas of inflamed retina can be seen. In short time, these areas expand and coalesce into large areas of necrotic retina. Later, multiple posterior retinal breaks may develop, and rhegmatogenous RD soon follows.
**HIV and the Eye**

**Ophthalmic HIV manifestations**

**Adnexa**
- Eyelids
  - HZO
  - Molluscum
  - Kaposi sarcoma

**Eye**
- Conj
  - Conj microvasculopathy
  - SCC
- Anterior segment
  - KCS
  - Infectious keratitis
  - Iridocyclitis
- Posterior segment
  - Secondary to opportunistic infection
    - Infectious chorioretinitis
    - Necrotizing retinitis
  - Not 2° to opportunistic infection

**Necrotizing retinitis**
- ARN
- PORN

*How do ARN and PORN present ophthalmoscopically?*

*Is prophylactic laser retinopexy effective in reducing the risk of RD?*

Generally no

*Later, multiple posterior retinal breaks may develop, and rhegmatogenous RD soon follows.*
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa

- Eyelids
  -- Herpes zoster ophthalmicus (HZO)
  -- Molluscum
  -- Kaposi sarcoma

- Conj
  -- Conjunctival microvasculopathy
  -- Squamous cell carcinoma (SCC)

- Necrotizing retinitis
  -- ARN

Eye

Anterior segment

- Conjunctiva
  -- Keratoconjunctivitis sicca (KCS)
  -- Infectious keratitis
  -- Iridocyclitis

Posterior segment

Secondary to opportunistic infection

- Infectious chorioretinitis
  -- Necrotizing retinitis

Not secondary to opportunistic infection

What is the treatment for ARN?

Intravenous acyclovir
Ophthalmic HIV manifestations

Adnexa
- Eyelids
  -- HZO
  -- Molluscum
  -- Kaposi sarcoma
- Conj
  -- Conj microvasculopathy
  -- SCC

Eye
- Anterior segment
  -- KCS
  -- Infectious keratitis
  -- Iridocyclitis
- Posterior segment
  Secondary to opportunistic infection
    -- Infectious chorioretnitis
    -- Necrotizing retinitis
  Not 2° to opportunistic infection

Necrotizing retinitis
- ARN
- PORN

What is the treatment for ARN? Intravenous acyclovir
Ophthalmic HIV manifestations

Adnexa
- Eyelids
  -- HZO
  -- Molluscum
  -- Kaposi sarcoma

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- Conj microvasculopathy
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Anterior segment
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Posterior segment
- Secondary to opportunistic infection
  -- Infectious chorioretinitis
  -- Necrotizing retinitis
- Not 2o to opportunistic infection

Eye

Necrotizing retinitis

ARN

PORN

What is the treatment for ARN?
Intravenous acyclovir

What is the treatment for PORN?
**HIV and the Eye**

**Ophthalmic HIV manifestations**

**Adnexa**

- Eyelids
  - HZO
  - Molluscum
  - Kaposi sarcoma

- Conj
  - Conj microvasculopathy
  - SCC

**Eye**

**Anterior segment**

- KCS
- Infectious keratitis
- Iridocyclitis

**Posterior segment**

- Secondary to opportunistic infection
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- Not 2° to opportunistic infection

**Necrotizing retinitis**

- ARN
- PORN

**What is the treatment for ARN?**
Intravenous acyclovir

**What is the treatment for PORN?**
PORN is notoriously treatment-resistant. High-dose IV acyclovir + intravitreal ganciclovir is one option. Progression to NLP is a common outcome. Bilateral involvement is the rule, even in the face of attempted maintenance therapy.
Ophthalmic HIV manifestations

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Secondary to opportunistic infection
- ARN
- PORN

Not 2° to opportunistic infection

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Which of these diseases can occur in immunocompetent pts?
Ophthalmic HIV manifestations

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Which of these diseases can occur in immunocompetent pts?
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Who is the typical immunocompetent ARN pt?
**HIV and the Eye**

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**Who is the typical immunocompetent ARN pt?**
An otherwise healthy older adult
HIV and the Eye

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Which of these diseases can occur in immunocompetent pts?
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Who is the typical immunocompetent ARN pt?
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How does the presentation of ARN differ between the immunocompetent and immunocompromised populations?
**HIV and the Eye**

