Uveitis: **TB**

**Basics**

*What is the causative organism in typical TB?*
Uveitis: TB

Basics

*What is the causative organism in typical TB?*
Mycobacterium tuberculosis

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: TB

Basics

What is the causative organism in typical TB?
Mycobacterium tuberculosis

What are its basic properties (ie, what sort of organism is it in a microbiology sense)?
What is the causative organism in typical TB? Mycobacterium tuberculosis

What are its basic properties (ie, what sort of organism is it in a microbiology sense)? It is an obligate aerobe.
What is the causative organism in typical TB?
Mycobacterium tuberculosis

What are its basic properties (i.e., what sort of organism is it in a microbiology sense)?
It is an obligate aerobe

Is it Gram positive, or Gram negative?
What is the causative organism in typical TB?
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**Uveitis: TB**

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Uveitis:  \textit{TB}

\textit{M tuberculosis}, acid-fast stain
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What proportion of the world’s population is infected with TB?
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Almost 1/3
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What proportion of the world’s population is infected with TB?
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In the US, what characteristics put an individual at risk for TB?
--?
--?
--?
--?
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--Immunocompromised (eg, pts with AIDS, debilitating chronic diseases; or on immunosuppressive meds)
--Working in the healthcare field
--Recently emigrated from a developing nations
--Advanced age
--Marginal living conditions (eg, homeless; malnourished)
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Which organ is most likely to be affected?

Uveitis: TB

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Which organ is most likely to be affected?
The lungs
Uveitis: **TB**

**Basics**

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--Recently emigrated from a developing nations
--Advanced age
--Marginal living conditions (e.g., homeless; malnourished)

Which organ has a special affinity for what portion of the lungs?
The lungs
What is the causative organism in typical TB? Mycobacterium tuberculosis.

What are its basic properties (i.e., what sort of organism is it in a microbiology sense)? It is an obligate aerobe.

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What proportion of the world’s population is infected with TB? Almost 1/3.

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--Working in the healthcare field
--Recently emigrated from a developing nations
--Advanced age
--Marginal living conditions (e.g., homeless; malnourished)

Which organ has a special affinity for what portion of the lungs? The apices.

TB has a special affinity for what portion of the lungs? The apices.

Basics

Uveitis: TB

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.
TB: Cavity in the right lung apex with evidence of consolidation
**Uveitis: TB**

**Basics**

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Mycobacterium tuberculosis

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--Recently emigrated from a developing nations
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--Marginal living conditions (eg, homeless; malnourished)

Which organ does TB have a special affinity for?
The apices

Why the apices?

**Uveitis:**

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--Recently emigrated from a developing nations
--Advanced age
--Marginal living conditions (eg, homeless; malnourished)

Which organ has a special affinity for what portion of the lungs?
The apices

Why the apices?
TB thrives under conditions of high O₂ tension, and pulmonary O₂ levels are highest at the apices
What is the causative organism in typical TB?
Mycobacterium tuberculosis

What are its basic properties (ie, what sort of organism is it in a microbiology sense)?
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Which organ is most likely to be affected?
The lungs

Foreshadowing alert!

TB has a special affinity for what portion of the lungs?
The apices

Why the apices?
TB thrives under conditions of high $O_2$ tension.
What is the causative organism in typical TB?
Mycobacterium tuberculosis

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--Recently emigrated from a developing nations
--Advanced age
--Marginal living conditions (eg, homeless; malnourished)

Which organ is most likely to be affected?
The lungs

What are the three classic constitutional signs/symptoms?
What is the causative organism in typical TB?
Mycobacterium tuberculosis

What are its basic properties (ie, what sort of organism is it in a microbiology sense)?
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--Recently emigrated from a developing nations
--Advanced age
--Marginal living conditions (eg, homeless; malnourished)

Which organ is most likely to be affected?
The lungs

What are the three classic constitutional signs/symptoms?
Fever, night sweats and weight loss
Uveitis

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

TB uveitis can present in any form...

Panuveitis

Posterior

Intermediate

Anterior

Tuberculosis
Uveitis

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

...including as an anterior uveitis.

