Uveitis: *Toxoplasmosis*

Toxoplasmosis: Basics

What is the causative organism in ocular toxoplasmosis?

1) The uveitis is profiled
2) The profiled case is meshed
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Uveitis: *Toxoplasmosis*

**Toxoplasmosis: Basics**

What is the causative organism in ocular toxoplasmosis? *Toxoplasma gondii*
Toxoplasma gondii
Uveitis: **Toxoplasmosis**

**Toxoplasmosis: Basics**

What is the causative organism in ocular toxoplasmosis?
*Toxoplasma gondii*

*What are its basic properties, ie, what sort of organism is it in a microbiology sense?*
Toxoplasmosis: Basics

What is the causative organism in ocular toxoplasmosis? 
Toxoplasma gondii

What are its basic properties, ie, what sort of organism is it in a microbiology sense? 
It is a protozoan—an obligate intracellular parasite
Toxoplasma gondii intracellular

infected host cell containing tachyzoites
What is the causative organism in ocular toxoplasmosis? 
Toxoplasma gondii

**What are its basic properties, ie, what sort of organism is it in a microbiology sense?**
It is a protozoan—an obligate intracellular parasite

**Where in the world can T gondii be found?**
Uveitis:  **Toxoplasmosis**

**Toxoplasmosis: Basics**

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Everywhere—it has a worldwide distribution
Uveitis: **Toxoplasmosis**

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Toxoplasmosis: Basics

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What are its basic properties, *i.e.*, what sort of organism is it in a microbiology sense?
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*Where in the world can* T *gondii* *be found?* *Is it a common human pathogen?*
Everywhere—it has a worldwide distribution
Yes—it’s likely that a billion people are infected worldwide
Uveitis: *Toxoplasmosis*

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A cat
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Uveitis: **Toxoplasmosis**

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About 2
Uveitis: **Toxoplasmosis**

**Toxoplasmosis: Basics**

*T. gondii* has a complex life cycle, existing in three forms.
T. gondii has a complex life cycle, existing in **three forms**

**What are they?**

- ?
- ?
- ?
*T. gondii* has a complex life cycle, existing in **three forms**. What are they?

- Oocyst
- Tachyzoite
- Tissue cyst

---

**Uveitis: Toxoplasmosis**

**Toxoplasmosis: Basics**

T. gondii has a complex life cycle, existing in **three forms**.

What are they?

1. The uveitis is profiled
2. The profiled case is meshed
3. A differential diagnosis list is generated
4. Studies are obtained to identify the etiology
5. Treatment appropriate for the etiology is initiated
T. gondii has a complex life cycle, existing in **three forms**.

What are they?

- **Oocyst**
- **Tachyzoite**
- **Tissue cyst**

Each form has a ‘nickname’ capturing its essence. What is the nickname for this form?
T. gondii has a complex life cycle, existing in **three forms**.

What are they?

- **Oocyst**
  - "Soil form"

- **Tachyzoite**

- **Tissue cyst**

Each form has a ‘nickname’ capturing its essence.

What is the nickname for this form?

---

**Toxoplasmosis: Basics**

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2) The profiled case is meshed
3) A differential diagnosis list is generated
4) Studies are obtained to identify the etiology
5) Treatment appropriate for the etiology is initiated
T. gondii has a complex life cycle, existing in **three forms**.

- Oocyst
  - ‘Soil form’
- Tachyzoite
- Tissue cyst

Each form has a ‘nickname’ capturing its essence.

**What is the nickname for this form?**
T. gondii has a complex life cycle, existing in **three forms**.

What are they?

- **Oocyst** (‘Soil form’)
- **Tachyzoite** (‘Infectious form’)
- **Tissue cyst**

Each form has a ‘nickname’ capturing its essence.

What is the nickname for this form?
T. gondii has a complex life cycle, existing in three forms. What are they?

- **Oocyst**
  - "Soil form"

- **Tachyzoite**
  - "Infectious form"

- **Tissue cyst**

Each form has a ‘nickname’ capturing its essence. What is the nickname for this form?
*Uveitis: Toxoplasmosis*

**Toxoplasmosis: Basics**

*T gondii has a complex life cycle, existing in three forms.*

1) The uveitis is profiled
2) The profiled case is meshed
3) A differential diagnosis list is generated
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5) Treatment appropriate for the etiology is initiated

---

**What are they?**

- **Oocyst**
  - ‘Soil form’

- **Tachyzoite**
  - ‘Infectious form’

- **Tissue cyst**
  - ‘Latent form’

---

Each form has a ‘nickname’ capturing its essence.

**What is the nickname for this form?**
T. gondii has a complex life cycle, existing in **three forms**

What are they?

- **Oocyst**
  - ‘Soil form’
  - Found in...

- **Tachyzoite**
  - ‘Infectious form’

- **Tissue cyst**
  - ‘Latent form’

Where does this form reside?
T. gondii has a complex life cycle, existing in three forms. What are they?

1) The uveitis is profiled
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**Toxoplasmosis: Basics**

- **Oocyst**
  - ‘Soil form’
  - Found in GI tract of cat (shed in feces)

- **Tachyzoite**
  - ‘Infectious form’

- **Tissue cyst**
  - ‘Latent form’

**Cat GI tract**

Where does this form reside?
T. gondii has a complex life cycle, existing in **three forms**.

**Uveitis: Toxoplasmosis**

**Toxoplasmosis: Basics**

- Oocyst
  - ‘Soil form’
  - Found in GI tract of cat (shed in feces)

- Tachyzoite
  - ‘Infectious form’
  - Found in...

- Tissue cyst
  - ‘Latent form’

*Where does this form reside?*
Uveitis: **Toxoplasmosis**

**Toxoplasmosis: Basics**

*T* gondii has a complex life cycle, existing in **three forms**

What are they?

- **Oocyst**
  -- ‘Soil form’
  -- Found in GI tract of cat (shed in feces)

- **Tachyzoite**
  -- ‘Infectious form’
  -- Found in circulatory system

- **Tissue cyst**
  -- ‘Latent form’

Cat GI tract

Host circulatory system

Where does this form reside?

1) The uveitis is profiled
2) The profiled case is meshed
3) A differential diagnosis list is generated
4) Studies are obtained to identify the etiology
5) Treatment appropriate for the etiology is initiated
T. gondii has a complex life cycle, existing in three forms.

What are they?

**Uveitis: Toxoplasmosis**

**Toxoplasmosis: Basics**

T. gondii has a complex life cycle, existing in **three forms**

1. **Oocyst**
   - ‘Soil form’
   - Found in GI tract of cat (shed in feces)

2. **Tachyzoite**
   - ‘Infectious form’
   - Found in circulatory system

3. **Tissue cyst**
   - ‘Latent form’
   - Found in...

Where does this form reside?

1) The uveitis is profiled
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T. gondii has a complex life cycle, existing in **three forms**. What are they?

**Oocyst**
- 'Soil form'
- Found in GI tract of cat (shed in feces)

**Tachyzoite**
- 'Infectious form'
- Found in circulatory system

**Tissue cyst**
- 'Latent form'
- Found in host tissue

Where does this form reside?
T. gondii has a complex life cycle, existing in **three forms**.

**What are they?**

- **Oocyst**
  - ‘Soil form’
  - Found in GI tract of cat (shed in feces)

- **Tachyzoite**
  - ‘Infectious form’
  - Found in circulatory system

- **Tissue cyst**
  - ‘Latent form’
  - Found in host tissue

**Infectious?**

**Is this form infectious?**
T gondii has a complex life cycle, existing in **three forms**.

**What are they?**

- **Oocyst**
  --‘Soil form’
  --Found in GI tract of cat (shed in feces)
  --*infectious*

- **Tachyzoite**
  --‘Infectious form’
  --Found in circulatory system

- **Tissue cyst**
  --‘Latent form’
  --Found in host tissue

**Infectious? Yes**

**Is this form infectious?** Yes
T gondii has a complex life cycle, existing in three forms.

What are they?

- **Oocyst**
  - ‘Soil form’
  - Found in GI tract of cat (shed in feces)
  - +infectious

- **Tachyzoite**
  - ‘Infectious form’
  - Found in circulatory system

- **Tissue cyst**
  - ‘Latent form’
  - Found in host tissue

Infectious? Yes

Is this form infectious?

Infectious?
T. gondii has a complex life cycle, existing in three forms. What are they?

**Toxoplasmosis: Basics**

1. **Oocyst**
   - ‘Soil form’
   - Found in GI tract of cat (shed in feces)
   - +infectious

2. **Tachyzoite**
   - ‘Infectious form’
   - Found in circulatory system
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3. **Tissue cyst**
   - ‘Latent form’
   - Found in host tissue

Is this form infectious? Yes

1) The uveitis is profiled
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Uveitis: Toxoplasmosis

Toxoplasmosis: Basics

T. gondii has a complex life cycle, existing in **three forms**

What are they?

1. Oocyst
   - 'Soil form'
   - Found in GI tract of cat (shed in feces)
   - **+infectious**

2. Tachyzoite
   - 'Infectious form'
   - Found in circulatory system
   - **+infectious**

3. Tissue cyst
   - 'Latent form'
   - Found in host tissue

---

Infectious? Yes

---

Infectious? Yes

---

Infectious?

