Actinomyces

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Review Questions

1. What is clinical significance of Actinomyces
2. Salient bacteriological properties
3. Lab diagnosis
Actinomyces from Greek "actis" ray, beam and "mykes" mucus, fungus, is a genus of the actinobacteria class of bacteria.

They are all Gram-positive and are characterized by
- contiguous spread,
- suppurative and granulomatous inflammation, and
- formation of multiple abscesses and
- sinus tracts that may discharge sulfur granules

Important role they play in soil ecology. They produce a number of enzymes that help degrade organic plant material, lignin and chitin. As such, their presence is important in the formation of compost.
Belongs to class Actinobacteria. At least there are 36 species identified. Normal flora of mouth (Gingiva) and play important role in soil ecology. Actinomyces israeli is clinically important.
Morphology & Cultural properties

- Actinomyces are anaerobic
- Thin, branching (filamentous) Gram positive bacillus.
- morphologically Actinomyces colonies form fungus-like branched networks of hyphae
- Microaerophilic, grow best anaerobically. VERY fastidious.

Scanning electron micrograph of *Actinomyces israelii*. 

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Clinical infections by *A. israeli*

1. **Actinomycosis** - a disease characterized by the formation of abscesses in the mouth, lungs, or the gastrointestinal tract

2. **Bacterial endocarditis** – Rarely.

3. **Dental caries**

4. **Periodontal disease:**
Actinomycosis

- May occur as acute pyogenic infection or more commonly as a chronic infection that is both suppurative and granulomatous.
- Characterized by multiple abscesses and interconnecting sinus tracts that contain granules of microcolonies imbedded in tissue elements:
  - Microcolonies are macroscopic masses of filamentous bacterial cells that are "cemented" together by calcium phosphate.
  - Known as sulfur granules due to their yellow or orange appearance.
- Chronic suppuration results in granuloma formation and a fibrotic "walling off" of the lesion.
- Ultimately resulting in bone involvement.

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Types of actinomycosis

- Five major clinical forms of actinomycoses based on site of infection:
  1. Cervicofacial actinomycosis (most common form)
  2. Thoracic actinomycosis
  3. Abdominal actinomycosis
  4. Pelvic actinomycosis
  5. Cerebral actinomycosis
Lab diagnosis

- Lab diagnosis is made by Gram staining and histopathology but not by culture.
Difficult to culture and identify because the numbers of organisms are limited in affected tissues and are sequestered in sulfur granules.

- Fastidious and slow growth (up to two weeks or more).
- Colonies have "molar tooth" appearance on agar.
Antimicrobial sensitivity

- **1st choice**-
  - Penicillin or amoxicillin for six to twelve months
- **2nd choice**
  - Doxicycline
- Surgery if the disease is extensive.