Anterior

Intermediate

Posterior

Panuveitis

Tuberculosis
Let's review how the Uveitis book organizes anterior uveitis:
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Let's review how the Uveitis book organizes anterior uveitis:
Uveitis: **Anterior**

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

Nongranulomatous

Acute
- Unilateral
  - HLA-B27 dz
  - Posner-Schlossman
  - Sarcoid
  - Syphilis
  - HSV/VZV
  - ?

- Bilateral
  - TINU
  - Behçet
  - Drug rxn
  - Leptospirosis
  - Sarcoid
  - Syphilis
  - IBD/PA
  - ?

Chronic
- JIA
- FHI
- IBD/PAHLA-B27 dz
- Syphilis
- ?

1) The uveitis is profiled
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On the diagram above, where can TB present?
Uveitis: **Anterior**

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

Nongranulomatous
- **Acute**
  - Unilateral
    - HLA-B27 dz
    - Posner-Schlossman
    - Sarcoid
    - Syphilis
    - HSV/VZV
    - **TB**
  - Bilateral
    - TINU
    - Behçet
    - Drug rxn
    - Leptospirosis
    - Sarcoid
    - Syphilis
    - IBD/PA
    - **TB**

- **Chronic**
  - JIA
  - FHI
  - IBD/PA
  - Sarcoid
  - Syphilis
  - **TB**

---

*On the diagram above, where can TB present? Anywhere!*
Uveitis: *Anterior*

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

Nongranulomatous
- Acute
- Bilateral
  - Unilateral
    - HLA-B27 dz
    - Posner-Schlossman
    - Sarcoid
    - Syphilis
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    - **TB**
  - Bilateral
    - TINU
    - Behçet
    - Drug rxn
    - Leptospirosis
    - Sarcoid
    - Syphilis
    - IBD/PA
    - **TB**

IBD/PAHLA-B27 dz
- HSV/VZV
- TB

On the diagram above, where can TB present?
Anywhere!

OK, but when TB presents as an anterior uveitis, in which form is it most likely to occur?
Uveitis: Anterior

1) The uveitis is profiled
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Granulomatous:
- TB
  - Syphilis
  - Sarcoid
  - HSV
  - VKH
  - Toxoplasmosis
  - Lyme

Nongranulomatous:
- Acute
  - Unilateral
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    - Behçet
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    - IBD/PA
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  - IBD/PA
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  - Syphilis
  - TB

On the diagram above, where can TB present?
Anywhere!

OK, but when TB presents as an anterior uveitis, in which form is it most likely to occur?
As an acute granulomatous uveitis
On the diagram above, where can TB present?
Anywhere!

OK, but when TB presents as an anterior uveitis, in which form is it most likely to occur?
As an acute granulomatous uveitis

How likely is TB to present in this manner, ie, as an isolated anterior uveitis without posterior findings?
On the diagram above, where can TB present? Anywhere!

OK, but when TB presents as an anterior uveitis, in which form is it most likely to occur? As an acute granulomatous uveitis

How likely is TB to present in this manner, ie, as an isolated anterior uveitis without posterior findings? Very unlikely
Where can TB present?
Anywhere!

OK, but when TB presents as an anterior uveitis, in which form is it most likely to occur?
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How likely is TB to present in this manner, ie, as an isolated anterior uveitis without posterior findings?
Very unlikely
On the diagram above, where can TB present?

Anywhere!

OK, but when TB presents as an anterior uveitis, in which form is it most likely to occur?

As an acute granulomatous uveitis

How likely is TB to present in this manner, ie, as an isolated anterior uveitis without posterior findings? Very unlikely

What descriptive term is often applied to the KP in TB? ‘Mutton fat’ (just as in sarcoid)
Uveitis: **TB**

Sarcoid: Mutton-fat KP

TB: Mutton-fat KP (note also the AC granuloma)
On the diagram above, where can TB present?
Anywhere!

OK, but when TB presents as an anterior uveitis, in which form is it most likely to occur?
As an acute granulomatous uveitis

How likely is TB to present in this manner, ie, as an isolated anterior uveitis without posterior findings?
Very unlikely
On the diagram above, where can TB present?

Anywhere!

OK, but when TB presents as an anterior uveitis, in which form is it most likely to occur?

As an **acute granulomatous uveitis**

How likely is TB to present in this manner, ie, as an isolated anterior uveitis without posterior findings?