---

Is this form infectious?

---

1) The uveitis is profiled
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T. gondii has a complex life cycle, existing in three forms. What are they?

**Oocyst**
- 'Soil form'
- Found in GI tract of cat (shed in feces)
- +infectious

**Tachyzoite**
- 'Infectious form'
- Found in circulatory system
- +infectious

**Tissue cyst**
- 'Latent form'
- Found in host tissue
- +infectious

Infectious? Yes  Infectious? Yes  Infectious? Yes

Is this form infectious? Yes
T. gondii has a complex life cycle, existing in **three forms**.

**Uveitis:**

1) The uveitis is profiled
2) The profiled case is meshed
3) A differential diagnosis list is generated
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**Toxoplasmosis: Basics**

- **Oocyst**
  - ‘Soil form’
  - Found in GI tract of cat (shed in feces)
  - +infectious

- **Tachyzoite**
  - ‘Infectious form’
  - Found in circulatory system
  - +infectious

- **Tissue cyst**
  - ‘Latent form’
  - Found in host tissue
  - +infectious

**Infectious?** Yes

---

**All forms are infectious under the right circumstances.**
Don’t let the nickname of the tachyzoite form fool you into thinking it’s the only one!
T gondii has a complex life cycle, existing in three forms. What are they?

- **Oocyst**
  - ‘Soil form’
  - Found in GI tract of cat (shed in feces)
  - +infectious via…

- **Tachyzoite**
  - ‘Infectious form’
  - Found in circulatory system
  - +infectious

- **Tissue cyst**
  - ‘Latent form’
  - Found in host tissue
  - +infectious

How is infection transmitted for this form?
T. gondii has a complex life cycle, existing in **three forms**.

**What are they?**

- **Oocyst**
  - ‘Soil form’
  - Found in GI tract of cat (shed in feces)
  - +infectious via...

- **Tachyzoite**
  - ‘Infectious form’
  - Found in circulatory system
  - +infectious

- **Tissue cyst**
  - ‘Latent form’
  - Found in host tissue
  - +infectious

---

**Infectious via…**

---

**How is infection transmitted for this form?**

---

**Uveitis: Toxoplasmosis**

**Toxoplasmosis: Basics**

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2) The profiled case is meshed
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**Uveitis: Toxoplasmosis**

**Toxoplasmosis: Basics**

1. The uveitis is profiled
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---

**Oocyst**
- ‘Soil form’
- Found in GI tract of cat (shed in feces)
- + infectious via...

**Tachyzoite**
- ‘Infectious form’
- Found in circulatory system
- + infectious via...

**Tissue cyst**
- ‘Latent form’
- Found in host tissue
- + infectious

---

Ingestion of contaminated soil

Infectious via...

**How is infection transmitted for this form?**
T. gondii has a complex life cycle, existing in **three forms**.

**Oocyst**
- 'Soil form'
- Found in GI tract of cat (shed in feces)
- Infectious via...
  **Ingestion of contaminated soil**

**Tachyzoite**
- 'Infectious form'
- Found in circulatory system
- Infectious via...
  **Blood-to-blood contact**

**Tissue cyst**
- 'Latent form'
- Found in host tissue
- Infectious via...

How is infection transmitted for this form?

---

Uveitis: **Toxoplasmosis**

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  - ‘Soil form’
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  - +infectious via...
    - Ingestion of contaminated soil

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  - ‘Infectious form’
  - Found in circulatory system
  - +infectious via...
    - Blood-to-blood contact

- **Tissue cyst**
  - ‘Latent form’
  - Found in host tissue
  - +infectious via...

How is infection transmitted for this form?
T. gondii has a complex life cycle, existing in three forms. What are they?

**Toxoplasmosis: Basics**

1. **Oocyst**
   - ‘Soil form’
   - Found in GI tract of cat (shed in feces)
   - Infectious via...
   - Ingestion of contaminated soil

2. **Tachyzoite**
   - ‘Infectious form’
   - Found in circulatory system
   - Infectious via...
   - Blood-to-blood contact

3. **Tissue cyst**
   - ‘Latent form’
   - Found in host tissue
   - Infectious via...
   - Consumption in foodstuffs

How is infection transmitted for this form?
**Uveitis: Toxoplasmosis**

*T gondii* has a complex life cycle, existing in **three forms**.

**Toxoplasmosis: Basics**

What are they?

![Diagram](image)

- **Oocyst**
  - 'Soil form'
  - Found in GI tract of cat (shed in feces)
  - Infectious via:
    - Ingestion of contaminated soil

- **Tachyzoite**
  - 'Infectious form'
  - Found in circulatory system
  - Infectious via:
    - Blood-to-blood contact

- **Tissue cyst**
  - 'Latent form'
  - Found in host tissue
  - Infectious via:
    - Consumption in foodstuffs

What very, very important means of disease transmission is not mentioned here?

How is infection transmitted for this form?
T gondii has a complex life cycle, existing in three forms.

What are they?

- **Oocyst**
  - ‘Soil form’
  - Found in GI tract of cat (shed in feces)
  - Infectious via...
  - Ingestion of contaminated soil

- **Tachyzoite**
  - ‘Infectious form’
  - Found in circulatory system
  - Infectious via...
  - Blood-to-blood contact

- **Tissue cyst**
  - ‘Latent form’
  - Found in host tissue
  - Infectious via...
  - Consumption in foodstuffs

What very, very important means of disease transmission is not mentioned here? Transplacentally, resulting in congenital toxoplasmosis (we will have much to say about this later in the slide-set)
T. gondii has a complex life cycle, existing in **three forms**

**Oocyst**
- ‘Soil form’
- Found in GI tract of cat (shed in feces)
- + infectious via...
  - Ingestion of contaminated soil
- ?

**Tachyzoite**
- ‘Infectious form’
- Found in circulatory system
- + infectious via...
  - Blood-to-blood contact

**Tissue cyst**
- ‘Latent form’
- Found in host tissue
- + infectious via...
  - Consumption in foodstuffs

---

In a nutshell…

---

In a nutshell, how should we think of each form?
- Oocysts…
T. gondii has a complex life cycle, existing in three forms. What are they?

- **Oocyst**
  - ‘Soil form’
  - Found in GI tract of cat (shed in feces)
  - + infectious via...
    - Ingestion of contaminated soil
  - ‘Spores’

- **Tachyzoite**
  - ‘Infectious form’
  - Found in circulatory system
  - + infectious via...
    - Blood-to-blood contact

- **Tissue cyst**
  - ‘Latent form’
  - Found in host tissue
  - + infectious via...
    - Consumption in foodstuffs

In a nutshell…

In a nutshell, how should we think of each form? --Oocysts…are toxo eggs or ‘spores’ (the bug is a sporozoite at this stage)
T gondii has a complex life cycle, existing in **three forms**.

What are they?

**Oocyst**
- 'Soil form'
- Found in GI tract of cat (shed in feces)
- +infectious via...
  - Ingestion of contaminated soil
- 'Spores'

**Tachyzoite**
- 'Infectious form'
- Found in circulatory system
- +infectious via...
  - Blood-to-blood contact

**Tissue cyst**
- 'Latent form'
- Found in host tissue
- +infectious via...
  - Consumption in foodstuffs

In a nutshell...

In a nutshell, how should we think of each form?

--Oocysts...are toxo eggs or 'spores' (the bug is a **sporozoite** at this stage)
T. gondii has a complex life cycle, existing in **three forms**

**Oocyst**
- ‘Soil form’
- Found in GI tract of cat (shed in feces)
  - +infectious via...
  - Ingestion of contaminated soil
- ‘Spores’

**Tachyzoite**
- ‘Infectious form’
- Found in circulatory system
  - +infectious via...
  - Blood-to-blood contact
- ?

**Tissue cyst**
- ‘Latent form’
- Found in host tissue
  - +infectious via...
  - Consumption in foodstuffs

---

**Uveitis: Toxoplasmosis**

**Toxoplasmosis: Basics**

*In a nutshell…*

---

*In a nutshell, how should we think of each form?*

- Oocysts…are toxo eggs or ‘spores’ (the bug is a *sporozoite* at this stage)
- Tachyzoites…
T. gondii has a complex life cycle, existing in three forms.

What are they?

**Uveitis: Toxoplasmosis**

**Toxoplasmosis: Basics**

In a nutshell, how should we think of each form?

- **Oocysts**: are toxo eggs or ‘spores’ (the bug is a sporozoite at this stage)  
- **Tachyzoites**: are toxo ‘adults’ that are active  
- **Tissue cyst**: ‘Latent form’  
  - Found in host tissue  
  - Consumption in foodstuffs
T. gondii has a complex life cycle, existing in three forms. What are they?

