

**Actinomycetes (branching bacteria ):** Dr.Jawad K. Al-Khafaji

---

Actinomycete (fungus-like bacteria) resembles fungus as it forms mycelia and resemble bacteria as it has not true nucleus.

**Important properties:**

1. Actinomycetes for many years were classified as fungi because the actinomycetes are form long branching filaments that resemble the hyphae of fungi .But they are reclassified as bacteria since they are thin, possesses cell wall containing muramic acid, it has prokaryotic nuclei and susceptible to bacterial antibiotic agents.
2. Actinomycetes are common in soil .There are two medically important organisms, *Actinomyces israelii* and *Nocardia asteroides* . *A.israelii* is anaerobe that forms part of normal flora of oral cavity. *N.asteroides* is aerobe and is found in environment, particularly in the soil.
3. They are gram-positive bacilli. Many isolates of *N.asteroides* are weakly acid fast stain.
4. The *A israelii* is strict anaerobic; whereas *N.asteroides* is grow under strict aerobic conditions.

**Transmission :**

*A.israelii* infection is acquired endogenously, from normal oral flora. There is no person to person spread. Infection of *N.asteroides* is acquired from soil by airborne route. Actinomycetes infections are not transmitted from person to person ( the diseases are not communicable ).

**Pathogenesis :**

Actinomycetes are responsible for three human infections.

1. Actinomycosis is caused by *A.israelii* in human or by *A.bovis* in cattle. The disease is chronic suppurative and granulomatous infection that produces pyogenic lesions with interconnecting sinus tract that contain sulfur granules.

Three forms are

- (i)Cervicofacial lesion is most common ,especially among poor dental hygiene and tooth extraction. After local trauma such as broken jaw or dental extraction, it may invade tissues, forming filaments surrounded by areas of inflammation . Hard, yellow granules

composed of filament mass are formed in pus. The lesion presents as swollen, erythematous process in jaw area. The disease will extend to other tissue or lymph nodes of head and neck.  
(ii) Thoracic actinomycosis (chest infection) resemble those of subacute pulmonary infection, which involve lung and chest wall.  
(iii) Abdominal abscess often follows a ruptured appendix or ulcer (occur after surgery and infection related to intrauterine contraceptive devices).

2. Nocardiosis is caused by *N. asteroides*, and less frequently, *N. brasiliensis*. The usual presentation is as subacute to chronic pulmonary infection (like pneumonia) that may disseminate to other organs to form abscesses, usually in brain, kidney or skin, especially in immunocompromised patients.
3. Mycetoma (madura foot) is localized lesion begins as hard, red swelling, slowly progressive, become filled with liquid and pus. chronic infection that begins in subcutaneous tissue (often in foot) and spreads to adjacent tissues. The most common causes of actinomycetoma are *Actinomyces madurae* and *N. brasiliensis*.

#### Lab.Dx

- (i) Microscopic examination : seeing gram positive filamentous rods, with yellow sulfur granules of *A. israelii* in pus or weakly acid fast in *N. asteroides*. sulfur granules are made up of large masses of organisms.
- (ii) Slow-growing under anaerobic in *A. israelii* or under aerobic conditions in *N. asteroides*.
- (iii) There are no serologic tests.

#### Control :

1. Treatment: Penicillin is drug of choice for *A. israelii* with prolonged administration. Sulfonamide is used for treatment of *N. asteroides* infections.
  2. Surgical drainage may be needed for some cases.
  3. good oral hygiene.
  4. No vaccine is available.
-