Very **unlikely**
Uveitis: *TB*

Sarcoid: Iris nodules

TB: Iris nodules

(I couldn’t find any pics, but they should look like the sarcoid ones)
On the diagram above, where can TB present?

Anywhere!

OK, but when TB presents as an anterior uveitis, in which form is it most likely to occur?

As an acute granulomatous uveitis

How likely is TB to present in this manner, ie, as an isolated anterior uveitis without posterior findings? Very unlikely
On the diagram above, where can TB present?
Anywhere!

OK, but when TB presents as an anterior uveitis, in which form is it most likely to occur?
As an acute granulomatous uveitis

How likely is TB to present in this manner, ie, as an isolated anterior uveitis without posterior findings?
Very unlikely
Uveitis: **TB**

Sarcoid: Posterior synechiae
(and the world’s largest Busacca nodule)

TB: Posterior synechiae
Isolated *intermediate uveitis* would be an unexpected presentation in *TB*…
Uveitis

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Anterior

Intermediate

Posterior

Panuveitis

...but posterior uveitis is a hallmark of TB.

Tuberculosis
Uveitis: **Posterior**

- Chorioretinitis or Retinochoroiditis
- Retinitis
- Neuroretinitis

1) The uveitis is profiled
2) The profiled case is meshed
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What is the classic posterior manifestation of TB?
What is the classic posterior manifestation of TB?
Choroiditis
What is the classic posterior manifestation of TB?
Choroiditis

Why does TB have a special affinity for the choroid?
Chorioretinitis

1) The uveitis is profiled
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Choroiditis

Chorioretinitis or Retinochoroiditis

Retinitis

Neuroretinitis

What is the classic posterior manifestation of TB?
Choroiditis

Why does TB have a special affinity for the choroid?
Recall TB has an affinity for those areas of the body with especially high O₂ tension (eg, the lung apices).
What is the classic posterior manifestation of TB?
Choroiditis

Why does TB have a special affinity for the choroid?
Recall TB has an affinity for those areas of the body with especially high $O_2$ tension (eg, the lung apices). The choroid has the highest blood flow in the entire body, and thus is extremely well oxygenated.
What is the classic posterior manifestation of TB?
Choroiditis

Why does TB have a special affinity for the choroid?
Recall TB has an affinity for those areas of the body with especially high O₂ tension (eg, the lung apices). The choroid has the highest blood flow in the entire body, and thus is extremely well oxygenated.

How does TB choroiditis present?
What is the classic posterior manifestation of TB? Choroiditis

Why does TB have a special affinity for the choroid? Recall TB has an affinity for those areas of the body with especially high $O_2$ tension (eg, the lung apices). The choroid has the highest blood flow in the entire body, and thus is extremely well oxygenated.

How does TB choroiditis present? Usually as multiple (up to hundreds) small (1/3 - 2 DD) yellowish lesions known as tubercles.
Uveitis: **Posterior**

- **Choroiditis**
- **Chorioretinitis or Retinochoroiditis**
- **Retinitis**
- **Neuroretinitis**

What is the classic posterior manifestation of TB?
Choroiditis

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How does TB choroiditis present?
Usually as multiple (up to hundreds) small (1/3 - 2 DD) yellowish lesions known as **tubercles**.
Uveitis: **TB**

Choroidal tubercles
What is the classic posterior manifestation of TB?
Choroiditis

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Recall TB has an affinity for those areas of the body with especially high O$_2$ tension (eg, the lung apices). The choroid has the highest blood flow in the entire body, and thus is extremely well oxygenated.

How does TB choroiditis present?
Usually as multiple (up to hundreds) small (1/3 - 2 DD) yellowish lesions known as tubercles. Occasionally, only one large (2 - 10 DD) tubercle will be present.
Uveitis: **TB**

*Large choroidal tubercles*
TB choroiditis: Single large tubercle pre- and post-tx
What is the classic posterior manifestation of TB?  
Choroiditis

Why does TB have a special affinity for the choroid?  
Recall TB has an affinity for those areas of the body with especially high O₂ tension (eg, the lung apices).  
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Usually as multiple (up to hundreds) small (1/3 - 2 DD) yellowish lesions known as tubercles.  
Occasionally, only one large (2 - 10 DD) tubercle will be present.