**Oocyst**
- **‘Soil form’**
- Found in GI tract of cat (shed in feces)
- + infectious via...
  - Ingestion of contaminated soil
- **‘Spores’**

**Tachyzoite**
- **‘Infectious form’**
- Found in circulatory system
- + infectious via...
  - Blood-to-blood contact
- **‘Active adult’**

**Tissue cyst**
- **‘Latent form’**
- Found in host tissue
- + infectious via...
  - Consumption in foodstuffs
  - ?

**In a nutshell…**
- Oocysts…are toxo eggs or ‘spores’ (the bug is a *sporozoite* at this stage)
- Tachyzoites…are toxo ‘adults’ that are active
- The tissue cysts…
T. gondii has a complex life cycle, existing in three forms. What are they?

**Oocyst**
- 'Soil form'
- Found in GI tract of cat (shed in feces)
- Infectious via...
  - Ingestion of contaminated soil
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**Tachyzoite**
- 'Infectious form'
- Found in circulatory system
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- 'Active adult'

**Tissue cyst**
- 'Latent form'
- Found in host tissue
- Infectious via...
  - Consumption in foodstuffs
- 'Dormant adult'

In a nutshell, how should we think of each form?
- Oocysts...are toxo eggs or 'spores' (the bug is a sporozoite at this stage)
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T. gondii has a complex life cycle, existing in three forms. What are they?

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What is the name for the dormant adults in the tissue cysts?
- toxo adults that are dormant
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- Tachyzoites... are toxo ‘adults’ that are active
- The tissue cysts... contain toxo adults that are dormant

---

What is the name for the dormant adults in the tissue cysts?

**Bradyzoites**

---

1) The uveitis is profiled
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T. gondii has a complex life cycle, existing in **three forms**.

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---

**What is the name for the dormant adults in the tissue cysts?**
- **Bradyzoites**

---

It’s not a coincidence that the active adults are identified as *tachy* (‘fast’) -zoites, whereas the dormant adults are *brady* (‘slow’) –zoites!
Toxoplasmosis Basics tl;dr

The person consumes either oocysts (wash your hands!) or tissue cysts (cook your meat!). The consumed bugs transform into tachyzoites, enter the bloodstream, and disseminate throughout the body. The immune system quickly clears the circulating parasites, but not before some get encased in tissue cysts, which are impervious to the host's immune system.

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(No question—review slide, proceed when ready)
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**Uveitis:**  
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**Toxoplasmosis: Basics**

T gondii has a complex life cycle, existing in **three forms**

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**What foodstuffs are commonly involved?**
T. gondii has a complex life cycle, existing in three forms. What are they?

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---

**What foodstuffs are commonly involved?**

Meat, especially pork

---

**Uveitis: Toxoplasmosis**

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**Uveitis: Toxoplasmosis**

**Toxoplasmosis: Basics**

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**Uveitis: Toxoplasmosis**

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**What foodstuffs are commonly involved?**
- Meat, especially pork
- Fruits and veggies
*Uveitis: Toxoplasmosis*

*T gondii* has a complex life cycle, existing in three forms.

**What are they?**

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**Toxoplasmosis: Basics**

*T gondii*: three forms

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---

*What foodstuffs are commonly involved?*

- Meat, especially pork
- Fruits and veggies
- Goat’s milk
- Baa... milk

---

*Diagram and text layout*
T. gondii has a complex life cycle, existing in three forms. What are they?

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- Meat, especially pork
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**How does toxo get into the animals and/or onto the fruits and veggies?**

---

**Uveitis: Toxoplasmosis**

**Toxoplasmosis: Basics**

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*How does toxo get into the animals and/or onto the fruits and veggies?*
It gets into animals when they eat feed that has been pooped on by infected cats (ie, that contains oocysts)
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**How does toxo get into the animals and/or onto the fruits and veggies?**
It gets into animals when they eat feed that has been pooped on by infected cats (ie, that contains oocysts)

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**How is toxo able to get into humans from the animals?**
T. gondii has a complex life cycle, existing in three forms. What are they?

**Uveitis: Toxoplasmosis**

**Toxoplasmosis: Basics**

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It gets into animals when they eat feed that has been pooped on by infected cats (i.e., that contains oocysts).

**How is toxo able to get into humans from the animals?**
It gets into them when they eat meat that is...
Toxoplasmosis: Basics

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What foodstuffs are commonly involved?
- Undercooked meat, especially pork
- Fruits and veggies
- Goat’s milk

How does toxo get into the animals and/or onto the fruits and veggies?
It gets into animals when they eat feed that has been pooped on by infected cats (ie, that contains oocysts)

How is toxo able to get into humans from the animals?
It gets into them when they eat meat that is undercooked…
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It gets into them when they eat meat that is undercooked… eat fruits/veggies that are
Uveitis: **Toxoplasmosis**

**Toxoplasmosis: Basics**

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**What foodstuffs are commonly involved?**

- Undercooked meat, especially pork
- Unwashed fruits and veggies
- Goat's milk

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**How does toxo get into the animals and/or onto the fruits and veggies?**

It gets into animals when they eat feed that has been pooped on by infected cats (i.e., that contains oocysts).

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**How is toxo able to get into humans from the animals? From fruits/veggies?**

It gets into them when they eat meat that is undercooked... eat fruits/veggies that are unwashed...
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What are they?

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  - ‘Dormant adult’

What foodstuffs are commonly involved?

- **Undercooked** meat, especially pork
- **Unwashed** fruits and veggies
- **Goat’s milk**

How does toxo get into the animals and/or onto the fruits and veggies?

It gets into animals when they eat feed that has been pooped on by infected cats (ie, that contains oocysts).

How is toxo able to get into humans from the animals? From fruits/veggies? From goat’s milk?

It gets into them when they eat meat that is undercooked... eat fruits/veggies that are unwashed... or drink goat’s milk that is...

---

**Foodstuffs**

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- Consumption in foodstuffs
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What foodstuffs are commonly involved?

- **Undercooked** meat, especially pork
- **Unwashed** fruits and veggies
- **Goat’s milk**

How does toxo get into the animals and/or onto the fruits and veggies?

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How is toxo able to get into humans from the animals? From fruits/veggies? From goat’s milk?

It gets into them when they eat meat that is undercooked... eat fruits/veggies that are unwashed... or drink goat’s milk that is...
T. gondii has a complex life cycle, existing in three forms. What are they?

**Uveitis: Toxoplasmosis**

**Toxoplasmosis: Basics**

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  - ‘Dormant adult’

**What foodstuffs are commonly involved?**

- Undercooked meat, especially pork
- Unwashed fruits and veggies
- Unpasteurized goat’s milk

How does toxo get into the animals and/or onto the fruits and veggies?

It gets into animals when they eat feed that has been pooped on by infected cats (ie, that contains oocysts)

How is toxo able to get into humans from the animals? From fruits/veggies? From goat’s milk?

It gets into them when they eat meat that is undercooked… eat fruits/veggies that are unwashed… or drink goat’s milk that is unpasteurized
Uveitis

1) The uveitis is profiled
2) The profiled case is meshed
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Anterior

Forget shortage

Posterior

Toxoplasmosis

Toxoplasmosis is an infectious agent that can cause uveitis. Can toxoplasmosis present with anterior uveitis?

Intermediate

Panuveitis
Uveitis

1) The uveitis is profiled
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Anterior

Can toxoplasmosis present with anterior uveitis? Yes

Posterior

Intermediate

Panuveitis

Toxoplasmosis
First, let’s review the basic taxonomy of anterior uveitis…
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Uveitis: *Anterior*

- **Granulomatous**
  - ?
  - ?

- **Nongranulomatous**
  - **Acute**
    - Unilateral
      - ?
    - Bilateral
      - ?
  - **Chronic**
    - ?

Now that the taxonomy is laid out: *Where does toxoplasmosis reside?*
Uveitis: *Anterior*

- Granulomatous
  - Toxoplasmosis
- Nongranulomatous
  - Acute
  - Chronic
    - Unilateral
    - Bilateral

Now that the taxonomy is laid out: *Where does toxoplasmosis reside?*

Among the granulomatous uveitides
Uveitis: *Anterior*

1) The uveitis is profiled
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Granulomatous

- ?
- ?
- ?
- ?
- ?
- Toxoplasmosis

Nongranulomatous

- Acute
  - Unilateral
- Chronic
  - Bilateral

What is the rest of the DDx for granulomatous uveitis?

Now that the taxonomy is laid out:
*Where does toxoplasmosis reside?*
Among the granulomatous uveitides
Uveitis: **Anterior**

Granulomatous
- TB
- Sarcoid
- Syphilis
- HSV
- VKH
- Lyme
- Toxoplasmosis

Nongranulomatous

What is the rest of the DDx for granulomatous uveitis?

Acute
- Unilateral

Chronic
- Bilateral

Now that the taxonomy is laid out:

*Where does toxoplasmosis reside?*

Among the granulomatous uveitides
1) The uveitis is profiled
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The BCSC Uveitis book does not list toxoplasmosis in the DDx for intermediate uveitis
Uveitis

1) The uveitis is profiled
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4) Studies are obtained to identify the etiology
5) Treatment appropriate for the etiology is initiated

OTOH, toxoplasmosis is a premiere cause of posterior uveitis!
Uveitis: *Toxoplasmosis*

**Posterior uveitis**

*...Is divided into three subtypes based on what attribute?*

1. The uveitis is profiled
2. The profiled case is meshed
3. A differential diagnosis list is generated
4. Studies are obtained to identify the etiology
5. Treatment appropriate for the etiology is initiated

It is called: 

? 

