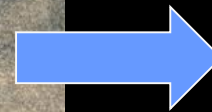


# Bacterial Infections of Oral Cavity



I am not as  
innocent as I  
look!!!!

DEPARTMENT OF ORAL AND MAXILLOFACIAL PATHOLOGY &  
ORAL MICROBIOLOGY

# Bacterial Infections of Oral Cavity

- Tuberculosis
- Actinomycosis
- Noma (cancrum oris)
- Scarlet fever
- Syphilis
- Diphtheria
- Leprosy

- Botryomycosis
- Tularemia
- Melioidosis
- Tetanus
- GRANULOMA INGUINALE
- Rhinoscleroma
- Cat-scratch Disease
- Pyogenic Granuloma

# Tuberculosis

- Tuberculosis (TB) is a specific infectious granulomatous disease caused by *Mycobacterium tuberculosis*. It commonly affects lungs but also affects the intestines, meninges, bones, joints, lymph glands, skin, and other tissues of the body.

# Etiology

- M.tuberculosis is a facultative intracellular parasite. M. Tuberculosis is a rod-shaped, nonspore forming, and thin aerobic bacteria called acid-fast bacilli, its acid-fastness is due to the high content of mycolic acids.

# Pathogenesis

- The interaction of the bacilli and the host begins when droplet nuclei from infectious patients are inhaled.
- Either host's macrophages control the multiplication of the bacteria or the bacteria grow and kill the macrophages.
- Initial stages are asymptomatic.
- About two or four weeks after infection
- (i) tissue damaging and
- (ii) macrophage activation responses develop.

- Granulomas or tubercles are formed. It consists of epitheloid cells, langhan's giant cells, plasma cells and fibroblasts.
- These lesions develop when host resistance is low
- The central part of the lesion contains caeseous soft cheesy necrotic material (caeseous necrosis)
- This necrotic material may undergo calcification at a later stage called **Ranne complex**
- In few cases, caeseous necrotic material undergoes liquefaction and discharges into the lungs leading to the formation of a cavity.

# Clinical Features

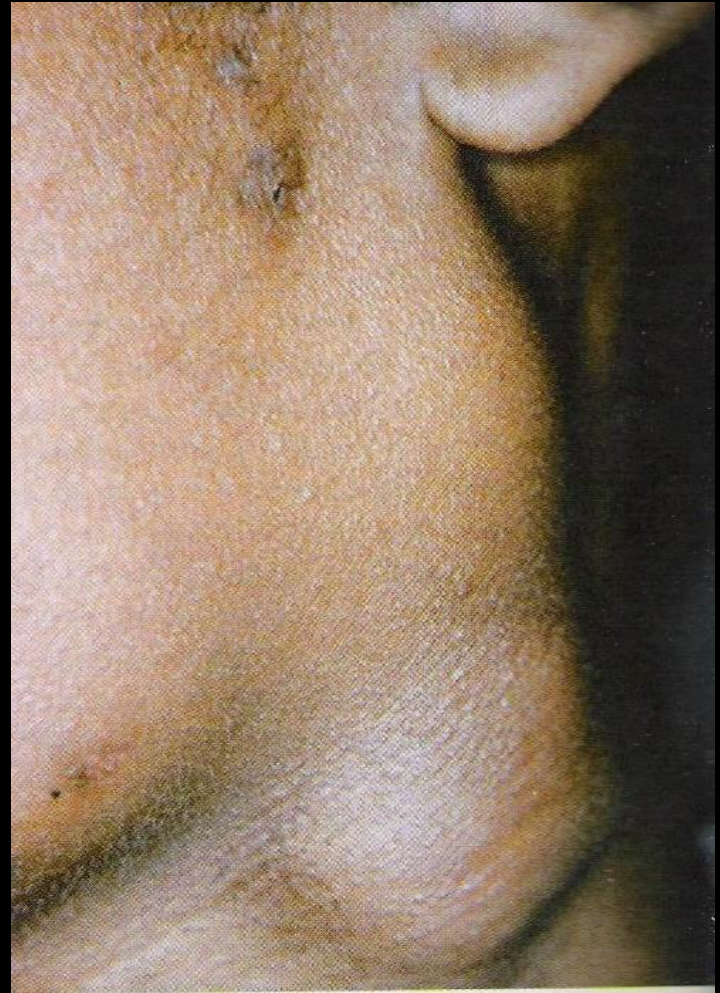
- The patient may suffer episodic fever and chills, but easy fatigability and malaise, gradual loss of weight by a persistent cough with or without associated hemoptysis.
- Tuberculosis is either pulmonary or extrapulmonary.
- Pulmonary TB may be primary, secondary or miliary.
- Extrapulmonary sites include lymphnodes, Pleura, genitourinary tract, bones, joints, meninges and peritoneum.

- Primary pulmonary TB is usually seen in children in a majority of cases, it is asymptomatic. A few may present with febrile illness and cough;
- symptoms of post-primary TB or secondary TB include fever, cough, chest pain, and hemoptysis.

- Symptoms of miliary TB in children include acute febrile illness but in adults it is more insidious ill health, anorexia, loss of weight, and fever, hepatosplenomegaly, and lymphadenopathy.
- Scrofula : Tuberculous infection of submaxillary and cervical lymph nodes. A swelling of the nodes often show inflammation of the overlying skin perforate and discharge pus.
- Lupus vulgaris : Primary tuberculosis of the skin, appears as popular nodules, which frequently ulcerate. It is Common on the face

# Tuberculosis

Scrofula: Tuberculous infection of cervical lymph nodes





**Tuberculosis:** Tuberculous infection of submaxillary appear as a swelling of the nodes with inflammation of the overlying skin which perforate and discharge pus.

# Oral Manifestation

- Relatively uncommon.
- Lesions of the oral mucosa are seldom primary, but rather are secondary to a pulmonary disease.
- It appears most likely that the organisms are carried in the sputum and enter the mucosal tissue through a small break in the surface.
- The dentist may contract an infection from his contact with living tubercle bacilli in the mouths of patients who have pulmonary or oral tuberculosis is a problem of great clinical significance.

- In the secondary tuberculosis tongue is most commonly affected, followed by the palate, Lips, buccal mucosa, gingival, and frenula.
- Irregular, superficial or deep, painful ulcer which tends to increase slowly in size, occur. It is frequently found in areas of trauma.
- Occasional mucosal lesions show swelling, granular, nodular or fissured lesions,
- Primary oral tuberculosis usually involves gingival and present as diffuse, hyperemic, nodular or papillary proliferation of the gingival tissues, Associated with regional lymphadenopathy.