Do these tubercles tend to be found in the posterior pole, or more peripherally?
**Uveitis: Posterior**

- **Choroiditis**
- **Chorioretinitis or Retinochoroiditis**
- **Retinitis**
- **Neuroretinitis**

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**Do these tubercles tend to be found in the posterior pole, or more peripherally?**
The posterior pole
What is the classic posterior manifestation of TB?
Choroiditis

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The posterior pole

Is the overlying retina affected?
What is the classic posterior manifestation of TB?
Choroiditis

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Do these tubercles tend to be found in the posterior pole, or more peripherally?
The posterior pole

Is the overlying retina affected?
Yes; retinal hemorrhages, edema (sometimes in the form of a macular star), and/or serous RD can result.
Uveitis: TB

Macular star 2ndry to TB chorioretinitis
What is the classic posterior manifestation of TB?
Choroiditis

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The posterior pole

Is the overlying retina affected?
Yes; retinal hemorrhages, edema (sometimes in the form of a macular star), and/or serous RD can result.

Can the ONH be affected?
What is the classic posterior manifestation of TB? 
Choroiditis

Why does TB have a special affinity for the choroid? 
Recall TB has an affinity for those areas of the body with especially high O₂ tension (eg, the lung apices). The choroid has the highest blood flow in the entire body, and thus is extremely well oxygenated.

How does TB choroiditis present? 
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Do these tubercles tend to be found in the posterior pole, or more peripherally? 
The posterior pole

Is the overlying retina affected? 
Yes; retinal hemorrhages, edema (sometimes in the form of a macular star), and/or serous RD can result.

Can the ONH be affected? 
Yes; disc edema is a common occurrence
Uveitis: TB

Dis edema in TB
What is the classic posterior manifestation of TB?
Choroiditis

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Recall TB has an affinity for those areas of the body with especially high O₂ tension (eg, the lung apices). The choroid has the highest blood flow in the entire body, and thus is extremely well oxygenated.

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The posterior pole

Is the overlying retina affected?
Yes; retinal hemorrhages, edema (sometimes in the form of a macular star), and/or serous RD can result.

Can the ONH be affected?
Yes; disc edema is a common occurrence

So, TB can present as a neuroretinitis
There is another classic posterior manifestation that involves the retina. What is its eponymous name?
There is another classic posterior manifestation that involves the retina. What is its eponymous name?
Eales disease
There is another classic posterior manifestation that involves the retina. What is its eponymous name? Eales disease

What specific component of the retina is primarily affected in Eales dz?
There is another classic posterior manifestation that involves the retina. What is its eponymous name? Eales disease

What specific component of the retina is primarily affected in Eales dz? The vasculature; ie, Eales is a retinal vasculitis
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*What specific component of the retina is primarily affected in Eales dz?*
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*Does Eales tend to occur in the posterior pole, or the periphery?*
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What specific component of the retina is primarily affected in Eales dz? The vasculature; ie, Eales is a retinal vasculitis

Does Eales tend to occur in the posterior pole, or the periphery? The periphery

Demographically speaking, who is the classic Eales pt?
There is another classic posterior manifestation that involves the retina. *What is its eponymous name?* Eales disease

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*Does Eales tend to occur in the posterior pole, or the periphery?*
The periphery

*Demographically speaking, who is the classic Eales pt?*
A healthy young adult male from [Two Words] or the [Two Words]
There is another classic posterior manifestation that involves the retina. What is its eponymous name? Eales disease

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A healthy young adult male from India or the Middle East
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Demographically speaking, who is the classic Eales pt? A healthy young adult male from India or the Middle East

How does Eales dz present?
Chorioretinitis or Retinochoroiditis (Retinal vasculitis)

There is another classic posterior manifestation that involves the retina. What is its eponymous name? Eales disease

What specific component of the retina is primarily affected in Eales dz? The vasculature; ie, Eales is a retinal vasculitis

Does Eales tend to occur in the posterior pole, or the periphery? The periphery

Demographically speaking, who is the classic Eales pt? A healthy young adult male from India or the Middle East

How does Eales dz present? As a peripheral vascular occlusive disease with retinal hemorrhages. In time, retinal nonperfusion can lead to neovascularization and tractional RD
Eales disease: Peripheral neo
Eales disease: Peripheral neo
Eales disease: Peripheral neo
Uveitis

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

Anterior

Posterior

Intermediate

And of course, TB can present as a panuveitis.