It is called: 

? 

It is called: 

?
Posterior uveitis

...Is divided into three subtypes based on what attribute?

Inflammation location

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2) The profiled case is meshed
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Uveitis: Toxoplasmosis
Uveitis: **Toxoplasmosis**

1) The uveitis is profiled
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**Posterior uveitis**

*If inflammation is located…*

What are the three ‘inflammation locations’?

<table>
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1) The uveitis is profiled
2) The profiled case is meshed
3) A differential diagnosis list is generated
4) Studies are obtained to identify the etiology
5) Treatment appropriate for the etiology is initiated

**Uveitis:**

- Toxoplasmosis
Uveitis: \textbf{Toxoplasmosis}

Posterior uveitis

\textit{If inflammation is located…}

- Exclusively in the choroid
- In both the choroid \textit{and} the retina
- Exclusively in the retina

\textbf{What are the three ‘inflammation locations’?}

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Exclusively in the choroid

In both the choroid \textit{and} the retina

Exclusively in the retina

\textit{It is called:}

\textit{It is called:}

\textit{It is called:}
Uveitis: **Toxoplasmosis**

### Posterior uveitis

*If inflammation is located…*

- **Exclusively in the choroid**
  - *It is called:*
  - ?

- **In both the choroid and the retina**
  - *It is called:*
  - ?

- **Exclusively in the retina**
  - *It is called:*
  - ?

---

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**Uveitis: Toxoplasmosis**

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5) Treatment appropriate for the etiology is initiated

**Posterior uveitis**

*If inflammation is located…*

- Exclusively in the choroid
  - *It is called:*
  - **Choroiditis**

- In both the choroid and the retina
  - *It is called:*
  - ?

- Exclusively in the retina
  - *It is called:*
  - ?
Uveitis: Toxoplasmosis

Posterior uveitis

*If inflammation is located...*

- Exclusively in the choroid
  - *It is called:* Choroiditis

- In both the choroid and the retina
  - *It is called:* ?

- Exclusively in the retina
  - *It is called:* ?

Steps:
1) The uveitis is profiled
2) The profiled case is meshed
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4) Studies are obtained to identify the etiology
5) Treatment appropriate for the etiology is initiated
Uveitis: *Toxoplasmosis*

**Posterior uveitis**

*If inflammation is located…*

- Exclusively in the choroid
  - *It is called:* **Choroiditis**

- In both the choroid and the retina
  - *It is called:* ?

- Exclusively in the retina
  - *It is called:* **Retinitis**

---

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Uveitis: **Toxoplasmosis**

Posterior uveitis

*If inflammation is located…*

- Exclusively in the choroid
  - *It is called:* **Choroiditis**
- In both the choroid *and* the retina
  - *It is called:* ?
- Exclusively in the retina
  - *It is called:* **Retinitis**

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Uveitis: *Toxoplasmosis*

**Posterior uveitis**

*If inflammation is located…*

- **Exclusively in the choroid**
  - *It is called:*
  - **Choroiditis**

- **In both the choroid and the retina**
  - *It is called:*
  - **Chorioretinitis** *or*
  - **Retinochoroiditis**

- **Exclusively in the retina**
  - *It is called:*
  - **Retinitis**

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Uveitis: *Toxoplasmosis*

**Posterior uveitis**

*If inflammation is located…*

- Exclusively in the choroid
  - *It is called:* Choroiditis

- In both the choroid and the retina
  - *It is called:* Chorioretinitis or Retinochoroiditis

- Exclusively in the retina and ONH
  - *It is called:* Retinitis

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Uveitis: **Toxoplasmosis**

### Posterior uveitis

*If inflammation is located…*

- **Exclusively in the choroid**
  - *It is called:*
  - **Choroiditis**

- **In both the choroid and the retina**
  - *It is called:*
  - **Chorioretinitis** or **Retinochoroiditis**

- **Exclusively in the retina and ONH**
  - *It is called:*
  - **Retinitis**
  - **Neuroretinitis**

### Processes:

1. The uveitis is profiled
2. The profiled case is meshed
3. A differential diagnosis list is generated
4. Studies are obtained to identify the etiology
5. Treatment appropriate for the etiology is initiated
Uveitis: **Toxoplasmosis**

Posterior uveitis

*If inflammation is located...*

- Exclusively in the choroid
- In both the choroid and the retina
- Exclusively in the retina

*It is called:*

- Choroiditis?
- Chorioretinitis? or Retinochoroiditis?
- Retinitis?

What is the classic posterior manifestation of toxoplasmosis?
Uveitis: **Toxoplasmosis**

Posterior uveitis

*If inflammation is located…*

- Exclusively in the choroid
  - *It is called:* Choroiditis

- In both the choroid and the retina
  - *It is called:* Chorioretinitis or Retinochoroiditis

- Exclusively in the retina
  - *It is called:* Retinitis

---

What is the classic posterior manifestation of toxoplasmosis?

Retinochoroiditis
Uveitis: *Toxoplasmosis*

*Toxoplasmosis: Retinochoroiditis*

What is the classic appearance of an inactive toxoplasmosis lesion?
Uveitis: *Toxoplasmosis*

**Toxoplasmosis: Retinochoroiditis**

*What is the classic appearance of an inactive toxoplasmosis lesion?*

A pigmented chorioretinal scar
Toxoplasmosis: Inactive scar
Uveitis: **Toxoplasmosis**

**Toxoplasmosis: Retinochoroiditis**

What is the classic appearance of an inactive toxoplasmosis lesion?
A pigmented chorioretinal scar

What is the classic appearance of an **active** toxoplasmosis lesion?
What is the classic appearance of an inactive toxoplasmosis lesion?
A pigmented chorioretinal scar

What is the classic appearance of an active toxoplasmosis lesion?
A white lesion adjacent to a scar, with overlying vitreous cell
Recurrent ocular toxoplasmosis. Note the active retinal lesion associated with an old inactive scar.
Uveitis: **Toxoplasmosis**

**Toxoplasmosis: Retinochoroiditis**

What is the classic appearance of an inactive toxoplasmosis lesion?
A pigmented chorioretinal scar

What is the classic appearance of an active toxoplasmosis lesion?
A white lesion **adjacent to a scar**, with overlying vitreous cell

The fact that active lesions are usually adjacent to an old scar indicates **what about their origin?**
Uveitis: Toxoplasmosis

Toxoplasmosis: Retinochoroiditis

What is the classic appearance of an inactive toxoplasmosis lesion?
A pigmented chorioretinal scar

What is the classic appearance of an active toxoplasmosis lesion?
A white lesion adjacent to a scar, with overlying vitreous cell

The fact that active lesions are usually adjacent to an old scar indicates what about their origin?
It indicates they represent reactivation of a previously dormant infection.
Uveitis: *Toxoplasmosis*

**Toxoplasmosis: Retinochoroiditis**

*What is the classic appearance of an inactive toxoplasmosis lesion?*
A pigmented chorioretinal scar

*What is the classic appearance of an active toxoplasmosis lesion?*
A white lesion not adjacent to a scar, with overlying vitreous cell

*The fact that active lesions are usually adjacent to an old scar indicates what about their origin?*
It indicates they represent reactivation of a previously dormant infection

*What is indicated if an active is not adjacent to a scar?*
Uveitis: **Toxoplasmosis**

**Toxoplasmosis: Retinochoroiditis**

*What is the classic appearance of an inactive toxoplasmosis lesion?*
A pigmented chorioretinal scar

*What is the classic appearance of an active toxoplasmosis lesion?*
A white lesion adjacent to a scar, with overlying vitreous cell

**The fact that active lesions are usually adjacent to an old scar indicates what about their origin?**
It indicates they represent reactivation of a previously dormant infection

*What is indicated if an active is not adjacent to a scar?*
It indicates the dz is newly acquired
Uveitis: *Toxoplasmosis*

**Toxoplasmosis: Retinochoroiditis**

What is the classic appearance of an inactive toxoplasmosis lesion?
A pigmented chorioretinal scar

What is the classic appearance of an **active** toxoplasmosis lesion?
A white lesion adjacent to a scar, with overlying vitreous cell

What is the classic description of the appearance of an active lesion?
Uveitis: **Toxoplasmosis**

**Toxoplasmosis: Retinochoroiditis**

What is the classic appearance of an inactive toxoplasmosis lesion?
A pigmented chorioretinal scar

What is the classic appearance of an **active** toxoplasmosis lesion?
A white lesion adjacent to a scar, with overlying vitreous cell

What is the classic description of the appearance of an active lesion?