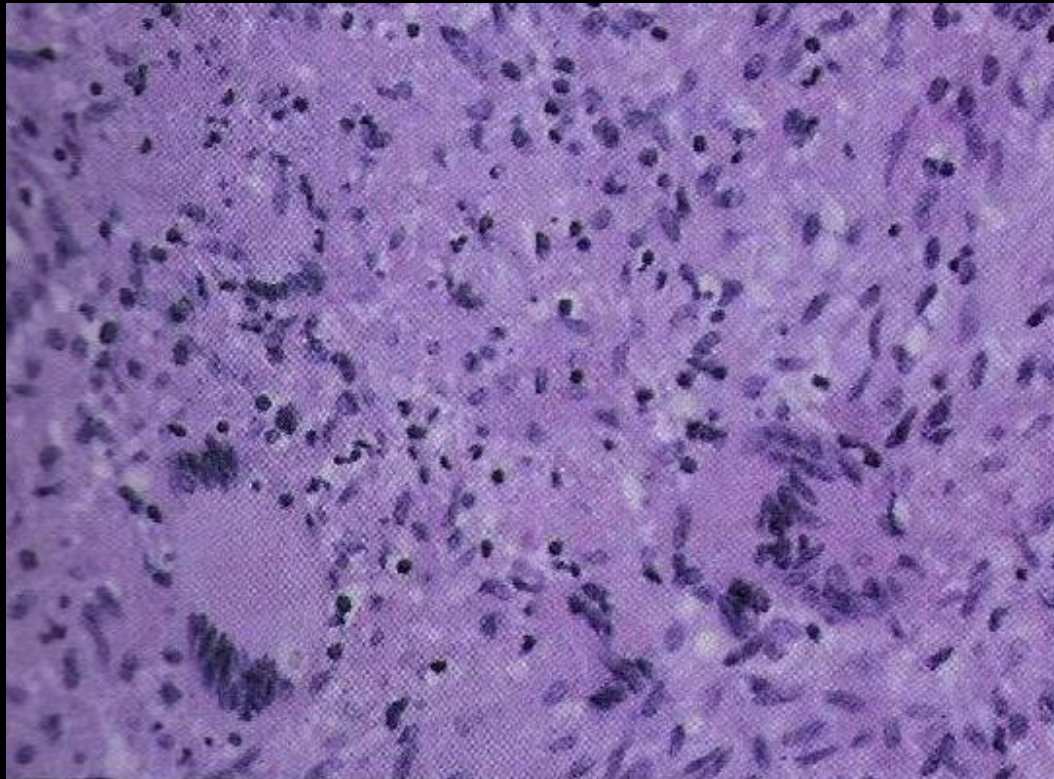


**Tuberculosis:** Irregular, superficial, painful ulcer on tongue

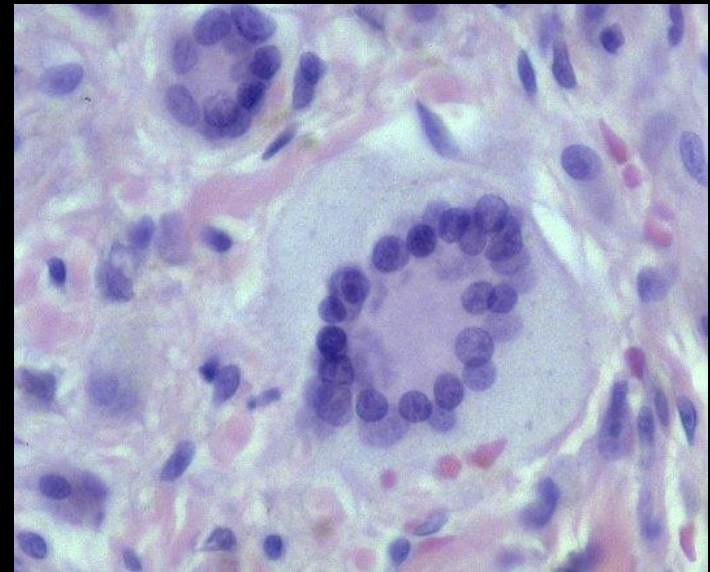
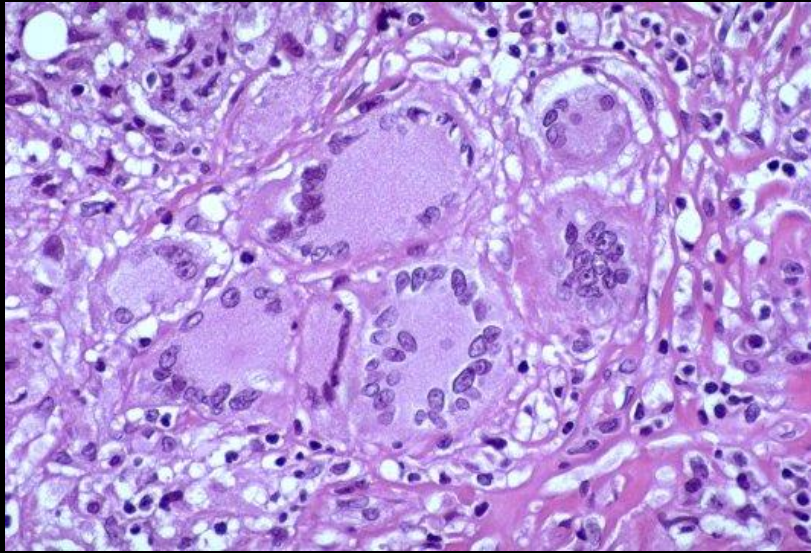
- Tuberculosis may also involve the bone of the maxilla or mandible. The lesion produced is essentially a tuberculous periapical granuloma or tuberculoma. Usually painful diffuse involvement of the maxilla or mandible may also occur, usually by hematogenous spread of infection (Tuberculous osteomyelitis) .

## Histologic Features

- The characteristic histopathologic appearance is due to the cell-mediated hypersensitivity reaction formation of granuloma exhibiting foci of caseous necrosis surrounded by epithelioid cells, lymphocytes, and occasional multinucleated giant cells.



**Tuberculosis:** granuloma exhibiting foci of caseous necrosis surrounded by epithelioid cells, lymphocytes, and multinucleated giant cells.

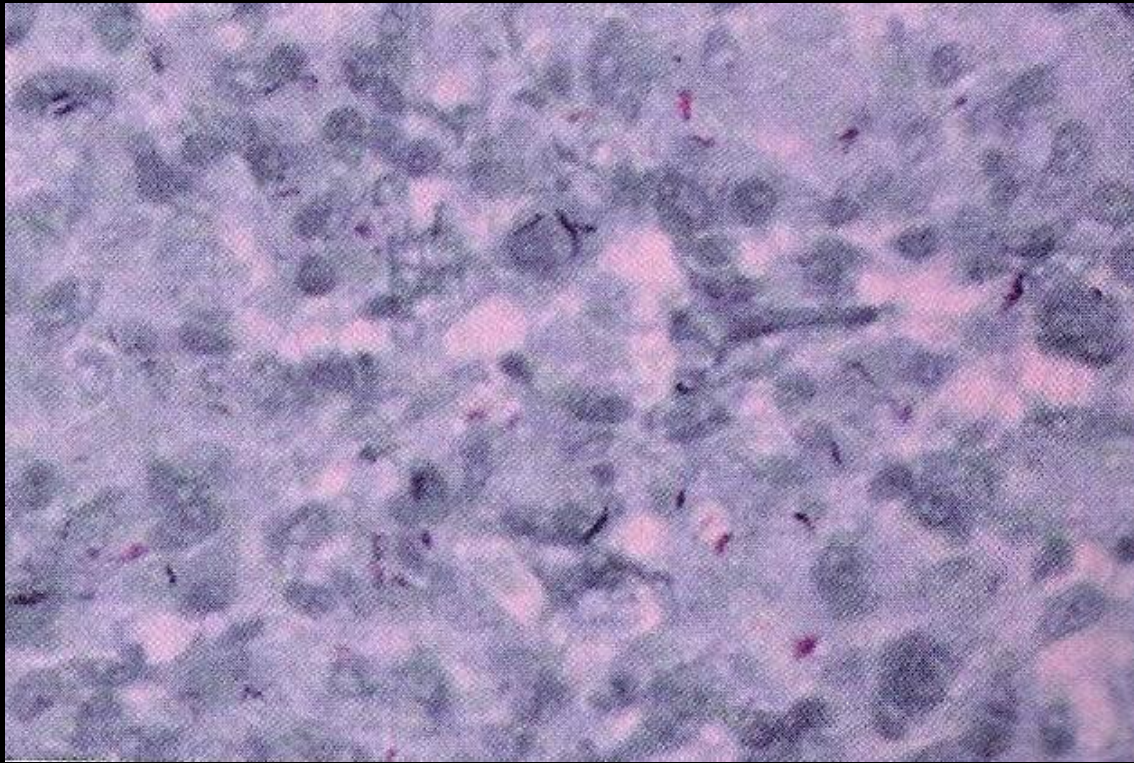


# Diagnosis

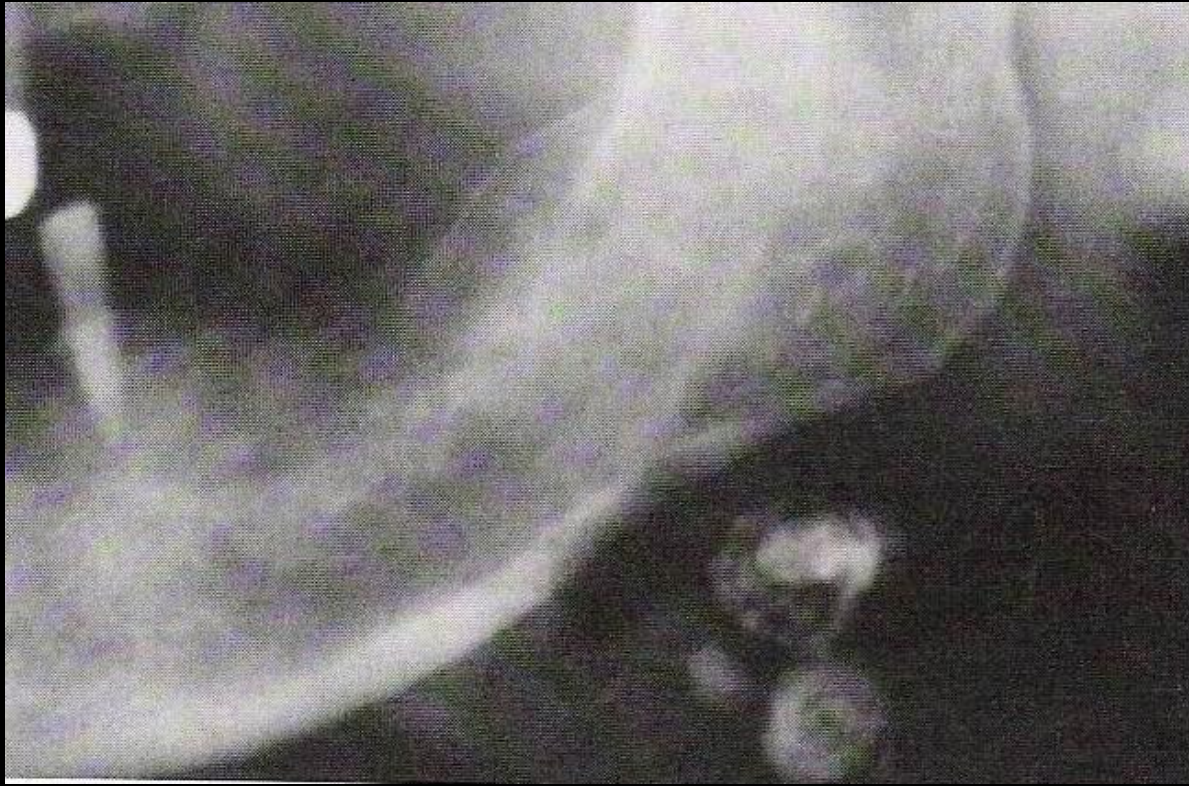
- The presence of acid fast bacilli (AFB) in sputum smear
- Roentgenograph of the chest
- tuberculin test
- CT scan is used to diagnose mediastinal or hilar lymphadenopathy, cavities and intralesional calcification.
- MRI is most useful for diagnosis of extrapulmonary TB.

Smear stained with modified Ziehl-Nielsen method to detect *M. tuberculosis*.





**Tuberculosis:** presence of acid fast bacilli (AFB) in sputum smear



**Tuberculosis:** Roentgenograph showing multiple calcified lymph nodes

- Mycobacterial Culture is done on Lowenstein-Jensen medium. It takes four to six weeks for the growth of *M. tuberculosis*.
- Other faster methods of culture :-
- Rapid slide culture technique involves growing mycobacterium on slides examining microcultures under a microscope.
- Radiometric culture method is based on the detection of utilization of a radioisotope of carbon by mycobacteria.

# Treatment

- Multiple drug therapy Isoniazid (INH) combined with rifampicin for nine months or INH, rifampicin and pyrazinamide for two months followed by INH and rifampicin for four months.
- Other Drugs used are streptomycin and ethambutol.