Panuveitis

Tuberculosis
Uveitis: **TB**

**Diagnosis**

How is the diagnosis of TB made?
Uveitis: **TB**

**Diagnosis**

*How is the diagnosis of TB made?*

Definitively, only via observation of the organism on a specimen. More commonly, the diagnosis is made presumptively on other, indirect evidence.
Uveitis: **TB**

**Diagnosis**

*How is the diagnosis of TB made?*
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*What ‘presumptive evidence’ tests are commonly employed first-line?*
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--PPD
--QuantiFERON Gold
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*Note that the characteristics that increase the risk of a false-negative PPD are the same as those that put someone at risk of having TB in the first place!*
Uveitis: **TB**

**Diagnosis**

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Under what circumstances can the PPD yield a false-positive result?
--Hx of exposure to BCG
--Pt is infected with atypical mycobacteria
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In this context, what does BCG stand for?

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bacille Calmette-Guérin

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--It is used to treat certain forms of cancer

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Given the vagaries of PPD testing, how should it be employed in a low-prevalence country like the US?
Uveitis: **TB**

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--?
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--?

Lymph node biopsy for microbiologic analysis

If all of the above are negative, what should the uveitis-managing clinician do next?
Consider aqueous, vitreous or even chorioretinal sampling for microbiologic analysis

1) The uveitis is profiled
2) The profiled case is meshed
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--Chest imaging
--PET scanning
--Culture and staining of sputum, urine, and gastric samples
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Uveitis: **TB**

**Treatment**

What two overarching principles guide TB treatment?

--?

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Uveitis: **TB**

**Treatment**

*What two overarching principles guide TB treatment?*
-- Multidrug regimen is employed
-- Directly-observed therapy (DOT) is utilized
Uveitis: **TB**

**Treatment**

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*Why is it important to employ multiple anti-TB agents simultaneously?*
Uveitis: **TB**

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*What two overarching principles guide TB treatment?*
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*Why is it important to employ multiple anti-TB agents simultaneously?*
In a word, resistance. There is already widespread resistance to isoniazid (INH); in some locales, TB is resistant to several agents. Multidrug regimens reduce the risk of development of further resistance.
Uveitis: **TB**

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Why is DOT so important?
Again, because of resistance. One of the chief causes of resistance is noncompliance with the long-term treatment regimen needed to eradicate the exceedingly slow-growing M. tuberculosis. DOT is intended to ensure compliance.
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What is a typical anti-TB drug regimen?
Uveitis: **TB**

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**What is a typical anti-TB drug regimen?**
Initial therapy consists of four drugs for 8 weeks.
Uveitis: TB

**Treatment**

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*What is a typical anti-TB drug regimen?*

Initial therapy consists of INH, rifampin, ethambutol, and pyrazinamide for 8 weeks.
Uveitis: **TB**

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**What is a typical anti-TB drug regimen?**

Initial therapy consists of INH, rifampin, ethambutol, and pyrazinamide for 8 weeks *(the ethambutol can be stopped earlier if the bug proves susceptible to the rest of the regimen)*. After 8 weeks the two drugs are stopped, and the other two are continued for another 18 weeks.
Uveitis: TB

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Again, because of resistance. One of the chief causes of resistance is noncompliance with the long-term treatment regimen needed to eradicate the exceedingly slow-growing M. tuberculosis. DOT is intended to ensure compliance.

What is a typical anti-TB drug regimen?
Initial therapy consists of **INH**, rifampin, **ethambutol**, and pyrazinamide for 8 weeks (the ethambutol can be stopped earlier if the bug proves susceptible to the rest of the regimen). After 8 weeks the ethambutol and pyrazinamide are stopped, and the INH and rifampin are continued for another...
What two overarching principles guide TB treatment?
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EMB optic neuropathy is particularly concerning.

Is its risk dose-dependent?
Yes

At what dose (in mg/kg/d) does the risk of EMB optic neuropathy warrant monthly follow-up?
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