‘Headlight in the fog’
Uveitis: *Toxoplasmosis*

Active toxoplasmosis: Headlight in the fog
Uveitis: **Toxoplasmosis**

**Toxoplasmosis: Retinochoroiditis**

*What is the classic appearance of an inactive toxoplasmosis lesion?*
A pigmented chorioretinal scar

*What is the classic appearance of an active toxoplasmosis lesion?*
A white lesion adjacent to a scar, with overlying vitreous cell

*What is the classic description of the appearance of an active lesion?*
*In terms of the Headlight in the fog appearance…*

*The headlight =*
*The fog =*
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**Uveitis: Toxoplasmosis**

**Toxoplasmosis: Retinochoroiditis**

What is the classic appearance of an inactive toxoplasmosis lesion?
A pigmented chorioretinal scar

What is the classic appearance of an **active** toxoplasmosis lesion?
A white lesion adjacent to a scar, with overlying vitreous cell

What is the classic description of the appearance of an active lesion?

*In terms of the Headlight in the fog appearance…*

*The headlight = the white toxo lesion*

*The fog =*
Uveitis: *Toxoplasmosis*

**Toxoplasmosis: Retinochoroiditis**

What is the classic appearance of an inactive toxoplasmosis lesion?
A pigmented chorioretinal scar

What is the classic appearance of an *active* toxoplasmosis lesion?
A white lesion adjacent to a scar, with overlying vitreous cell

What is the classic description of the appearance of an active lesion?
*In terms of the Headlight in the fog appearance…*

_The headlight = the white toxo lesion_
_The fog =_
Uveitis: **Toxoplasmosis**

**Toxoplasmosis: Retinochoroiditis**

What is the classic appearance of an inactive toxoplasmosis lesion? A pigmented chorioretinal scar

What is the classic appearance of an **active** toxoplasmosis lesion? A white lesion adjacent to a scar, with overlying vitreous cell

What is the classic description of the appearance of an active lesion? *'Headlight in the fog'*

*In terms of the Headlight in the fog appearance…*  
*The headlight = the white toxo lesion*  
*The fog = the dense overlying vitritis*
What is the classic appearance of an inactive toxoplasmosis lesion?
A pigmented chorioretinal scar

What is the classic appearance of an active toxoplasmosis lesion?
A white lesion adjacent to a scar, with overlying vitreous cell

What is the classic description of the appearance of an active lesion?
‘Headlight in the fog’

What is the natural history of active toxo retinochoroiditis in immunocompetent pts?
What is the classic appearance of an inactive toxoplasmosis lesion?
A pigmented chorioretinal scar

What is the classic appearance of an active toxoplasmosis lesion?
A white lesion adjacent to a scar, with overlying vitreous cell

What is the classic description of the appearance of an active lesion?
‘Headlight in the fog’

What is the natural history of active toxo retinochoroiditis in immunocompetent pts?
The news in this regard is mixed. In one sense it is self-limited condition in that active lesions resolve spontaneously over a couple of months.
What is the classic appearance of an inactive toxoplasmosis lesion?
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What is the classic description of the appearance of an active lesion?
‘Headlight in the fog’

What is the natural history of active toxo retinochoroiditis in immunocompetent pts?
The news in this regard is mixed. In one sense it is self-limited condition in that active lesions resolve spontaneously over a couple of months. However, it is also a chronic and progressive condition in that new lesions appear periodically adjacent or near to old scars.
Uveitis: *Toxoplasmosis*

**Diagnosis**

*How is the diagnosis of ocular toxoplasmosis made?*
How is the diagnosis of ocular toxoplasmosis made?
In most cases, clinically
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In most cases, clinically

Is serology testing helpful?
How is the diagnosis of ocular toxoplasmosis made?
In most cases, clinically

*Is serology testing helpful?*
It can be. As with most infectious conditions, toxo acquisition produces a transient (<1 yr) IgM response, and a lifelong IgG response. Thus, a positive IgM result confirms a recent infection.
Uveitis: *Toxoplasmosis*

**Diagnosis**

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It can be. As with most infectious conditions, toxo acquisition produces a transient (<1 yr) IgM response, and a lifelong IgG response. Thus, a positive IgM result confirms a recent infection. Because of the high prevalence of toxo exposure in the population at large, IgG positivity cannot be considered confirmatory vis a vis a pt who presents with retinochoroiditis. However, if the pt's toxo serology is IgG(-), this result removes toxo from the DDx.
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What about suspected congenital toxo—is serology helpful in these cases?
Uveitis: Toxoplasmosis

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Again, it can be. Maternal antibodies will cross the placenta, so their presence in a newborn is noncontributory.
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What about suspected congenital toxo—is serology helpful in these cases?
Again, it can be. Maternal IgG antibodies will cross the placenta, so their presence in a newborn is noncontributory. In contrast, IgM does not cross the placenta, so if a newborn is IgM(+), it is confirmatory of congenital infection.
Uveitis: **Toxoplasmosis**

**Treatment**

What are the indications for treating active ocular toxoplasmosis?
What are the indications for treating active ocular toxoplasmosis? This is controversial. Some physicians tx all lesions, whereas other elect to watch small peripheral ones. That said, the following clinical scenarios are considered relative indications to tx:
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--Lesions in the [_____] or threatening the [_____]
--Lesions associated with decreased [_____]
--[_____] or [_____] lesions
--A lesion that remains active for [_____]
--Lesions associated with significant [two words]
What are the indications for treating active ocular toxoplasmosis?
This is controversial. Some physicians tx all lesions, whereas other elect to watch small peripheral ones. That said, the following clinical scenarios are considered relative indications to tx:
--Lesions in the fovea or threatening the ONH
--Lesions associated with decreased VA
--Large or multifocal lesions
--A lesion that remains active for >1 month
--Lesions associated with significant vitreous inflammation
Uveitis: Toxoplasmosis

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--If the pt is __immunocompromised__
--If the pt is __pregnant__, and has newly-acquired dz
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--So-called ‘triple therapy’ consists of pyrimethamine + sulfadiazine + steroids
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Pyrimethamine and sulfadiazine inhibit the metabolism of what vitamin?

Folate

What critical hematopoietic issues can arise if folate metabolism is inhibited?
Leukopenia and thrombocytopenia

In order to prevent pyrimethamine/sulfadiazine-induced leukopenia and thrombocytopenia, what med is given along with triple therapy?
Folinic acid (aka leucovorin). In addition, pts treated with triple therapy should have their blood count checked weekly.
What are the indications for treating active ocular toxoplasmosis? 
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Uveitis: **Toxoplasmosis**

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In terms of route, are steroids given…
--Systemically?
Uveitis: **Toxoplasmosis**

**Treatment**

What are the indications for treating active ocular toxoplasmosis?
This is controversial. Some physicians tx all lesions, whereas other elect to watch small peripheral ones. That said, the following clinical scenarios are considered relative indications to tx:

--Lesions in the fovea or threatening the ONH
--Lesions associated with decreased VA
--Large or multifocal lesions
--A lesion that remains active for >1 month
--Lesions associated with significant vitreous inflammation

And most physicians consider the following clinical scenarios **absolute** indications to tx:

--If the pt is immunocompromised
--If the pt is pregnant, and has newly-acquired dz

How is ocular toxo treated?
Multiple regimens have been developed:

--So-called ‘triple therapy’ consists of pyrimethamine + sulfadiazine + **steroids**

In terms of route, are steroids given…

--Systemically? Yes, so long as anti-microbial tx is on-board
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- Topically?
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Which is the most effective tx regimen for ocular toxoplasmosis?

None of the above. That is, while all are employed, none has been shown via clinical trial to be definitively the best.
A woman with a hx of toxoplasmosis becomes pregnant. What is the risk of fetal infection?
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What is the risk if she has a recurrence during her pregnancy?
Uveitis: **Toxoplasmosis**

**Toxoplasmosis: Congenital**

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How might a pregnant woman become primarily infected? By any of the pathways described earlier—by consuming foodstuffs containing viable tissue cysts, consuming oocysts, or (very rarely) by blood-to-blood transmission of tachyzoites.
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--Don’t consume... two words... or... three words...
--Don’t handle litter boxes (or cats, especially kittens)
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*How should a pregnant woman go about minimizing her risk of becoming infected?* --Don’t consume undercooked meat or unpasteurized goat’s milk
--Don’t handle litter boxes (or cats, especially kittens)
What is the classic ocular manifestation of congenital toxoplasmosis?
Uveitis: **Toxoplasmosis**

**Toxoplasmosis: Congenital**

*What is the classic ocular manifestation of congenital toxoplasmosis?*
The same as in the acquired version—a retinochoroiditis (either active, or a scar)
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*Does congenital toxo present unilaterally, or bilaterally?*
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The macula

Does congenital toxo present unilaterally, or bilaterally?
Bilaterally in the majority of cases
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They are protean, but include intracranial calcifications, hydrocephalus, and developmental issues
Uveitis: *Toxoplasmosis*

- Hydrocephalus
- Intracranial calcifications

Congenital toxoplasmosis
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Is there a relationship between gestational age at the time of maternal infection and dz severity? Mos def. If mom is infected very early, there’s a significant chance of fetal demise; if very late, the infant may appear completely normal. Acquisition between these extremes will result in a ‘sliding scale’ of dz severity.
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Are such infants in the clear?
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Are such infants in the clear? Unfortunately not. Almost all of these ‘unaffected’ infants will experience a retinochoroiditis event in one or both eyes at some point in childhood, and up to 25% will be blinded by it.
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What impact does this have on dz management?