# Actinomycosis

- Actinomycosis is a chronic granulomatous suppurative disease caused by anaerobic gram-positive nonacid fast, branched filamentous bacteria.
- These are normal saprophytic component of oral flora. The most commonly isolated organism is *Actinomyces israelii*.

- The infection is characterized by the formation of abscesses that tend to drain by the formation of sinus tracts. It Shows the typical 'sulfur granules' or colonies of organisms, as tiny, Yellow grains
- Another infection that produces this type of sulfur granules is botryomycosis.

- Actinomycosis is classified anatomically according to the location of the lesions, as:

Cervicofacial,  
Abdominal, and  
Pulmonary forms.

# Pathogenesis

- Actinomycosis appears to be an endogenous infection and not communicable.
- Furthermore, it does not appear to be an opportunistic infection in a situation of depressed cell-mediated immunity
- Trauma seems to play a role in some cases by initiating a portal of entry for the organisms, since they are not highly invasive.
- The extraction socket, Periodontal pocket, non vital tooth or mucosal abrasion may act as the portal of entry for the infection.

# Clinical Features

- Males are more affected than females, because of poor oral hygiene and trauma.
- Cervicofacial actinomycosis is the most common form of this disease .
- The organisms may enter the tissues through the oral mucous membranes and may either remain localized in the subjacent soft tissues or spread to involve the salivary glands, bone or even the skin of the face and neck, producing swelling and induration of the tissue.

- These soft tissue swellings eventually develop into one or more abscesses, which tend to discharge upon a skin surface, liberating pus containing the typical 'sulfur granules'. the skin overlying the abscess is purplish red, indurated and has the feel of wood or often fluctuant.

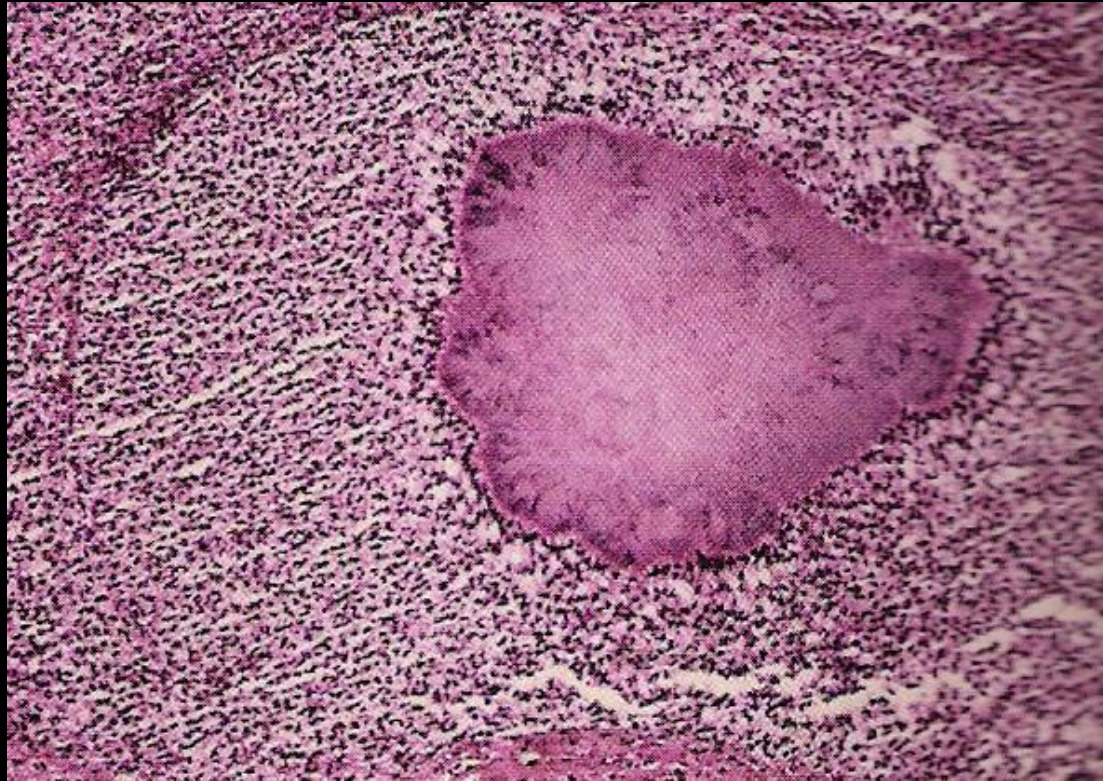


**Actinomycosis:** soft tissue swellings develop into abscess, which discharge upon a skin surface, liberating pus containing the typical 'sulfur granules'

- The infection of the soft tissues may extend to involve the mandible, or less commonly the maxilla which results in actinomycotic osteomyelitis.
- Abdominal actinomycosis is serious form of the disease and carries a high mortality rate. Fever, chills, nausea and vomiting, intestinal manifestations develop.
- Pulmonary actinomycosis had fever and chills cough and pleural pain.

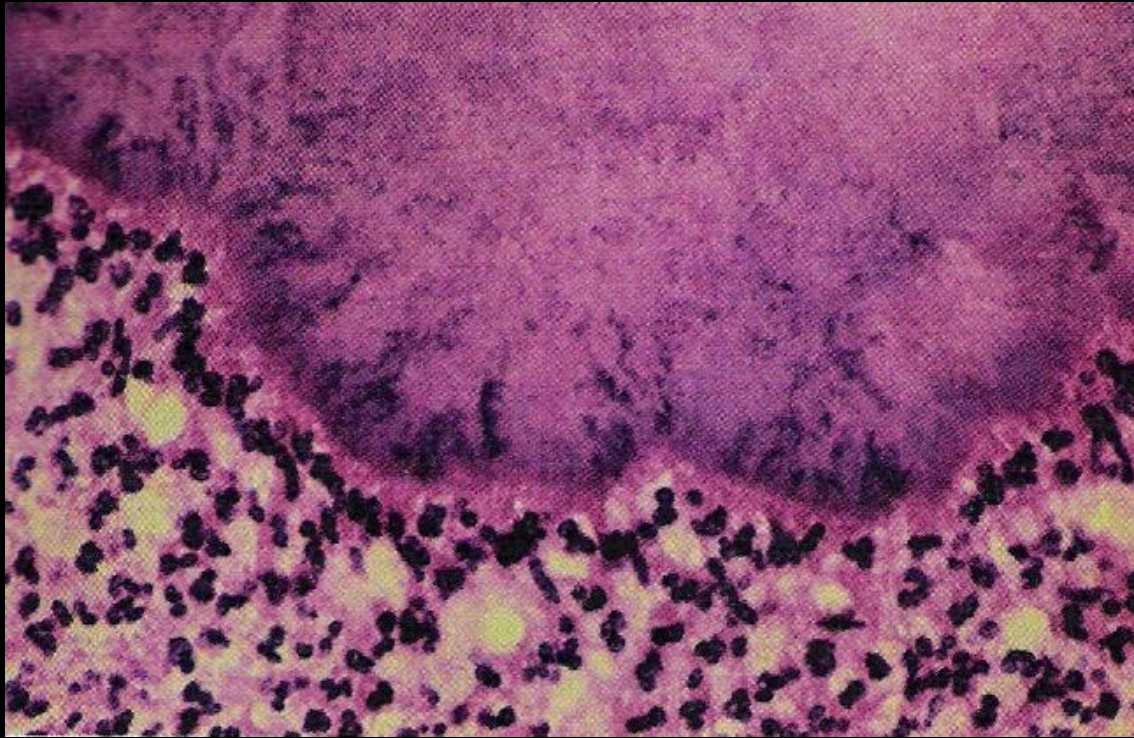
# Histologic Features

- It is Granulomatous one showing central abscess formation within which may be seen the characteristic colonies of microorganisms.
- These colonies appear to be floating in a sea of polymorpho-nuclear leukocytes, often associated with multinucleated giant cells and macrophages particularly around the periphery of the lesion.



**Actinomycosis:** Granulomatous lesion showing central abscess formation

- Individual colony, appear round lobulated, is made up of a meshwork of filaments that stains with hematoxylin but show eosinophilia of the peripheral club shaped ends of the filaments . this peculiar appearance is the basis for the often-used term 'ray fungus.'



**Actinomycosis:** Individual colony, appear round lobutated, is made up of a meshwork of filaments

# Diagnosis

- It is based on Clinical findings
- Organisms is demonstrated in the tissue section or smear.

# Treatment and Prognosis

- Draining the abscess,
- excising the sinus tract
- high doses of antibiotics eg. Penicillin and tetracycline

# **Noma (cancrum oris, gangrenous stomatitis)**

- Noma, is a rapidly spreading mutilating, gangrenous, stomatitis that occurs usually in debilitated or nutritionally deficient persons.
- It is seen chiefly in children.

# Predisposing factors

- dysentery,
- measles,
- pneumonia,
- scarlet fever,
- syphilis,
- tuberculosis,
- and blood dyscrasias, including anemia.

- Noma may be considered a secondary complication of systemic disease
- Noma appears to originate as a specific infection by Vincent's organisms, an acute necrotizing gingivostomatitis, which is soon complicated by secondary invasion of many other microbial forms, including streptococci, staphylococci, and diphtheria bacilli.

# Clinical Features:

- Noma usually begins as a small ulcer of the gingival mucosa which rapidly spreads and involves the surrounding tissues of the jaws, lips and cheeks by gangrenous necrosis.
- Overlying skin becomes inflamed, edematous and finally necrotic, with the result that a line of demarcation develops between healthy and dead tissue, and large masses of the tissue may slough out, leaving the jaw exposed.
- The odor is extremely foul. The palate and tongue may become involved. Patients have a high temperature, suffer secondary infection and may die from toxemia or pneumonia .



