Uveitis: **TB**

**Basics**

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

**Basics**

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

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**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)?*
Uveitis: **TB**

**Basics**

*What is the causative organism in typical TB?*
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*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 (ie, what sort of organism is it in a microbiology sense)?
It is an obligate aerobe

Is it Gram positive, or Gram negative?
Uveitis: *TB*

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Uveitis: **TB**

*M. tuberculosis*, acid-fast stain
Uveitis: TB

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What proportion of the world’s population is infected with TB?
What is the causative organism in typical TB? Mycobacterium tuberculosis

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

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

*In the US, what characteristics put an individual at risk for TB?*

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**Uveitis: **TB

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

*In the US, what characteristics put an individual at risk for TB?*
--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?
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Which organ is most likely to be affected?
The lungs
TB

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

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What organ is most likely to be affected?
The lungs

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

TB: Cavity in the right lung apex with evidence of consolidation
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Mycobacterium tuberculosis

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Which organ is most likely to be affected?
The lungs

Why the apices?
TB thrives under conditions of high O₂ tension, and pulmonary O₂ levels are highest at the apices

Uveitis: **TB**

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Which organ is most likely to be affected?
The lungs

What are the three classic constitutional signs/symptoms?
**Uveitis: TB**

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*What are its basic properties (ie, what sort of organism is it in a microbiology sense)?*
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--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

Anterior

Posterior

Intermediate

Panuveitis

TB uveitis can present in any form...

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

...including as an anterior uveitis.

Tuberculosis
Uveitis: *Anterior*

(Start here, with the first distinction the book makes)

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

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

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

- Granulomatous
- Nongranulomatous
  - Acute
  - Chronic

Let’s review how the Uveitis book organizes anterior uveitis:

1) The uveitis is profiled
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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/PA
  - Sarcoid
  - Syphilis
  - ?

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

Uveitis: **Anterior**

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

- **Nongranulomatous**
  - Acute
    - Unilateral
      - HLA-B27 dz
      - Posner-Schlossman
      - Sarcoid
      - Syphilis
      - HSV/VZV
      - ?
    - Bilateral
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      - Behçet
      - Drug rxn
      - Leptospirosis
      - Sarcoid
      - Syphilis
      - IBD/PA
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    - Sarcoid
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1) The uveitis is profiled
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Uveitis: **Anterior**

Granulomatous
- **TB**
- Syphilis
- Sarcoid
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Nongranulomatous
- Acute
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    - 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!

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

Granulomatous
- **TB**
  - Syphilis
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  - Lyme

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

- **Chronic**
  - JIA
  - FHI
  - 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?**
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
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?
Acute granulomatous uveitis

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

What iris findings may occur? Nodules (just as in sarcoid)

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

How likely is TB to present in this manner, i.e., 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

What descriptive term is often applied to the KP in TB?

‘Mutton fat’ (just as in sarcoid)

What iris findings may occur?

Nodules (just as in sarcoid)

Are synechiae common?

Yes (just as in sarcoid)
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?
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
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

Isolated intermediate uveitis would be an unexpected presentation in 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
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...but posterior uveitis is a hallmark of TB.
What is the classic posterior manifestation of TB?
Uveitis: **Posterior**

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?
Uveitis: **Posterior**

**Chorioretinitis or Retinochoroiditis**

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

- Choroiditis
- Retinitis
- Neuroretinitis

*What is the classic posterior manifestation of TB?*
Choroiditis

*Why does TB have a special affinity for the choroid?*
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.
**Uveitis: Posterior**

- Choroiditis
- Chorioretinitis or Retinochoroiditis
- Retinitis
- Neuroretinitis

What is the classic posterior manifestation of TB?
Choroiditis

Foreshadowing alert payoff!

Why does TB have a special affinity for the choroid?
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.
What is the classic posterior manifestation of TB?
Choroiditis

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

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?

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

**Chorioretinitis or Retinochoroiditis**

*Choroiditis*

Retinitis

Neuroretinitis

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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: \textit{TB}

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

Why does TB have a special affinity for the choroid?
TB has an affinity for those areas of the body with especially high $O_2$ tension (e.g., 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: \textbf{TB}

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

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The posterior pole
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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: \textit{TB}

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

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

Can the ONH be affected?
Uveitis: **Posterior**

**Chorioretinitis or Retinochoroiditis**

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?
Yes; disc edema is a common occurrence
Uveitis: TB

Dis edema in TB
Chorioretinitis or Retinochoroiditis

What is the classic posterior manifestation of TB?
Choroiditis

Why does TB have a special affinity for the choroid?
TB has an affinity for those areas of the body with especially high O₂ tension (e.g., 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 \textit{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?
The posterior pole

Is the overlying retina affected?
Yes; retinal hemorrhages, edema (sometimes in the form of a \textit{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 \textit{neuroretinitis}
Uveitis: *Posterior*

Choroiditis  Chorioretinitis or Retinochoroiditis  Retinitis  Neuroretinitis

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

*There is another classic posterior manifestation that involves the retina. What is its eponymous name?*
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Eales disease
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Does Eales tend to occur in the posterior pole, or the periphery?
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Demographically speaking, who is the classic Eales pt?
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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 India or the Middle East
Uveitis: \textit{Posterior}

\begin{itemize}
  \item Choroiditis
  \item Chorioretinitis or Retinochoroiditis \textit{(Retinal vasculitis)}
  \item Neuroretinitis
\end{itemize}

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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
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1) The uveitis is profiled
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And of course, TB can present as a panuveitis.
Uveitis: **TB**

**Diagnosis**

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

**Diagnosis**

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

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What ‘presumptive evidence’ tests are commonly employed first-line?
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--Advanced age
--Marginal living conditions (eg, homeless; malnourished)
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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!
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bacille Calmette-Guérin

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**What is it?**
A live-attenuated version of *Mycobacterium bovis*

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Given the vagaries of PPD testing, how should it be employed in a low-prevalence country like the US?
Thoughtfully; ie, only in those cases where the clinical index of suspicion is fairly high for TB. Given a high index of suspicion and a positive PPD, the uveitis-managing clinician should proceed by searching for further evidence of systemic infection via:

--Chest imaging
   --PET scanning
--Culture and staining of sputum, urine, and gastric samples
--Lymph node biopsy for microbiologic analysis

If all of the above are negative, what should the uveitis-managing clinician do next?
Uveitis: **TB**

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--Chest imaging
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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
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: \textit{TB}

\textbf{Treatment}

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Why is it important to employ multiple anti-TB agents simultaneously?
Treatment

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.
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Why is DOT so important?
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.
Uveitis: \textbf{TB}

\textbf{Treatment}

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\textit{What is a typical anti-TB drug regimen?}
What two overarching principles guide TB treatment?
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What is a typical anti-TB drug regimen?
INH, rifampin and pyrazinamide for 6-9 months. Additional agents are included if the TB strain is drug-resistant.