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1) The uveitis is profiled
2) The profiled case is meshed
3) A differential diagnosis list is generated
4) Studies are obtained to identify the etiology
5) Treatment appropriate for the etiology is initiated
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Note: This is per the Uveitis book; the Peds book states “Ocular toxo does not require treatment unless it threatens vision.” Caveat emptor.
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The same as in the acquired version—a retinochoroiditis (either active, or a scar)

**Are the manifestations of congenital toxoplasmosis limited to retinochoroiditis?**
No, unfortunately—they can be systemic, and devastating

**What are the systemic manifestations?**
They are protean, but include intracranial calcifications, hydrocephalus, and developmental issues

**Is there a relationship between gestational age at the time of maternal infection and dz severity?**
Mos def. If mom is infected very early, there’s a significant chance of fetal demise; if very late, the infant may appear completely normal. Acquisition between these extremes will result in a ‘sliding scale’ of dz severity.

**Toxoplasmosis is not the only infectious agent that presents in this manner when acquired in utero. What is the well-known mnemonic for the infectious agents?**

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What is the well-known mnemonic for the infectious agents?
--T
--O
--R
--C
--H
--E
--S
Uveitis: Toxoplasmosis

Toxoplasmosis: Congenital

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--Toxoplasmosis
--Other
--Rubella
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--EBV
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The *Peds* book uses the mnemonic **TORCH:**
--**TO**xoplasmosis
--**R**ubella
--**C**MV
--**H**erpesviruses
Uveitis: *Toxoplasmosis*

*In HIV+ pts*

Is toxoplasmosis a common opportunistic infection in HIV/AIDS pts?
Uveitis: **Toxoplasmosis**

*In HIV+ pts*

*Is toxoplasmosis a common opportunistic infection in HIV/AIDS pts?*
Not particularly, no
1) The uveitis is profiled
2) The profiled case is meshed
3) A differential diagnosis list is generated
4) Studies are obtained to identify the etiology
5) Treatment appropriate for the etiology is initiated

**Uveitis: Toxoplasmosis**

*In HIV+ pts*

Is toxoplasmosis a common opportunistic infection in HIV/AIDS pts?
Not particularly, no

In what key way might the presentation of toxo retinitis in an HIV+ pt deviate from the classic *headlight in the fog* description?
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Uveitis: *Toxoplasmosis*

Toxoplasmosis in AIDS. Note 1) multifocality, and 2) the absence of old scars
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*In what ways does the management of toxo retinitis differ in the immunocompromised population?*
--Whereas 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, in immunocompromised pts, lesions are treated

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seven words
Uveitis: **Toxoplasmosis**

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*Why must all toxo retinochoroiditis be treated in HIV/AIDS pts?*
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*Why must all toxo retinochoroiditis be treated in HIV/AIDS pts?*
Because unlike in immunocompetent pts, dz in HIV/AIDS pts does **not** resolve spontaneously—instead, it is relentlessly progressive
Is toxoplasmosis a common opportunistic infection in HIV/AIDS pts?
Not particularly, no

In what key way might the presentation of toxo retinitis in an HIV+ pt deviate from the classic "headlight in the fog" description?
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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 HIV+ pts?
Yes—up to 50% of toxo retinitis pts will be found to have CNS involvement

What is the classic neuroimaging finding?
'Ring-enhancing lesions'
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Uveitis: *Toxoplasmosis*

CNS toxo: Ring-enhancing lesions
The following slides were part of an earlier version of the toxo review slide-set. There’s no new info in them, but as they take a different approach to the subject, it might be worth your time to go through them.
Where does toxoplasmosis rank as a cause of posterior segment infection?
Where does toxoplasmosis rank as a cause of posterior segment infection? #1
Where does toxoplasmosis rank as a cause of posterior segment infection? #1

In the US, what is the prevalence for toxoplasmosis infection?
Where does toxoplasmosis rank as a cause of posterior segment infection? #1

In the US, what is the prevalence for toxoplasmosis infection? 20-25%

What country has the highest toxoplasmosis prevalence rate? Brazil, at about 85% (France is really high as well)

What percentage of infected Brazilians have ocular dz? About 20
Where does toxoplasmosis rank as a cause of posterior segment infection? #1

In the US, what is the prevalence for toxoplasmosis infection? 20-25%

Of Americans who are infected, what percent have ocular dz?
Where does toxoplasmosis rank as a cause of posterior segment infection? #1

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Of Americans who are infected, what percent have ocular dz? Only 2
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Where does toxoplasmosis rank as a cause of posterior segment infection? #1

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*Is ocular toxoplasmosis known to present with anterior segment signs?*
Where does toxoplasmosis rank as a cause of posterior segment infection? #1

Is ocular toxoplasmosis known to present with anterior segment signs? Yes
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Is ocular toxoplasmosis known to present with anterior segment signs?
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When the anterior segment is involved, what appearance is typical for the KP?
Where does toxoplasmosis rank as a cause of posterior segment infection? #1

Is ocular toxoplasmosis known to present with anterior segment signs?

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When the anterior segment is involved, what appearance is typical for the KP?

They are typically granulomatous in appearance. However, toxoplasmosis is known to produce one word KP as well.
Where does toxoplasmosis rank as a cause of posterior segment infection? #1

Is ocular toxoplasmosis known to present with anterior segment signs?

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When the anterior segment is involved, what appearance is typical for the KP?

They are typically granulomatous in appearance. However, toxoplasmosis is known to produce ‘stellate’ KP as well.
Where does toxoplasmosis rank as a cause of posterior segment infection? #1

Is ocular toxoplasmosis known to present with anterior segment signs? Yes

When the anterior segment is involved, what appearance is typical for the KP? They are typically granulomatous in appearance. However, toxoplasmosis is known to produce ‘stellate’ KP as well.

Which four uveitides are associated with stellate KP?
--
--
--
--Toxoplasmosis
Where does toxoplasmosis rank as a cause of posterior segment infection?

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Which four uveitides are associated with stellate KP?
--FHI
--HSV
--VZV
--Toxoplasmosis
Where does toxoplasmosis rank as a cause of posterior segment infection? #1

Classic description of the posterior pole exam in toxoplasmosis: four words
Where does toxoplasmosis rank as a cause of posterior segment infection? #1

Classic description of the posterior pole exam in toxoplasmosis: ‘Headlight in the fog’
Where does toxoplasmosis rank as a cause of posterior segment infection? #1

Classic description of the posterior pole exam in toxoplasmosis: ‘Headlight in the fog’

In terms of the Headlight in the fog appearance…
The headlight =
The fog =
Where does toxoplasmosis rank as a cause of posterior segment infection?

Classic description of the posterior pole exam in toxoplasmosis: ‘Headlight in the fog’

In terms of the Headlight in the fog appearance…
The headlight = the white toxo lesion
The fog = the dense overlying vitritis
Where does toxoplasmosis rank as a cause of posterior segment infection? #1

Classic description of the posterior pole exam in toxoplasmosis: ‘Headlight in the fog’

The toxo organism is an obligate vs facultative
Where does toxoplasmosis rank as a cause of posterior segment infection? #1

Classic description of the posterior pole exam in toxoplasmosis: ‘Headlight in the fog’

The toxo organism is an obligate
Where does toxoplasmosis rank as a cause of posterior segment infection? #1

Classic description of the posterior pole exam in toxoplasmosis: ‘Headlight in the fog’

The toxo organism is an obligate intracellular bug-host relationship
● Where does toxoplasmosis rank as a cause of posterior segment infection?

● Classic description of the posterior pole exam in toxoplasmosis: ‘Headlight in the fog’

● The toxo organism is an obligate intracellular parasitic class of bug
● Where does toxoplasmosis rank as a cause of posterior segment infection? #1
● Classic description of the posterior pole exam in toxoplasmosis: ‘Headlight in the fog’
● The toxo organism is an obligate intracellular parasitic protozoan
Where does toxoplasmosis rank as a cause of posterior segment infection? #1

Classic description of the posterior pole exam in toxoplasmosis: ‘Headlight in the fog’

The toxo organism is an obligate intracellular parasitic protozoan

What is the full name of the organism?

Toxoplasma gondii

Are humans the so-called ‘definitive host’ for toxoplasma?

No; humans are an intermediate host

What animal is the definitive host?

The cat
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It had long been thought that virtually all cases of ocular toxo represented reactivation of congenital disease. However, recent research indicates a sizeable proportion of cases are acquired post-natally, with many experts now convinced that the majority of cases are acquired in this fashion.
Where does toxoplasmosis rank as a cause of posterior segment infection?

Classical description of the posterior pole exam in toxoplasmosis: 'Headlight in the fog'

The toxo organism is an obligate intracellular parasitic protozoan.

Can represent re-activation of congenital disease, or newly-acquired infection.

What is the typical DFE finding in congenital toxoplasmosis?

A chorioretinal scar

Where in the retina is the C-R scar usually found?

The macula

They are bilateral in the majority of cases.
Where does toxoplasmosis rank as a cause of posterior segment infection? 