**Noma** (cancrum oris): area of necrosis on  
palate



**Noma (cancrum oris):** extensive area of necrosis on cheek

# Treatment

- Antibiotics & Immediate treatment of existing malnutrition

# SCARLET FEVER (SCARLATINA )

- Scarlet fever is a highly contagious systemic infection, occurring predominantly in children, caused by B-hemolytic streptococci, St. Pyogenes which produces a pyrogenic exotoxin. Various studies suggest that Development of scarlet fever may reflect a hypersensitivity reaction requiring prior exposure to the toxin.

# Clinical Features

- There is an incubation period of three to five days, after which the patient exhibits severe pharyngitis and tonsillitis, headache, chills, fever, and vomiting. Accompanying enlargement and tenderness of the regional cervical lymph nodes occurs.

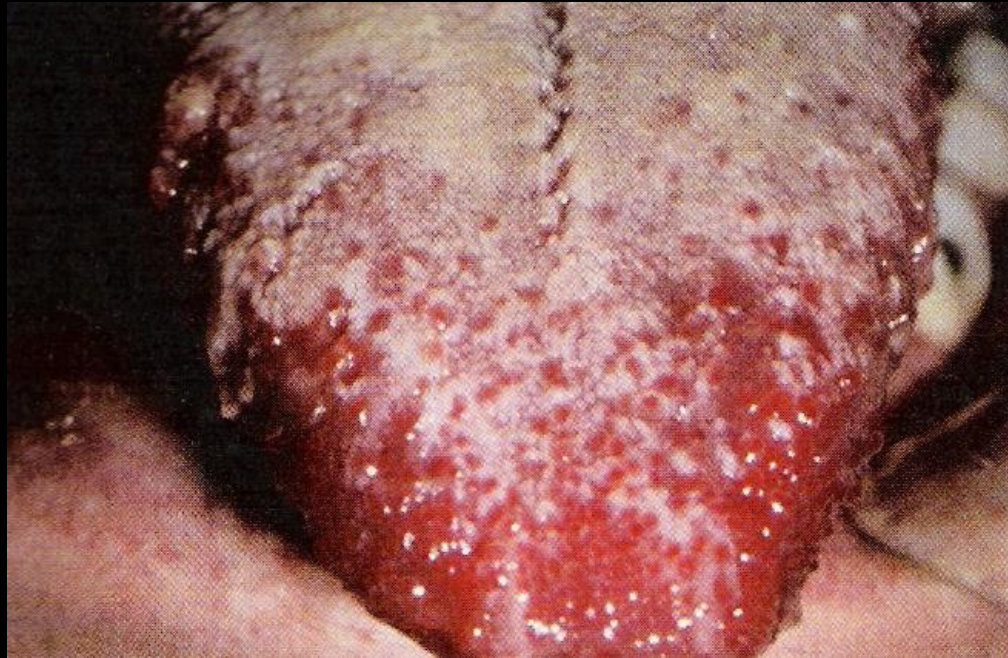
- The characteristic diffuse, bright scarlet skin rash appears on the second or third day of illness. This rash is a result of the toxic injury to the vascular endothelium which produces dilatation of the small blood vessels and consequent hyperemia.
- The rash typically begins first on the upper trunk, spreading to involve extremities but sparing the palms and soles.
- Small papules of normal color erupt through these rashes giving a characteristic 'sand paper' feel to the skin.

- This rash that is particularly prominent in the areas of skin folds is called '**Pasta lines.**' The rash subsides after six or seven days followed by the desquamation of palms and soles. The color of the rash varies from scarlet to dusky red.

# Oral Manifestations

- It referred as stomatitis scarlatina. The mucosa of the palate, may appear congested and may have petechiae scattered on the soft palate. The palate and the throat is often fiery red. The tonsils and faucial pillars are usually swollen and sometimes covered with grayish exudates

- More important are the changes occurring in the tongue. Early tongue exhibits a white coating, and the fungiform papillae are edematous and hyperemic, projecting above the surface as small red small red knobs. Described clinically as a 'strawberry tongue' or 'white strawberry tongue.' The coating of the tongue is soon lost; becomes deep red, glistening and smooth except for the swollen, hyperemic papillae. Termed the 'raspberry tongue' or 'red strawberry tongue.'



**‘Scarlet fever** white strawberry tongue-  
tongue exhibits a white coating, and the fungiform  
papillae are edematous and hyperemic, projecting  
above the surface as small red small red knobs.

- In severe cases, ulceration of the buccal mucosa and palate has been reported. Signaling the clinical termination of the disease is the desquamation of the skin, which usually occurs within a week or 10 days.

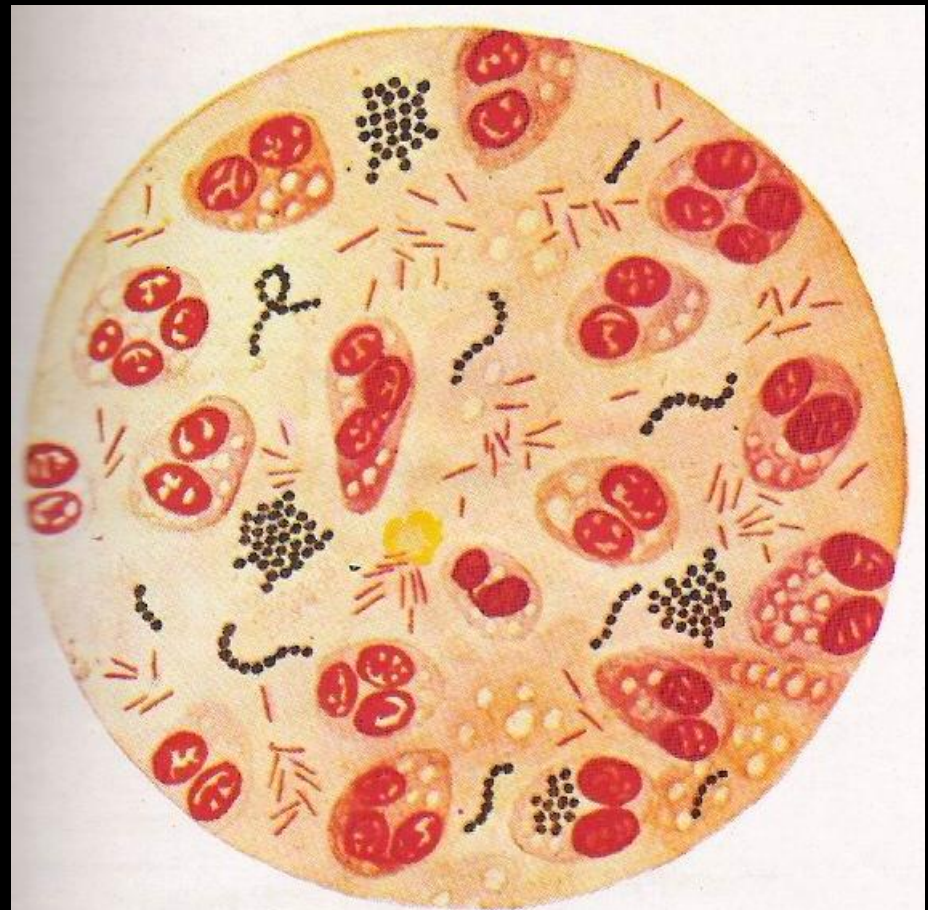
# Complications

- These may include peritonsillar abscess, rhinitis and sinusitis, otitis media and mastoiditis, meningitis, pneumonia, glomerulonephritis, rheumatic fever and arthritis.

# Diagnosis

It is done by

- Gram stain
- Culture



Gram stain of a pus smear. Plate shows Gram positive violet coloured cocci in groups (staphylococci), in chains (streptococci) and pink rods (Gram negative bacilli). Pus cells show up pink stained.

# Prevention and Treatment

- The administration of antibiotics like penicillin, help in controlling possible complications.
- Local applications like mupirocin topical ointment also can be used to relieve discomfort

# Syphilis (Lues)

- Syphilis is caused by *Treponema pallidum*, a spirochete, and is characterized by episodes of active disease interrupted by the period of latency. This is a gram-positive, motile, microaerophilic spirochete.

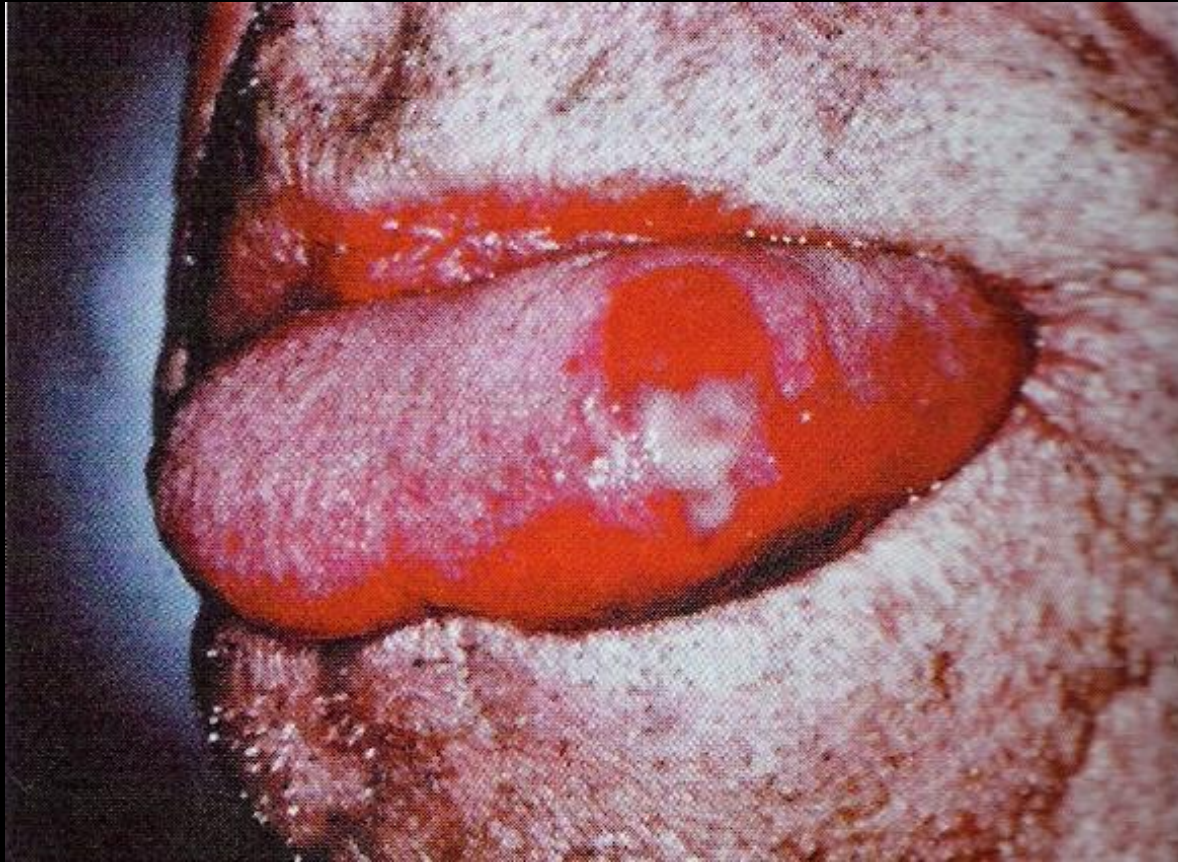
- Syphilis may be classified as  
acquired  
congenital

