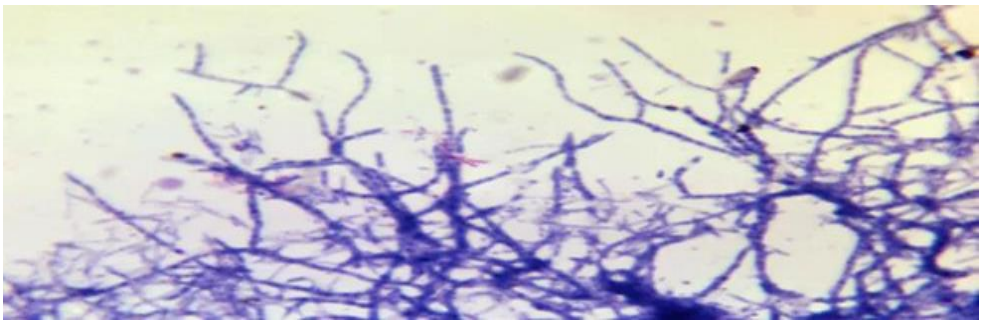
Actinomycetes

Actinomycetes as soil microorganism are remarkable Gram-positive, filamentous, bacteria that produce fungal-like hyphae or branching network of filaments. Actinomycetes are producing an estimated 70% of the antibiotics used in human therapy, making them as an inexhaustible source for antibiotics.

Nocardia

-It's a delicate filamentous branching Gram-positive rod bacterium, strictly aerobes, found in soil rich in organic matter, standing water and degraded plants.



-*Nocardia* has ability to produce antibiotics.

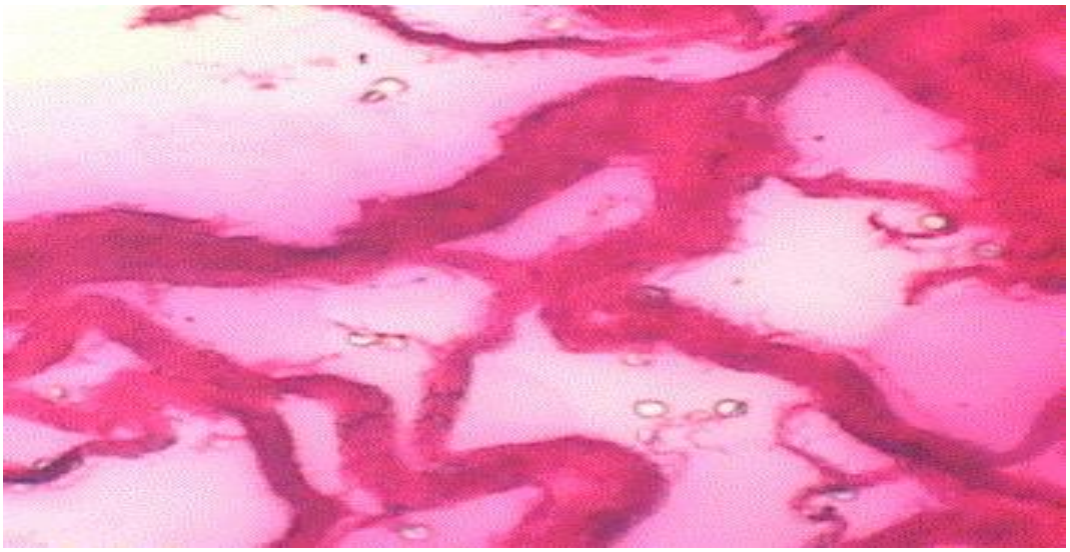
-The cell wall is distinctive with the mycolic acids (nocardimycolic acids). It's partially acid fast (weakly acid-fast) following staining with the modified Ziehl-Neelsen staining (cold method).

-Its opportunistic bacterium caused nocardiosis as a sub-acute or chronic lung infection and skin or as disseminated infection, associated with immunosuppressant individuals.

-The brain is the most common site of disseminated infection. Up to 44% of all people with brain or spinal cord infection die.

Virulence factors

-Catalase enzyme (decomposition of hydrogen peroxide).
- Superoxide dismutase (dismutation of superoxide).
-Cord factor (which interferes with phagocytosis).



-The causative agents of nocardiosis are *Nocardia asteroids*, less frequently by *N. brasillienssis* or *N. otitidiscaviarum*.

Nocardiosis is not transmitted from person to person and infection often happens from:

-Lung infection by breathing the contaminated dust.

-Traumatic inoculation by skin from soil or contaminated water.