Classic description of the posterior pole exam in toxoplasmosis: 'Headlight in the fog'

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A chorioretinal scar

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Are the lesion usually unilateral, or bilateral?
Where does toxoplasmosis rank as a cause of posterior segment infection? #1

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What is the principal means by which newly-acquired toxoplasmosis is transmitted?
Where does toxoplasmosis rank as a cause of posterior segment infection? #1

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What is the principal means by which newly-acquired toxoplasmosis is transmitted?
Via ingestion of the infectious cysts in:
-- ; or in
-- ; or in
--
Where does toxoplasmosis rank as a cause of posterior segment infection? #1

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Via ingestion of the infectious cysts in:
--Undercooked meat; or in
--contaminated fruits/veggies; or in
--unpasteurized milk
Where does toxoplasmosis rank as a cause of posterior segment infection? #1

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--contaminated fruits/veggies; or in
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Classic description of the posterior pole exam in toxoplasmosis: ‘Headlight in the fog’

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Can represent re-activation of congenital disease, or newly-acquired infection

of AIDS patients with ocular toxo will have lesions
Where does toxoplasmosis rank as a cause of posterior segment infection? 

Classic description of the posterior pole exam in toxoplasmosis: ‘Headlight in the fog’

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Can represent re-activation of congenital disease, or newly-acquired infection

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1/3 of AIDS patients with ocular toxo will have CNS lesions--they must undergo MRI (classic finding—ring-enhancing lesions)
Where does toxoplasmosis rank as a cause of posterior segment infection? #1

Classic description of the posterior pole exam in toxoplasmosis: ‘Headlight in the fog’

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1/3 of AIDS patients with ocular toxo will have CNS lesions--they must undergo MRI (classic finding—ring-enhancing lesions)
Treatment of ocular toxoplasmosis:

- Treat active infection if threatening the macula, ONH, major retinal vessels, structure/area 1, structure/area 2, structure/area 3.
Treatment of ocular toxoplasmosis:
- Treat active infection if threatening the...
  - macula
  - ONH
  - major retinal vessels
Treatment of ocular toxoplasmosis:
- Treat active infection if threatening the...
  - macula
  - ONH
  - major retinal vessels
- …or in cases of severe
Treatment of ocular toxoplasmosis:
- Treat active infection if threatening the...
  - macula
  - ONH
  - major retinal vessels
- ...or in cases of severe vitritis
Treatment of ocular toxoplasmosis:
- Treat active infection if threatening the
  - macula
  - ONH
  - major retinal vessels
- …or in cases of severe vitritis

What is the natural course of untreated ocular toxoplasmosis?
Treatment of ocular toxoplasmosis:

- Treat active infection if threatening the...
  - macula
  - ONH
  - major retinal vessels
- ...or in cases of severe vitritis

What is the natural course of untreated ocular toxoplasmosis? It is a self-limited disease in the immunocompetent—lesions will begin healing within a month or two.
Treatment of ocular toxoplasmosis:

- Treat active infection if threatening the...
  - macula
  - ONH
  - major retinal vessels
- ...or in cases of severe vitritis

Treat with

1) antibiotic
2) anti-malarial, actually

3)
Treatment of ocular toxoplasmosis:
- Treat active infection if threatening the...
  - macula
  - ONH
  - major retinal vessels
- ...or in cases of severe vitritis
- Treat with
  1) Sulfadiazine
  2) Pyrimethamine
  3)
Treatment of ocular toxoplasmosis:
- Treat active infection if threatening the...
  - macula
  - ONH
  - major retinal vessels
- ...or in cases of severe vitritis
- Treat with:
  1) Sulfadiazine
  2) Pyrimethamine

Give a [administration schedule] then [until resolved (usually takes [time])]

3)
Treatment of ocular toxoplasmosis:

- Treat active infection if threatening the...
  - macula
  - ONH
  - major retinal vessels

- …or in cases of severe vitritis

- Treat with
  1) Sulfadiazine
  2) Pyrimethamine

  (administration schedule)

  Give a loading dose, then qd until resolved (usually takes 4-6 weeks)
Treatment of ocular toxoplasmosis:
- Treat active infection if threatening the...
  - macula
  - ONH
  - major retinal vessels
- ...or in cases of severe vitritis
- Treat with
  1) Sulfadiazine
  2) Pyrimethamine
    (administration schedule)
    Give a loading dose, then qd until resolved (usually takes 4-6 weeks)
  3) Side effect: serious, systemic
Treatment of ocular toxoplasmosis:
- Treat active infection if threatening the...
  - macula
  - ONH
  - major retinal vessels
- …or in cases of severe vitritis
- Treat with
  1) Sulfadiazine
  2) Pyrimethamine
  Side effect: Bone-marrow suppression
  (administration schedule) Give a loading dose, then qd until resolved (usually takes 4-6 weeks)
Treatment of ocular toxoplasmosis:
- Treat active infection if threatening the...
  - macula
  - ONH
  - major retinal vessels
- ...or in cases of severe vitritis
- Treat with
  1) Sulfadiazine
  2) Pyrimethamine
     \[
     \text{(administration schedule)} \quad \text{Give a loading dose, then qd until resolved (usually takes 4-6 weeks)}
     \]
     Side effect: Bone-marrow suppression; to prevent, give…
  3) two words
Treatment of ocular toxoplasmosis:

- Treat active infection if threatening the...
  - macula
  - ONH
  - major retinal vessels
- ...or in cases of severe vitritis
- Treat with
  1) Sulfadiazine
  2) Pyrimethamine
  3) Folinic acid

Side effect: Bone-marrow suppression; to prevent, give...
Treatment of ocular toxoplasmosis:

- Treat active infection if threatening the...
  - macula
  - ONH
  - major retinal vessels

...or in cases of severe vitritis

- Treat with
  1) Sulfadiazine
  2) Pyrimethamine
  3) Folinic acid

  Side effect: Bone-marrow suppression; to prevent, give...

  (administration schedule)
  Give a loading dose, then qd until resolved (usually takes 4-6 weeks)

  anti-inflammatory
Treatment of ocular toxoplasmosis:
- Treat active infection if threatening the...
  - macula
  - ONH
  - major retinal vessels
- …or in cases of severe vitritis
- Treat with
  1) Sulfadiazine
  2) Pyrimethamine
  3) Folinic acid
  3) Prednisone

Side effect: Bone-marrow suppression; to prevent, give…

Give a loading dose, then qd until resolved (usually takes 4-6 weeks)
Treatment of ocular toxoplasmosis:

- Treat active infection if threatening the...
  - macula
  - ONH
  - major retinal vessels
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  1) Sulfadiazine
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  3) Prednisone

Give a loading dose, then qd until resolved (usually takes 4-6 weeks)

With respect to treating ocular toxoplasmosis, this combo of meds is known as the classic…what?
Treatment of ocular toxoplasmosis:

- Treat active infection if threatening the...
  - macula
  - ONH
  - major retinal vessels
- …or in cases of severe vitritis
- Treat with
  1) Sulfadiazine
  2) Pyrimethamine
     Side effect: Bone-marrow suppression
  3) Folinic acid
  3) Prednisone

(Administration schedule)

Give a loading dose, then qd until resolved (usually takes 4-6 weeks)

With respect to treating ocular toxoplasmosis, this combo of meds is known as the classic…what? ‘Triple therapy’
Treatment of ocular toxoplasmosis:

- Treat active infection if threatening the...
  - macula
  - ONH
  - major retinal vessels
- ...or in cases of severe vitritis
- Treat with
  1) Sulfadiazine
  2) Pyrimethamine
    - Side effect: Bone-marrow suppression; to prevent, give...
  3) Folinic acid
  4) Prednisone

(Administration schedule)

Are alternative therapies available?

Yes, the following have been found to be efficacious alternatives:
- Trimethoprim-sulfamethoxazole
- Azithromycin
- Clindamycin

Do HIV/AIDS pts require long-term suppressive therapy?

Yes

Toxoplasmosis
Treatment of ocular toxoplasmosis:
- Treat active infection if threatening the...
  - macula
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  2) Pyrimethamine
  3) Folinic acid
  4) Prednisone
  (administration schedule)

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Yes, the following have been found to be efficacious alternatives:
--
--
--

Toxoplasmosis
Treatment of ocular toxoplasmosis:
- Treat active infection if threatening the...
  - macula
  - ONH
  - major retinal vessels
- …or in cases of severe vitritis
- Treat with
  1) Sulfadiazine
  2) Pyrimethamine
  3) Folinic acid
  3) Prednisone

Are alternative therapies available?
Yes, the following have been found to be efficacious alternatives:
  -- Trimethoprim-sulfamethoxazole
  -- Azithromycin
  -- Clindamycin

Side effect: Bone-marrow suppression; to prevent, give…
3) Folinic acid
Treatment of ocular toxoplasmosis:

- Treat active infection if threatening the macula, ONH, major retinal vessels, or in cases of severe vitritis.

- Treat with:
  1) Sulfadiazine
  2) Pyrimethamine
  3) Folinic acid
  4) Prednisone

Side effect: Bone-marrow suppression; to prevent, give Folinic acid.