# Acquired Syphilis

- It is contracted primarily as a venereal disease, after sexual intercourse with an infected partner, although dentists working on infected patients have innocently acquired it.
- Acquired syphilis has primary, secondary and tertiary forms.

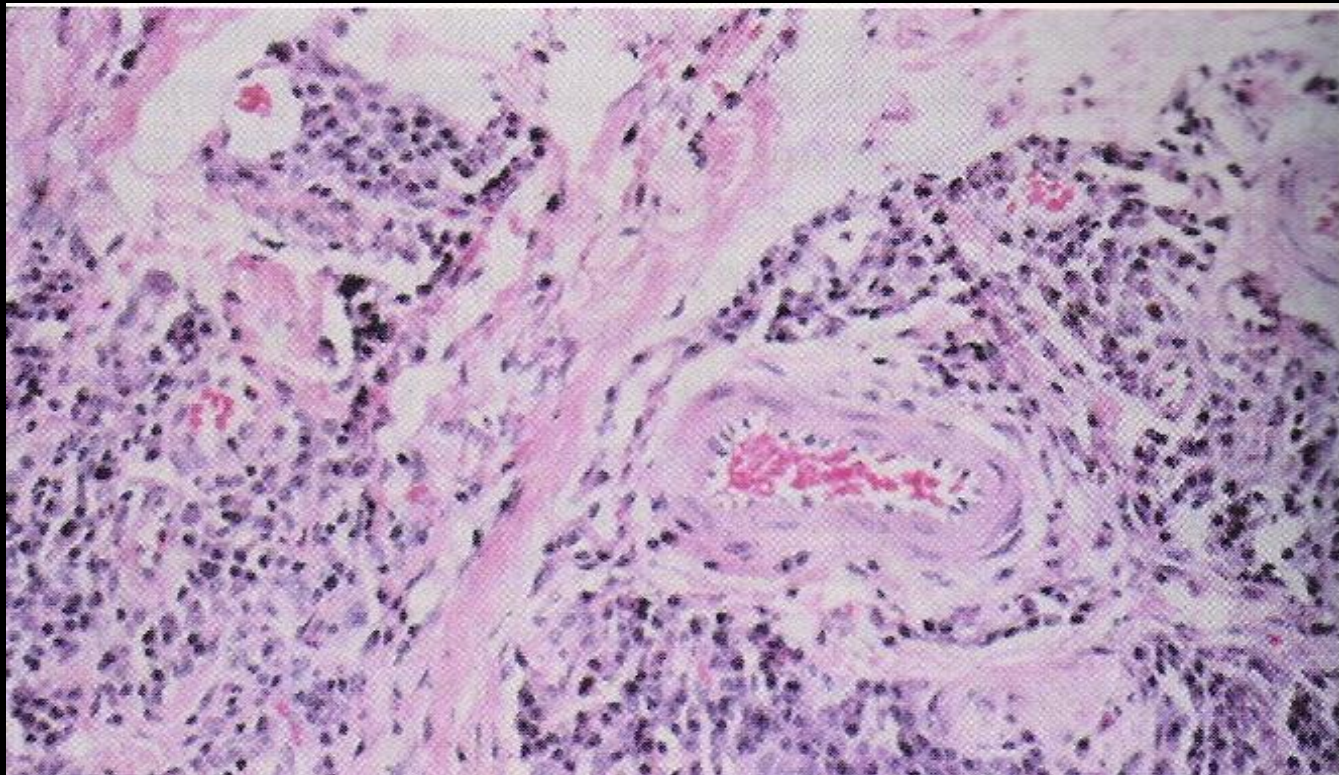
- In the primary stage, a lesion known as chancre develops at the site of inoculating approximately 3-90 days after contact with the infection.
- Chancre is solitary, most commonly occurs on the penis in the male and on the vulva or cervix in the female.
- There increase in the occurrence of extragenital syphilis as a result of an increase in altered sexual activity and occurring on the lips, tongue, palate, gingival and tonsils.

- It is an elevated, ulcerated nodule showing local indurations and producing regional lymphadenitis. Such a lesion on the lip may have a brownish, crusted appearance.
- The intra oral chancre is an ulcerated lesion covered by a grayish-white membrane, which may be painful because of secondary infection.
- Chancre spirochetes, easily demonstrable by dark field examination and are highly infectious.
- An enlarged lymph node is almost always found along the lymphatic draining of the area of the chancre.



**Syphilis:** The intra oral chancre appear as an ulcerated lesion on tongue

- The chancre appears microscopically as a superficial ulcer showing a rather intense inflammatory infiltrate. Plasma cells are particularly numerous. The microorganisms are present in the tissue and may be demonstrated by silver stain. The chancre heals in three weeks to two months.



**Syphilis:** The chancre appears microscopically as a superficial ulcer showing intense inflammatory infiltrate of lymphocytes & Plasma cells

- The secondary or metastatic stage, usually commencing about six weeks after the primary lesion
- It is characterized by diffuse eruptions of the skin and mucous membranes on the skin.
- The lesions often appear as macules or papules which are painless.



**Syphilis:** diffuse eruptions of the skin appear as macules

- The oral lesions, called 'mucous patches,' are usually multiple, painless, grayish-white plaques overlying an ulcerated surface occur most frequently on the tongue, gingival, or buccal mucosa.
- They are often ovoid or irregular in shape and are surrounded by an erythematous zone.



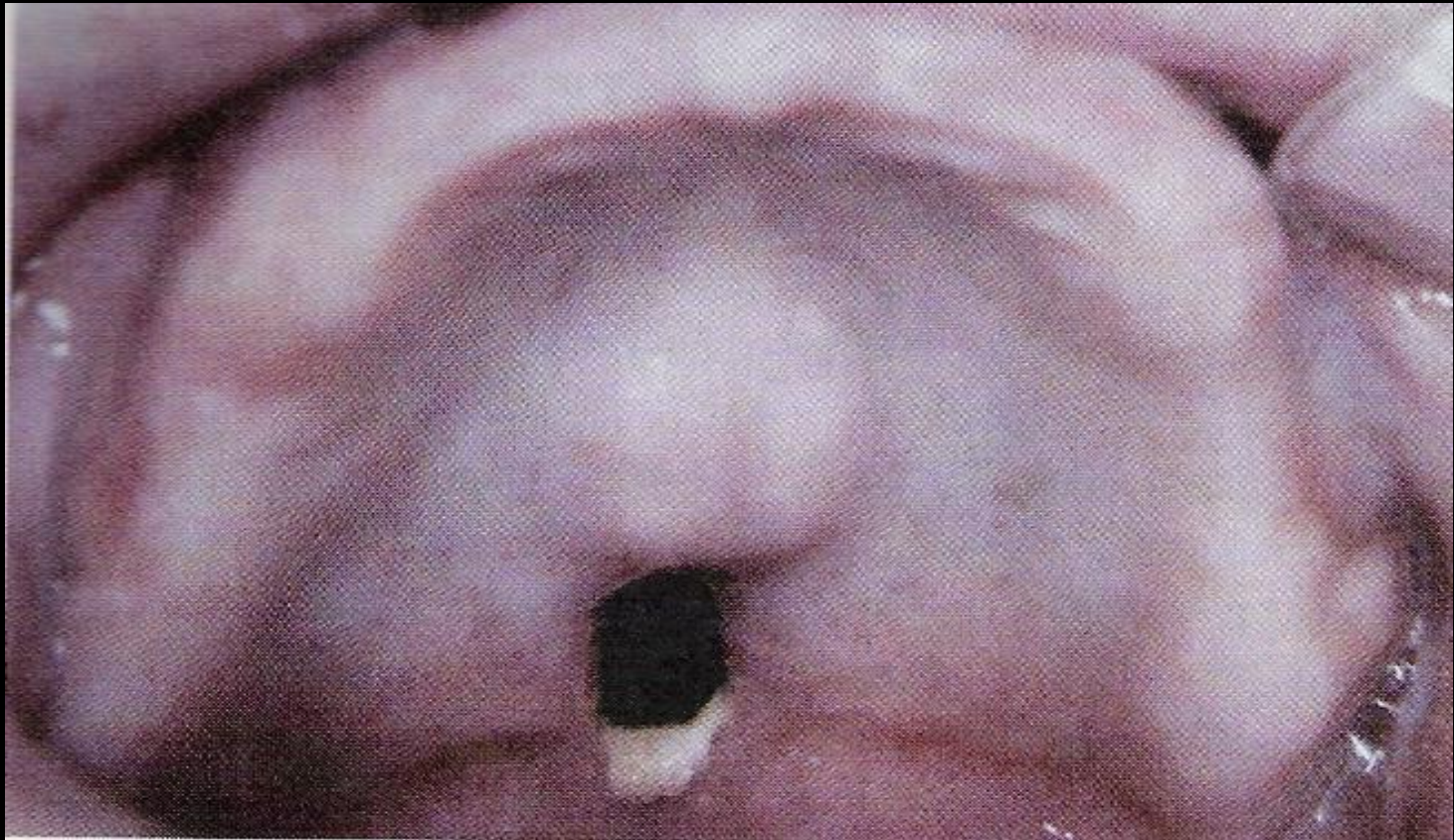
**Syphilis:** The oral lesions, called 'mucous patches,' appears as painless, grayish-white plaques overlying an ulcerated surface on the tongue.

