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*
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
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)?
It is an obligate aerobe

Is it Gram positive, or Gram negative?
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)?
It is an obligate aerobe

Is it Gram positive, or Gram negative?
It is neither--it is impervious to Gram’s stain. Instead, it stains with the so-called acid-fast stain.
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)?*
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What is the causative organism in typical TB?
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Is it Gram positive, or Gram negative?
It is neither--it is impervious to Gram’s stain. Instead, it stains with the so-called acid-fast stain.

What proportion of the world’s population is infected with TB?
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?
It is neither--it is impervious to Gram’s stain. Instead, it stains with the so-called acid-fast stain.

What proportion of the world’s population is infected with TB?
Almost 1/3
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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It is neither—it is impervious to Gram’s stain. Instead, it stains with the so-called acid-fast stain.

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**

**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)?
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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)
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)?
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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?
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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--Working in the healthcare field
--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 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

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--Working in the healthcare field
--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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--Working in the healthcare field
--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

Anterior

Intermediate

Posterior

Panuveitis

TB uveitis can present in any form...

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

Anterior

...including as an anterior uveitis.

Intermediate

Posterior

Panuveitis

Tuberculosis
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

Key distinction (not uni- vs bilateral)
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

Granulomatous (not uni- vs bilateral) Nongranulomatous

Key distinction
Uveitis: Anterior

Granulomatous

Nongranulomatous

Key distinction
(not uni- vs bilateral)

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: Anterior

- Granulomatous
- Nongranulomatous
  - Acute
  - Chronic

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Uveitis: *Anterior*

- Granulomatous
- Nongranulomatous
  - Acute
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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

Finally!
Uveitis: **Anterior**

- **Granulomatous**
  - Acute
  - Unilateral
  - Bilateral
- **Nongranulomatous**
  - Acute
  - Chronic

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: **Anterior**

Granulomatous

Nongranulomatous

Acute

Chronic

Unilateral

Bilateral

1) The uveitis is profiled
2) The profiled case is meshed
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5) Treatment appropriate for the etiology is initiated

*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

**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
  - 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/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?
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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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**
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)?
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On the diagram above, where can TB present?
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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

1) The uveitis is profiled
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Anterior

Posterior

Panuveitis

Intermediate

Isolated intermediate uveitis would be an unexpected presentation in TB…

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

Anterior

Intermediate

Posterior

Panuveitis

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

Tuberculosis
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?
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
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5) Treatment appropriate for the etiology is initiated

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
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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 (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 \( \text{O}_2 \) 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: **Posterior**

- Choroiditis
- Chorioretinitis or Retinochoroiditis
- Retinitis
- Neuroretinitis

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

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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

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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: **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
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What is the classic posterior manifestation of TB?
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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?
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?*  
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.
Uveitis: **Posterior**

- Choroiditis
- Chorioretinitis or Retinochoroiditis
- Retinitis
- Neuroretinitis

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?*
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.
Uveitis: *Posterior*

- Choroiditis
- Chorioretinitis or Retinochoroiditis *(Retinal vasculitis)*
- 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? 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?
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
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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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?
Chorioretinitis or Retinochoroiditis

Uveitis: **Posterior**

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

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
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.

Tuberculosis
Uveitis: **TB**

**Diagnosis**

How is the diagnosis of TB made?
Uveitis: TB

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

What ‘presumptive evidence’ tests are commonly employed first-line?
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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.

What ‘presumptive evidence’ tests are commonly employed first-line?
--PPD
--QuantiFERON Gold
Uveitis: TB

Diagnosis

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Does a positive PPD and/or QuantiFERON test prove the pt has active TB?
**Uveitis: TB**

**Diagnosis**

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*Does a positive PPD and/or QuantiFERON test prove the pt has active TB?*
No--it only proves they have been infected by/exposed to it
How is the diagnosis of TB made?
Definitely, only via observation of the organism on a specimen. More commonly, the diagnosis is made presumptively on other, indirect evidence.

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No--it only proves they have been infected by/exposed to it

The PPD has a high false-negative rate. What characteristics put a TB-positive individual at risk for a false-negative PPD?
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Uveitis: \textbf{TB}

\underline{Diagnosis}

\textit{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.

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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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--It is used to treat certain forms of cancer

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--------Lymph node biopsy for microbiologic analysis
Uveitis: TB

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

**Treatment**

*What two overarching principles guide TB treatment?*

-- Multidrug regimen is employed
-- Directly-observed therapy (DOT) is utilized
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Why is it important to employ multiple anti-TB agents simultaneously?
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**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?*
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?*
INH, rifampin and pyrazinamide for 6-9 months. Additional agents are included if the TB strain is drug-resistant.