-Nosocomial infection (hospital-acquired infection) from contaminated medical equipment's or wounds after surgery.

Signs and Symptoms

The symptoms of nocardiosis vary depending on which part of your body is affected.

1.Lung infection (fever, weight loss, chest pain, night sweats, cough and pneumonia).

2.Skin infection (ulcers and nodules, sometimes draining).

3.Brain and spinal cord infection (headache, weakness, confusion and seizures).

Diagnosis

Chest x-ray of the lung

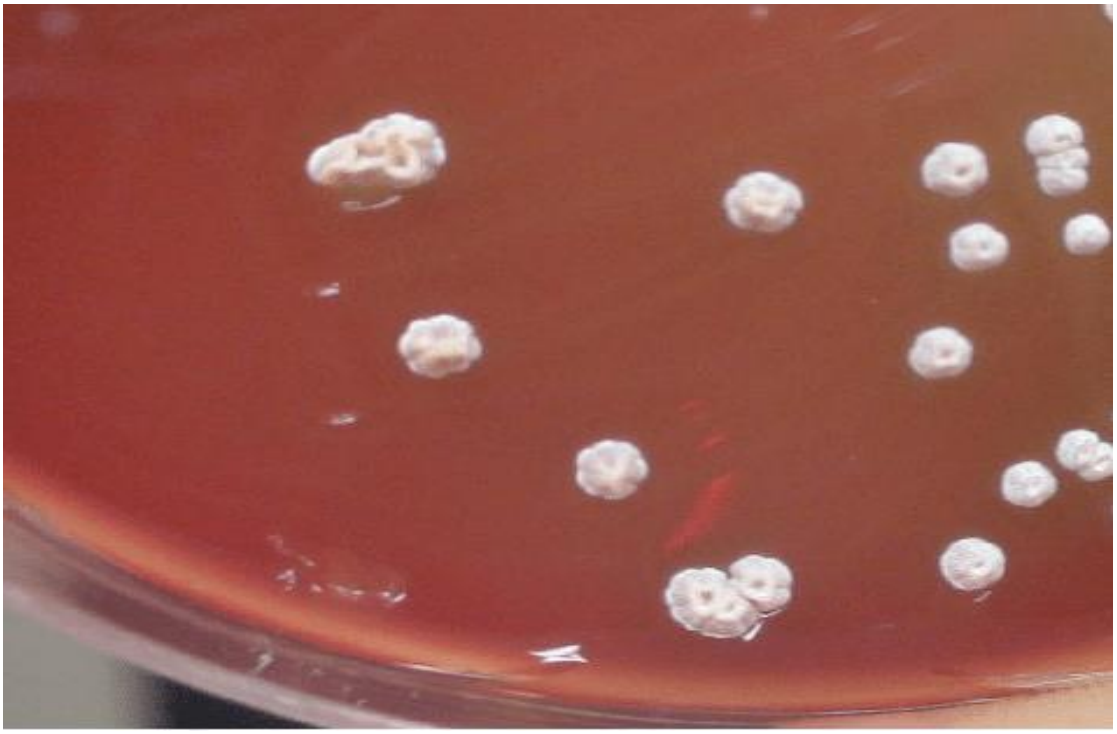
Bronchoscopy

Brain/lung/skin biopsy

Sputum culture.

Grow slowly on Saburoud dextrose agar, blood agar, Lowenstein-Jensen agar and Middlebrook agar as dry, pale yellowish orange colonies or chalky white, cotton candy appearance at 28-30 °C for 7-10 days or 2-3 weeks. *Nocardia* is not a commensal bacillus of the human body, so positive cultures should never be ignored. Therefore, after the isolation of Nocardia, we must begin antibiotic treatment.

Bloodagar



Saburoud dextrose agar

Treatment

People with nocardiosis may need to take of multiple antibiotics for several months to a year or more to prevent returning of disease. *Nocardia*

species are resistant to certain antibiotics, laboratory testing is needed to find out which species is causing the infection.

Historically, sulfonamides. Currently, trimethoprim sulfa methazole, amikacin, minocycline, imipenem, amoxicillin-clavulanic acid and cefotaxime are used. In patients with pulmonary nocardiosis and dissemination to other organs, especially the CNS, combined treatment is recommended and surgical drainage.

Prevention

People who have weakened immune system should wear shoes and clothing covering the skin (open wounds) when they are working in the soil. People who have an organ transplant might be given antibiotics to prevent nocardiosis. Hospitals should maintain strong infection control practices to avoid outbreaks of nocardiosis.