- It is Highly infections in the secondary stage & the serologic reaction is always positive.
- Remission within a few weeks,
- Secondary syphilis can present as an explosive and widespread form known as **lues maligna**, characterized by fever, headache, and muscle pain followed by necrotic ulcerations involving the face and the scalp. It is Reported in patients with a compromised immune system, particularly acquired immune deficiency syndrome.

- After second – stage patients are enter the latent stage which may last for 1-30 years till the next stage, tertiary syphilis, develops.
- **Tertiary syphilis:** Also called late syphilis, involve chiefly the cardiovascular system, the central nervous system , noninfectious .

- The classical lesion of the tertiary syphilis is gumma.
- It is the result of hypersensitivity reaction between the host and the treponemas or their breakdown products.
- Gumma occurs most frequently in the skin and mucous membranes, liver, testes, and bone.
- It consists of a focal, granulomatous inflammatory process with central necrosis.

- The intraoral gumma most commonly involves the tongue and palate.
- It is appears as firm nodular mass in the tissue, which may subsequently ulcerate, to form a deep painless ulcer.
- Lesions of the palate cause perforation by sloughing of the necrotic mass of tissue.



**Syphilis:** The intraoral gumma involving palate and cause perforation

# Syphilitic glossitis

- Atrophic or interstitial glossitis is due to endarteritis obliterans. In syphilitic glossitis rate to undergo carcinomatous transformation as high as 30 per cent in various reported series.



**Syphilis:** Atrophic or syphilitic glossitis

# Congenital (Prenatal ) Syphilis

- it is transmitted to the offspring by an infected mother if treatment with antibiotics is begun in infected pregnant women before their fourth month of pregnancy,
- 95 per cent of the offspring of these mothers will be free of the disease.
- One-third of pregnancies result in abortion or still birth;
- rest deliver children with congenital syphilis lesions,

- congenital syphilis lesions including
- frontal bossae,
- short maxilla,
- high palatal arch,
- saddle nose,
- mulberry molars,
- , relative protuberance of mandible,
- rhagades
- Higoumenakis's sign or irregular thickening of the sternoclavicular portion of the clavicle
- saber shin

# Hutchinson's triad

- The pathognomonic features of the Hutchinson's triad;
- hypoplasia of the incisor and molar teeth,
- eighth nerve deafness, and
- interstitial keratitis



**Congenital (Prenatal ) Syphilis:**  
hypoplasia of the incisor- Hutchinson's  
incisor



**Congenital (Prenatal ) Syphilis:**  
hypoplasia of the molar teeth- mulberry  
molar

# Diagnosis

- it is made by examining the exudates of the active lesion under a dark field microscope for spirochaetes
- **Treatment** : Penicillin is the drug of choice. Erythromycin or tetracycline is used if the patient is allergic to Penicillin

# Diphtheria

- Diphtheria is an acute, life-threatening, infectious, and communicable disease of skin and mucous membrane caused by toxemic strains of corynebacterium diphtheriae.
- It is characterized by local inflammation and the formation of a grayish adherent pseudomembrane, which bleeds on removal.
- It is a disease of children. It is transmitted mainly by respiratory droplets, direct skin contact and from the skin to the respiratory tract through hands.

# Pathogenesis

- Diphtheria is, in fact, toxemia since the bacillus remaining at the site of entry multiplies and liberates toxins.
- These toxins induce initial edema and hyperaemia followed by epithelial necrosis and acute inflammation.
- Coagulation of the fibrin and purulent exudates produce a **pseudo membrane** consists of dead cells, leukocytes, erythrocytes, and a bacterium.
- Systemically the toxin produces myocarditis. Neuritis, and focal necrosis in various organs including kidneys, liver, and adrenal glands.

# Clinical Features

- The incubation periods for respiratory diphtheria are two to five days.
- Various clinical types of diphtheria, classified by the location of the pseudomembrane are tonsillar, pharyngeal, laryngeal, tracheal, nasal, conjunctival, cutaneous, and genital

- There may be swelling of the neck (bull neck) and tender enlargement of the lymph nodes.
- Onset is gradual. It manifests as fever, sore throat, weakness, dysphagia, headache and change of voice.
- Toxic patients develop restlessness, pallor, tachycardia and rapidly progressed to vascular collapse.

- Initial findings include erythema of the posterior pharyngeal wall followed by white or gray spots that coalesce to form a thin veil-like membrane, which thickens and becomes gray.
- The larynx and trachea may be involved which manifests as hoarseness of voice, respiratory stridor, and dyspnea may progress to severe respiratory obstruction and death

# Oral Manifestations

- **‘Diphtheritic membrane’** is grayish-green, thick fibrinous, gelatinous – appearing exudates. It tends to be adherent and leaves a bleeding surface if stripped away. The membrane is asymmetric and extends to involve the tonsil, soft palate and tongue, lips, gingival, buccal mucosa, and site of erupting teeth. Its advancing border is reddened and bleeding occurs on scraping the membrane.

- The submandibular and anterior cervical nodes are enlarged with soft tissue edema.
- The soft palate may become temporarily paralyzed, usually during the third to fifth weeks of the disease. These patients have a peculiar nasal twang, and may exhibit nasal regurgitation of liquids during drinking

# Complications

- Myocarditis
- polyneuritis,
- Kidney lesions Particularly acute interstitial nephritis,
- obstruction of the airway.
- Acute circulatory failure,
- postdiphtheria paralysis,
- pneumonia,
- bleeding otitis media

# Diagnosis

- It is based on clinical signs and symptoms but definite diagnosis is based on the isolation of organisms from the affected sites.

Various media for isolation are

- Pai agar
- cystine-tellurite agar
- special stains like Albert's stain, Ponder's stain or Neissers stains are used to demonstrate metachromatiic granules of bacterium.

Corny bacterium  
diphtheriae appears  
as dumbbell shaped  
bacilli arranged in  
Chinese letter form



# Prevention and Treatment

- **It is Prevented by** prophylactic active immunization with diphtheria toxoid.
- The administration of antibiotics like penicillin, help in controlling possible complications.

# Leprosy

- Leprosy is a chronic granulomatous infection caused by *Mycobacterium leprae*. The disease is only slightly contagious. It mainly affects skin, peripheral nerves, the upper respiratory tract, eyes. And testes, but also affects muscles. Bones, and joints when untreated, it results in characteristic deformities.

# Etiology

- *M. leprae* is an obligate intracellular Gram-positive, acid-fast bacillus.
- It is the only bacteria to infect peripheral nerve. It is unique in exhibiting dopa oxidase activity and acid fastness.
- It grows best in cooler tissues like skin, peripheral nerves, upper respiratory tract, Anterior chamber of the eye, and testes.
- Leprosy has a bimodal age distribution with peaks at 10-14 and 35-44 years.
- Mode of infection is not known but spread could be through nasal secretion.

# Pathogenesis

- Most people develop a sub clinical infection and very few develop infection
- Once infected, both cell mediated and humoral responses are elicited by Lipoarabinomannan, a component of the cell membrane , induces immune suppression by inhibiting the interferon gamma mediated activation of macrophages.
- The bacteria are taken by histiocytes in the skin and Schwann cells in the nerves.

- The clinical spectrum and ultimate outcome of disease depends upon the intensity of specific cell mediated immunity.
- Individuals prone to tuberculoid type have an intense cell mediated immune response and low bacillary load, specific cell-mediated immune response and a high bacillary load.

# Clinical Features

- Leprosy manifests in two polar forms, namely, tuberculoid type and lepromatous type. Between these two the borderline and indeterminate forms occur, General features of leprosy are hypopigmented patches, partial or total loss of cutaneous sensation in the affected areas.

- The tuberculoid lesions are characterized by single or multiple macular, erythematous eruptions, with dermal nerve and peripheral nerve trunk involvement resulting in the loss of sensation, often accompanied by the loss of sweating of the affected skin.
- The lepromatous lesions develop as early erythematous macules or papules that subsequently lead to progressive thickening of the skin and characteristic nodules



Leprosy: Multiple characteristic thickened nodules of the skin

- Facial paralysis occurs due to nerve involvement features of advanced disease are nodules or lump in skin of the face and ears. Plantar ulcers, loss of fingers and toes, nasal depression, foot drop, claw toe and others. Disease is a crippling and disfiguring one, it runs a chronic course and seldom causes sudden death.

# Oral Manifestations

- Small tumor like masses called lepromas, develop on the tongue, lips or hard palate, these nodules show a tendency to break down and ulcerate.
- Gingival hyperplasia with loosening of the teeth .