**Ophthalmic HIV manifestations**

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**How does the presentation of ARN differ between the immunocompetent and immunocompromised populations?**

In brief: It tends to be worse in immunocompromised pts:
- More likely to be **bilateral**
- Tends to be **more severe**
- Tends to have a **less robust response to treatment**

**Which of these diseases can occur in immunocompetent pts?**

**ARN**

**Who is the typical immunocompetent ARN pt?**

An otherwise healthy older adult
Ophthalmic HIV manifestations

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HIV and the Eye

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What is the appearance of HIV retinopathy?

Cotton-wool spots in the posterior pole. Occasionally, retinal heme is seen as well.

How common is it?
Prior to HAART, it was very common (50-75% of HIV+ pts). It is less common now.

What is the pathophysiology?
Arteriolar occlusion → focal ischemia → disruption of axoplasmic flow → CWS
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**Ophthalmic HIV manifestations**

**Eye**

Anterior segment

- KCS
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- Iridocyclitis

Posterior segment

Secondary to opportunistic infection
- Infectious
- HIV retinopathy
- ONH problems

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**HIV and the Eye**
HIV and the Eye

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Necrotizing retinitis

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Fundamentally, HIV retinopathy is a retinal microvasculopathy.

Ophthalmic HIV manifestations

Adnexa
Eyelids
--HZO
--Molluscum
--Kaposi sarcoma
Conj
--Conj microvasculopathy
--SCC

Eye
Anterior segment
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Secondary to opportunistic infection
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HIV and the Eye

Ophthalmic HIV manifestations

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Arteriolar occlusion → focal ischemia → disruption of axoplasmic flow → CWS

Fundamentally, HIV retinopathy is a **retinal microvasculopathy**. In other words, it is the retinal equivalent of conj microvasculopathy.
Infectious chorioretinitis

Necrotizing retinitis

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Arteriolar occlusion → focal ischemia → disruption of axoplasmic flow → CWS

Fundamentally, HIV retinopathy is a **retinal microvasculopathy**. In other words, it is the retinal equivalent of **conj microvasculopathy**.
To aid in remembering this fundamental similarity, note that HIV retinopathy is also known as **HIV–Related Retinal Microvasculopathy**.

**HIV and the Eye**

**Ophthalmic HIV manifestations**

**Eyelids**
- HZO
- Molluscum
- Kaposi sarcoma

**Conj**
- SCC

**Anterior segment**
- KCS
- Infectious keratitis
- Iridocyclitis

**Posterior segment**

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HIV and the Eye

Ophthalmic HIV manifestations

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Eye
- Anterior segment
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Posterior segment
- Secondary to opportunistic infection
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- Not 2° to opportunistic infection
  -- HIV retinopathy
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What manifestations are these?
Ophthalmic HIV manifestations

**Adnexa**
- Eyelids
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**Eye**
- Conj
  - Conj microvasculopathy
  - SCC
- Anterior segment
  - KCS
  - Infectious keratitis
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**OnH problems**
- Infectious
- Noninfectious

- Secondary to opportunist infection
  - Infectious chorioretinitis
  - Necrotizing retinitis

Not 2° to opportunistic infection
- HIV retinopathy
- ONH problems
HIV and the Eye

Ophthalmic HIV manifestations

Adnexa
- Eyelids
  --HZO
  --Molluscum
  --Kaposi sarcoma
- Conj
  --Conj microvasculopathy
  --SCC
- ONH problems
  --(one very general category)

Eye
- Anterior segment
  --KCS
  --Infectious keratitis
  --Iridocyclitis
- Posterior segment
  Secondary to opportunistic infection
    --Infectious chorioretinitis
    --Necrotizing retinitis
  Not 2º to opportunistic infection
    --HIV retinopathy
    --ONH problems

Infectious
Noninfectious

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HIV and the Eye

Ophthalmic HIV manifestations

Adnexa
- Eyelids
  - HZO
  - Molluscum
  - Kaposi sarcoma
- Conj
  - Conj microvasculopathy
  - SCC