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- Treat active infection if threatening the macula, ONH, or major retinal vessels.
- Treat with:
  1. Sulfadiazine
  2. Pyrimethamine
  3. Folinic acid
  4. Prednisone

Side effect: Bone-marrow suppression; to prevent, give:
- Folinic acid

Administration schedule:
- Give a loading dose, then qd until resolved (usually takes 4-6 weeks).

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Yes, the following have been found to be efficacious alternatives:
- Trimethoprim-sulfamethoxazole
- Azithromycin
- Clindamycin

**Do HIV/AIDS pts require long-term suppressive therapy?**
Yes

**Does treatment eradicate the infection?**
No

Why not? Is the toxo bug not susceptible?
The active bug (the tachyzoite) is quite susceptible. However, the bradyzoite form (aka tissue cyst) is impervious to the anti-infectives; thus, the infection is incurable.

**Does treatment prevent recurrences?**
No

What is the purpose of anti-infective treatment, then?
Practically speaking, the purpose of treatment is to allow for the administration of steroids (to reduce inflammation) without fear of exacerbating the infection itself.

**Toxoplasmosis**
Treatment of ocular toxoplasmosis:

- Treat active infection if threatening the macula, ONH, major retinal vessels, or in cases of severe vitritis.

Treat with:

1) Sulfadiazine
2) Pyrimethamine
   - Side effect: Bone-marrow suppression; to prevent, give Folinic acid.
3) Prednisone
   - Give a loading dose, then qd until resolved (usually takes 4-6 weeks).

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**Toxoplasmosis**

**Does treatment eradicate the infection?**
No

**Why not? Is the toxo bug not susceptible?**

---

**Treat with**

1) **Sulfadiazine**

2) **Pyrimethamine**
   - Side effect: Bone-marrow suppression
   - Give with Folinic acid

3) **Folinic acid**

3) **Prednisone**

(Administration schedule)

---

**Are alternative therapies available?**
Yes, the following have been found to be efficacious alternatives:

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---

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Treat with

1) Sulfadiazine
2) Pyrimethamine
   Side effect: Bone-marrow depression
3) Folinic acid
3) Prednisone

(Administration schedule)

Are alternative therapies available?
Yes, the following have been found to be efficacious alternatives:
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**Toxoplasmosis**

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**Does treatment prevent recurrences?**

---

**Treat with**

1) **Sulfadiazine**
2) **Pyrimethamine**
3) **Folinic acid**
3) **Prednisone**

(Administration schedule)

*Are alternative therapies available?*
Yes, the following have been found to be efficacious alternatives:

---

- Trimethoprim-sulfamethoxazole
- Azithromycin
- Clindamycin

*Do HIV/AIDS pts require long-term suppressive therapy?*
Yes
Treatment of ocular toxoplasmosis:

- Treat active infection if threatening the macula, ONH, major retinal vessels, or in cases of severe vitritis.
- Treat with:
  1. Sulfadiazine
  2. Pyrimethamine
  3. Folinic acid
  4. Prednisone

- Side effect: Bone-marrow suppression. To prevent, give folic acid (administration schedule: give a loading dose, then qd until resolved (usually takes 4-6 weeks)).

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Yes, the following have been found to be efficacious alternatives:
- Trimethoprim-sulfamethoxazole
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*Does treatment prevent recurrences?*
No

*What is the purpose of anti-infective treatment, then?*

---

**Treat with**

1) **Sulfadiazine**
2) **Pyrimethamine**
   - Side effect: Bone-marrow suppression
3) **Folinic acid**
3) **Prednisone**

(administration schedule)

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--Trimethoprim-sulfamethoxazole
--Azithromycin
--Clindamycin

Do HIV/AIDS pts require long-term suppressive therapy?
Yes
Treatment of ocular toxoplasmosis:

- Treat active infection if threatening the **macula**, **ONH**, or in cases of severe vitritis.

- Treat with 1) Sulfadiazine, 2) Pyrimethamine, 3) Folinic acid, 3) Prednisone.

Side effect: Bone-marrow suppression; to prevent, give 3) Folinic acid.

Give a loading dose, then qd until resolved (usually takes 4-6 weeks).

Are alternative therapies available? Yes, the following have been found to be efficacious alternatives: 1) Trimethoprim-sulfamethoxazole, 2) Azithromycin, 3) Clindamycin.

Do HIV/AIDS pts require long-term suppressive therapy? Yes

Does treatment eradicate the infection? No

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Does treatment prevent recurrences? No

What is the purpose of anti-infective treatment, then? Practically speaking, **the purpose of treatment is to allow for the administration of steroids (to reduce inflammation) without fear of exacerbating the infection itself**.

The triple therapy includes prednisone. Is it appropriate to use peri- or intraocular steroids instead? No! Peri/intraocular steroids can result in inflammation so severe as to cause loss of the eye!

Does treatment prevent recurrences? No

What is the purpose of anti-infective treatment, then? Practically speaking, **the purpose of treatment is to allow for the administration of steroids (to reduce inflammation) without fear of exacerbating the infection itself**.

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Do HIV/AIDS pts require long-term suppressive therapy? Yes

Does treatment eradicate the infection? No

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Do HIV/AIDS pts require long-term suppressive therapy? Yes
**Toxoplasmosis**

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**Why not? Is the toxo bug not susceptible?**
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**Does treatment prevent recurrences?**
No

**What is the purpose of anti-infective treatment, then?**
Practically speaking, *the purpose of treatment is to allow for the administration of steroids (to reduce inflammation) without fear of exacerbating the infection itself*.

**Treat with**

1) **Sulfadiazine**
   (administration schedule)
2) **Pyrimethamine**
3) **Folinic acid**
3) **Prednisone**

*The triple therapy includes prednisone. Is it appropriate to use peri- or intraocular steroids instead?* No! Peri/intraocular steroids can result in inflammation so severe as to cause loss of the eye!

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Yes, the following have been found to be efficacious alternatives:
-- **Trimethoprim-sulfamethoxazole**
-- **Azithromycin**
-- **Clindamycin**

Do HIV/AIDS pts require long-term suppressive therapy?
Yes

**Does treatment prevent recurrences?**
No

**What is the purpose of anti-infective treatment, then?**
Practically speaking, *the purpose of treatment is to allow for the administration of steroids (to reduce inflammation) without fear of exacerbating the infection itself*.

**Does treatment eradicate the infection?**
No
Treatment of ocular toxoplasmosis:

- Treat active infection if threatening the macula, ONH, major retinal vessels, or in cases of severe vitritis.

- Treat with:
  1. Sulfadiazine
  2. Pyrimethamine
  3. Folinic acid
  4. Prednisone

- Side effect: Bone-marrow suppression; to prevent, give Folinic acid.

Are alternative therapies available? Yes, the following have been found to be efficacious alternatives:
- Trimethoprim-sulfamethoxazole
- Azithromycin
- Clindamycin

Do HIV/AIDS pts require long-term suppressive therapy? Yes

Does treatment eradicate the infection? No

Why not? Is the toxo bug not susceptible?
The active bug (the tachyzoite) is quite susceptible. However, the bradyzoite form (aka tissue cyst) is impervious to the anti-infectives; thus, the infection is incurable.

Does treatment prevent recurrences? No

When recurrence occurs, what relationship usually holds between the new lesion and the original one?
Practically speaking, the purpose of treatment is to allow for the administration of steroids (to reduce inflammation) without fear of exacerbating the infection itself.
**Toxoplasmosis**

*Does treatment eradicate the infection?*

No

*Why not? Is the toxo bug not susceptible?*

The active bug (the *tachyzoite*) is quite susceptible. However, the bradyzoite form (aka *tissue cyst*) is impervious to the anti-infectives; thus, the infection is incurable.

*Does treatment prevent recurrences?*

No

*When recurrence occurs, what relationship usually holds between the new lesion and the original one?*

The recurrence will occur at the border of the original lesion (which is now a scar)

Practically speaking, the purpose of treatment is to allow for the administration of steroids (to reduce inflammation) without fear of exacerbating the infection itself

**Treat with**

1) **Sulfadiazine**  
   *Side effect: Bone-marrow suppression; to prevent*  
   *Give*  
   *3) Folinic acid*  
   *3) Prednisone*  
   *(administration schedule)*

2) **Pyrimethamine**

Are alternative therapies available?

Yes, the following have been found to be efficacious alternatives:

- Trimethoprim-sulfamethoxazole
- Azithromycin
- Clindamycin

Do HIV/AIDS pts require long-term suppressive therapy?

Yes
What is the most common manifestation of congenital toxoplasmosis?
Retinochoroiditis

What mnemonic covers the differential for a congenital presentation such as this?
TORCHES

Where does toxoplasmosis rank as a cause of posterior segment infection? #1

Classic description of the posterior pole exam in toxoplasmosis: ‘Headlight in the fog’
The toxo organism is an obligate intracellular parasitic protozoan

Can represent re-activation of congenital disease, or newly-acquired infection
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What does TORCHES stand for?
- Toxoplasmosis
- Other agents
- Rubella
- CMV
- Herpes, including EBV
- Syphilis

What is the most common manifestation of toxoplasmosis?
Retinochoroiditis