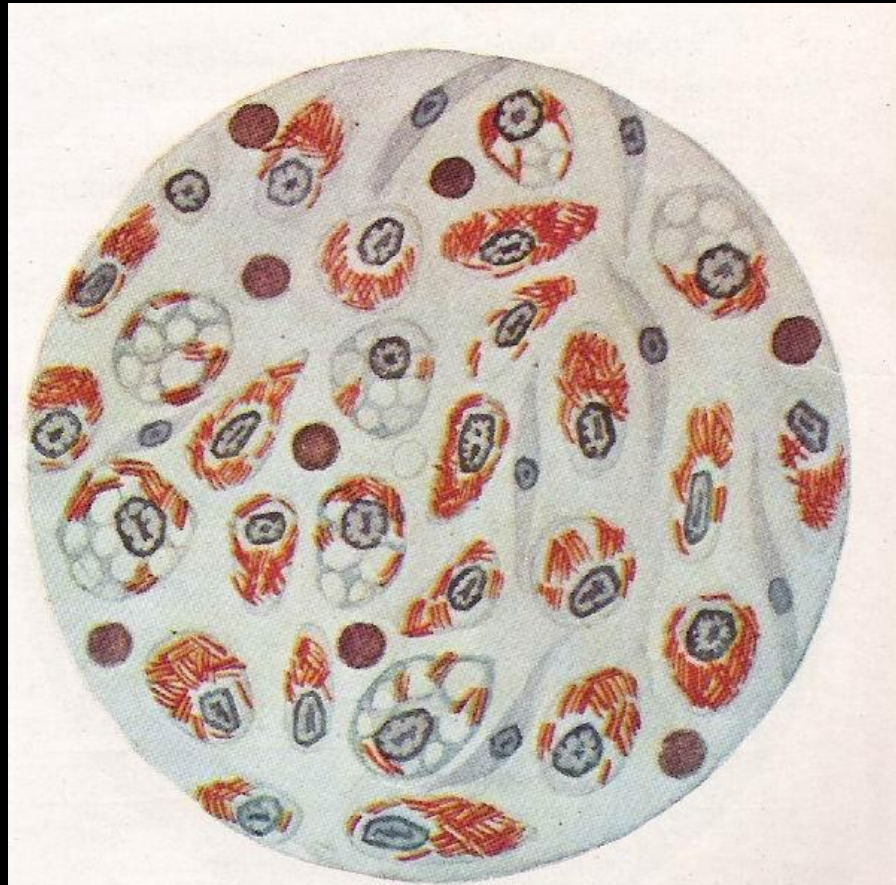
# Histological Features

- The typical granulomatous nodule shows collections of epithelioid histiocytes and lymphocytes in a fibrous stroma, Langhans type giant cells are variably present. Sheets of lymphocytes with vacuolated macrophages called lepra cells are scattered throughout the lesions. In tuberculoid pattern, there is a paucity of organisms and lepromatous type where there is an abundance of organisms.

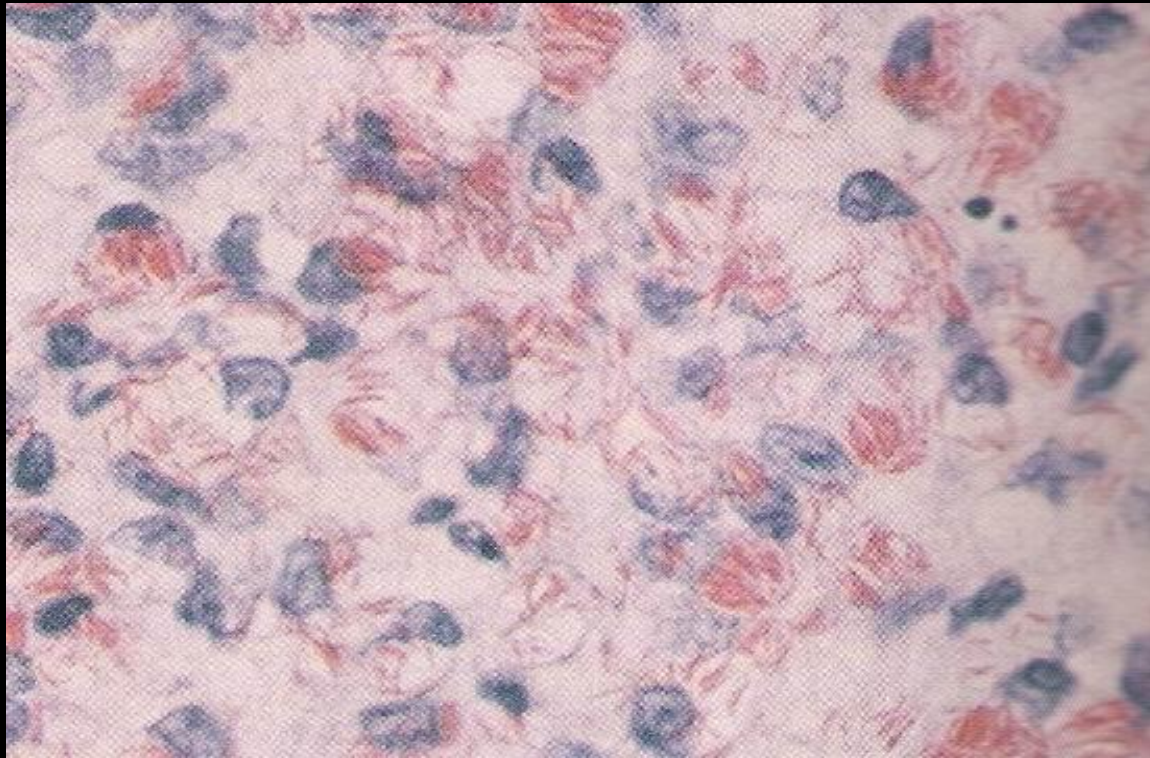
# Diagnosis

- Culture is difficult
- It is grown in the footpads of mice and armadillos.
- Nasal smears and scrapings stained with modified Ziehl-Nielsen method to detect lepra bacilli at a concentration greater than  $10^{11}$  gm of tissue.
- Other investigations are skin biopsy, nerve biopsy , and foot culture histamine test.

Smear stained with  
modified Ziehl-  
Nielsen method to  
detect lepra bacilli



*M. leprae* : Ziehl-Neelsen stain of section of lepra nodule showing lepra cells and characteristic arrangement of lepra bacilli.



Leprosy: skin scrapings stained with modified Ziehl-Nielsen method to detect lepra bacilli

# Treatment

- Rifamicin and Dapsone for six months in case of tuberculoid type
- rifamicin and Dapsone along with Clofazimine in case of lepromatous type is usually advocated.

# Botryomycosis

- Botryomycosis is a granulomatous disease . There is some confusion as to the actual causative organism in this disease. The Actinobacillus is often characterized as an 'associate' organism with the actinomycetes, but many workers believe that a number of common bacteria such as Staphylococcus, Streptococcus, Escherichia, pseudomonas serve as etiologic agents of the disease.

# Clinical Features

- it is a Localized granulomatous infection of the skin or mucosa. It may disseminate, involving the liver, lungs or kidneys. The significance of this disease lies in the fact that the localized infection may closely mimic actinomycosis by producing a chronic granulomatous mass with multiple ulcers and sinuses.

# Histologic Features

- It is characterized by the presence of suppurative foci which contain grains or granules these granules may be indistinguishable from those of actinomycosis these are eosinophilic and PAS – negative and negative to methenamine silver. the eosinophilic , peripheral club formations typical of actinomycetes are usually not identifiable in this disease

# Treatment

- The pathogenesis may be related more to a modified host resistance or tissue hypersensitivity than to a specific microorganism, therefore, treatment is nonspecific.

# Tularemia (Rabbit fever)

- It is caused by the gram-negative bacillus. *Francisella tularensis*, also known as *Bacterium tularensis* and *Pasteurella tularensis*. This infection is contracted through contact with infected rodents and rabbits.

# Clinical Features

- Tularemia may be classified into several types, and cutaneous, ophthalmic , Pleuro-pulmonary , oral , and abdominal forms.
- After a variable incubation period of up to seven days, the patient usually suffers a sudden headache, nausea, vomiting, chills, and fever.
- A single cut or sore on the skin develops into a suppurative ulcer.
- The lymphatic vessels become swollen and painful and the lymph nodes remarkably enlarged. It is Called ulceroglandular tularemia.
- Conjunctivitis, pneumonia and pleuritis are complications.

# Oral Manifestations

- necrotic ulcers of the oral mucosa or pharynx, usually accompanied by severe pain.
- A generalized stomatitis & regional lymphadenitis develop.
- Single nodular masses eventually developing into abscesses have also been described,

# Treatment

- Antibiotics
- Streptomycin
- tetracycline

# Melioidosis

- It is Caused by the bacillus *Pseudomonas pseudomallei*, an aerobic, gram negative nonacid-fast, and rod-shaped bacilli.
- The causative organism is abundant in soil and stagnant water where the disease occurs. It is believed that most human infections occur through contamination of skin abrasions by this soil or water.

# Clinical Features

- There are two forms of the disease: acute and chronic
- The acute form: the patients rapidly develop a high fever, evidence of acute pulmonary infection, diarrhea, and hemoptysis .
- Widespread visceral involvement as a result of hematogenous dissemination of microorganisms occur.
- The chronic form develops in patients who have survived the acute form. It is of granulomatous type, characterized by multiple, small, nonspecific abscesses occurring subcutaneously or in the viscera, lymph nodes or bones, which often develop draining sinus tracts.

# Treatment

- Incision and drainage of abscess,
- massive antibiotic therapy.
- tetracycline alone or in combination with Chloramphenica

# Tetanus (Lock – Jaw)

- Tetanus is an acute infection of the nervous system characterized by intense activity of motor neurons and resulting in severe muscle spasms.
- It is caused by the exotoxin of the anaerobic gram-positive bacillus *Clostridium tetani*, which acts at the synapse of the interneurons of inhibitory pathways and motor neurons to produce blockade of spinal inhibition.
- The organisms can enter the body through even the most trivial injury.