ONH problems
- Infectious
  - Infectious optic neuropathy
- Noninfectious

Eye
- Anterior segment
  - KCS
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- Posterior segment
  - Secondary to opportunistic infection
    - Infectious chorioretinitis
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  - Not 2o to opportunistic infection
    - HIV retinopathy
    - ONH problems

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**HIV and the Eye**

**Ophthalmic HIV manifestations**

- **Adnexa**
  - Eyelids
    - HZO
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    - Conj microvasculopathy
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- **Eye**
  - Anterior segment
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    - Secondary to opportunistic infection
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      - Necrotizing retinitis
    - Not 2\(\circ\) to opportunistic infection
      - Hale retinopathy
      - ONH problems

- ONH problems
  - Infectious
    - Infectious optic neuropathy
  - Noninfectious
    - (a sign)
    - (a vascular event)
    - (a general condition)
Infectious chorioretinitis --Necrotizing retinitis

Not 2o to opportunistic infection

Secondary to opportunistic infection

--HIV retinopathy

--ONH problems

ONH problems

Infectious optic neuropathy

--Infectious keratitis

--Iridocyclitis

KCS

Anterior segment

Secondary to opportunistic infection

HIV retinopathy

Posterior segment

Noninfectious optic atrophy

--Papilledema

--AION

Conj

--Conj microvasculopathy

--SCC

Eye

Adnexa

Eyelids

--HZO

--Molluscum

--Kaposi sarcoma

ONH problems

Infectious optic neuropathy

--Infectious keratitis

--Iridocyclitis

KCS

Anterior segment

Not 2o to opportunistic infection

Secondary to opportunistic infection

--HIV retinopathy

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ONH problems
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- Anterior segment
  -- KCS
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Posterior segment
- Secondary to opportunistic infection
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What are common causes of papilledema in HIV+ pts?

(Two broad categories)

- CNS lymphoma
- Toxoplasma encephalitis
- Cryptococcal meningitis

Not 2o to opportunistic infection

- Infectious chorioretinitis
- Necrotizing retinitis

- ONH problems
What are common causes of papilledema in HIV+ pts?
--Neoplasms
--Infectious processes
What are common causes of papilledema in HIV+ pts?
- Neoplasms (eg...
- Infectious processes
**HIV and the Eye**

**Ophthalmic HIV manifestations**

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    - Noninfectious
      - Papilledema
      - AION

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      -- ONH problems

**What are common causes of papilledema in HIV+ pts?**
- Neoplasms (e.g., Primary CNS lymphoma, PCNSL)
- Infectious processes
What are common causes of papilledema in HIV+ pts?
--Neoplasms (eg...Primary CNS lymphoma, PCNSL)
--Infectious processes, including
  --
  --
**HIV and the Eye**

**Ophthalmic HIV manifestations**

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- **ONH problems**
  - Infectious
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- Neoplasms (e.g., Primary CNS lymphoma, PCNSL)
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**HIV and the Eye**

**CD4+ T-cell count and HIV-related eye dz: Divvy the diseases up with respect to their typical CD4 thresholds for occurrence:**

<table>
<thead>
<tr>
<th>&lt;100 cells/mm³</th>
<th>&lt; 250 cells/mm³</th>
<th>&lt;500 cells/mm³</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Pneumocystis choroiditis</td>
<td>Toxoplasma chorioretinitis</td>
</tr>
<tr>
<td></td>
<td></td>
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</tr>
<tr>
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(Start here and work your way down the list)
HIV and the Eye

CD4+ T-cell count and HIV-related eye dz: Divvy the diseases up with respect to their typical CD4 thresholds for occurrence:

- **<100 cells/mm³**
  - Pneumocystis choroiditis
  - Toxoplasma chorioretinitis
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  - CMV retinitis
  - Microsporidia keratitis
  - PORN

- **< 250 cells/mm³**
  - Kaposi sarcoma

- **<500 cells/mm³**
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  - Toxoplasma chorioretinitis
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CMV retinitis
*Microsporidia* keratitis
PORN
**HIV and the Eye**

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*Kaposi sarcoma, Pneumocystis, Toxoplasma, Conj microvasculopathy, CMV retinitis, Microsporidia keratitis, PORN.*

*(CMV retinitis is uncommon if CD4 is >50)*
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