# Epidemiology

- It is common areas where the soil is cultivated, rural areas,
- it is more common in males than females.
- It usually occurs after acute injuries such as laceration or abrasion. It may be acquired during farming, gardening.
- It is associated with burns, frostbite, middle ear infection, surgery, abortion, and childbirth
- Neonatal tetanus is fatal.

# Pathogenesis

- Under the suitable anaerobic conditions with low oxidation-reduction potential spores of the *C. Tetani* germinate and produce toxins (tetanospasmin) in the wounds.
- Once released it binds to the peripheral motor nerve terminal, enters the axon and is transported to the nerve cell body in the brainstem and spinal cord by the toxins migrates across the synapse to pre synaptic terminate.
- There it block the release of glycine and gamma-aminobutyric acid (GABA). Once the inhibitory action is diminished, the resting-fixing rate of locomotor neuron increases, producing rigidity.

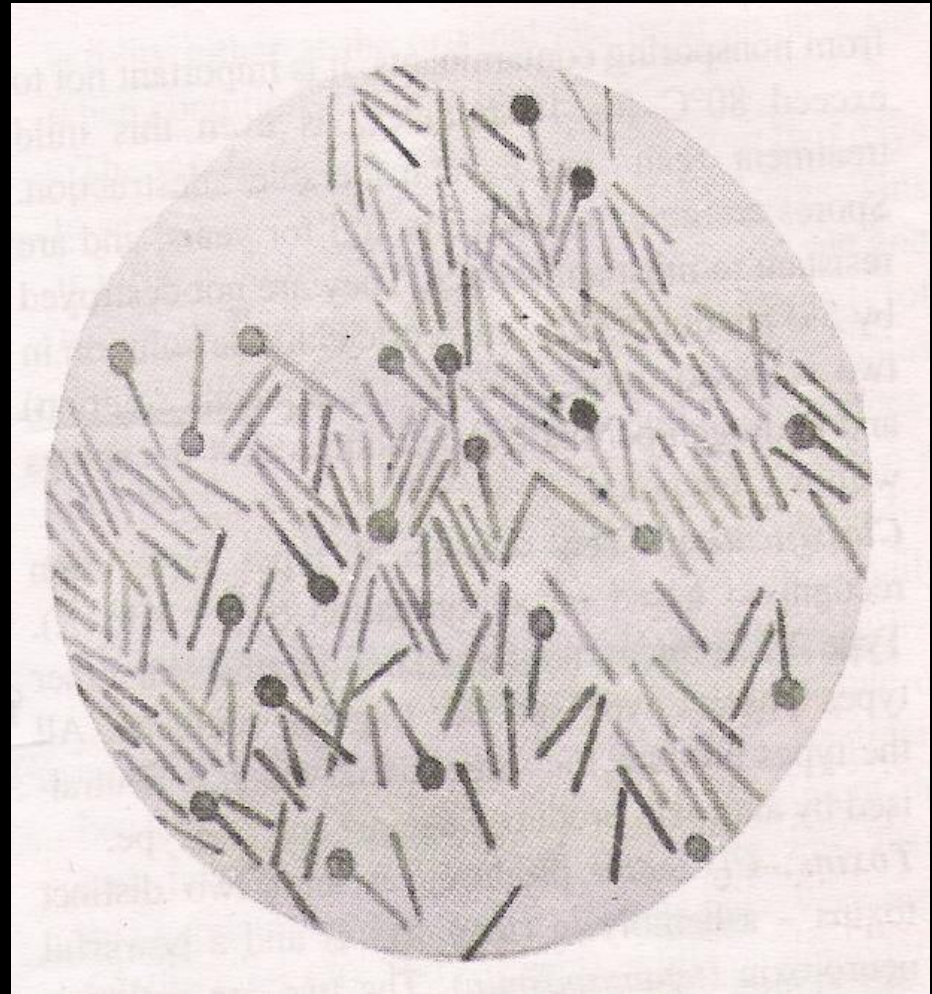
# Clinical Features

- The incubation period is 6-10 days.
- Generalized tetanus is characterized by lock jaw or trismus due to spasm of masseter, it is a initial symptom
- Dysphagia, stiffness or pain in the neck, shoulder or back muscles appear concurrently.
- Marked rigidity interferes with the movement of chest and impairs cough and swallowing reflexes.

- Laryngeal spasms may lead to asphyxia. Rigid abdomen and stiff proximal limb muscles.
- Sustained contraction of facial muscles results in a grimace or sneer called as **Risus scardonicus**. It Occur repetitively or spontaneously or provoked by slight stimulation
- **Local tetanus** :- Manifests as spasm of muscles near the wound and Cephalic tetanus characterized by trismus and facial palsy is rare one.

# Diagnosis

- Clostridium tetani appear as drumstick bacilli.



# Treatment

- General measures as remove spores at the site of the wound, prevent toxin production,
- Neutralize unbound toxins by antitoxin :- Human tetanus immunoglobulin (TIG) 3000-6000 units IM individual doses is injected to neutralize circulating toxin will prevent muscular spasm.
- Sedation,
- airway maintained,
- nutrition should be maintained
- Antibiotics should be given to eradicate organisms. Penicillin 10-12 million units IV for 10 days , metronidazole 1 gm every 12 hours should be administered.

# Prophylaxis

- Wound debridement and booster doses of TT.
- **In unimmunized Individuals ATS 1500 units of TIG 250 units should be given**

# Gonorrhoea

- a venereal disease affecting the male and female genitourinary tract and is transmitted by sexual intercourse.
- It is an infection of epithelium and commonly manifests as cervicitis urethritis, prostatitis and conjunctivitis.
- It is caused by *Neisseria gonorrhoea*, a gram-negative, (diplococci) the common age group affected is 15-29 years.

# Clinical Features

- The incubation period is one to five days.
- Infection in males results in acute urethritis, dysuria and urethral discharge of a purulent nature. Some patients may have mucoid discharge.
- It may lead to epididymitis, chronic prostatitis, balanitis and posterior urethritis.
- In females, it manifests as cervicitis with candidal or trichomonal vaginitis. Symptoms include vaginal discharge, discomfort, and dysuria.

# Oral Manifestations

- It occurs as a result of oral-genital contact or inoculation through infected hands.
- The lips may develop acute painful ulceration.
- the gingival may become erythematous, with or without necrosis;
- the tongue may present red, dry ulcerations or become glazed and swollen with painful erosions with similar lesions on the buccal mucosa and palate.
- Gonococcal pharyngitis and tonsillitis appear as vesicles or ulcers with a gray or white pseudomembrane with Fever and regional lymphadenopathy.

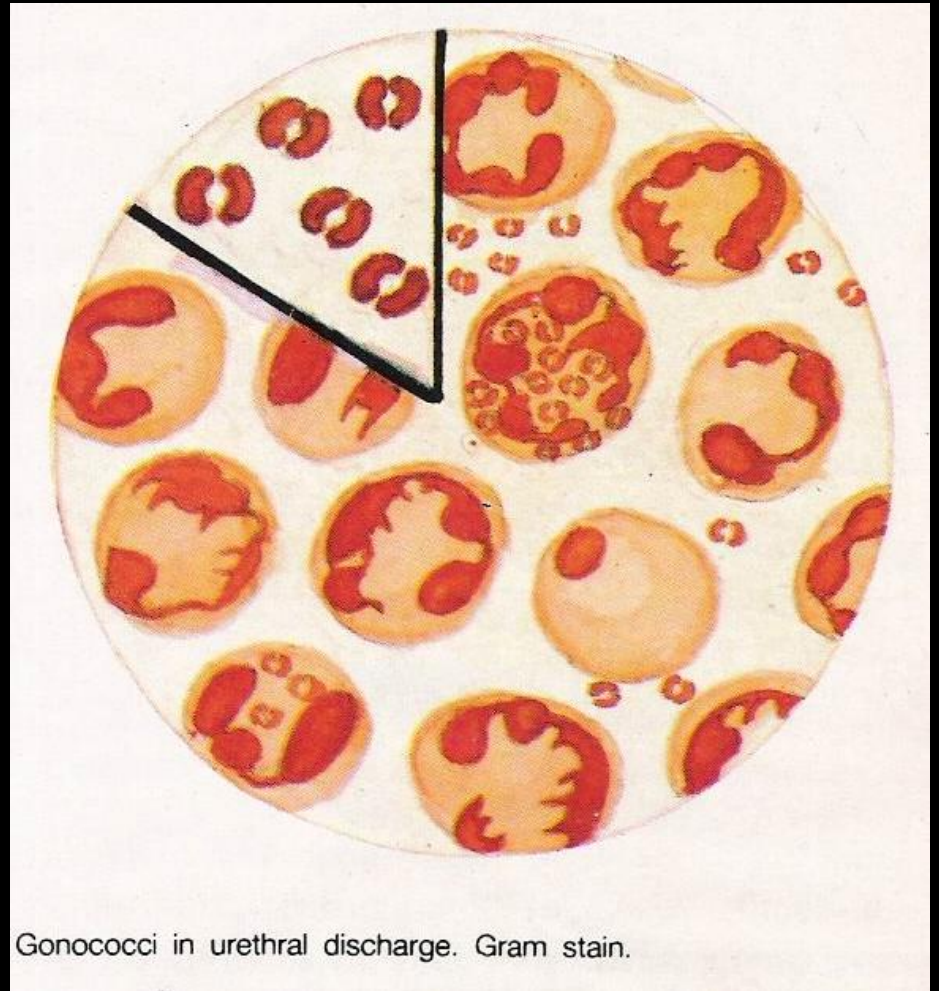
# Complications

- Epididymitis ,
- salpingitis ,
- pelvic inflammatory disease ,
- bartholinitis.
- Dermatitis
- arthritis or arthralgia .

# Diagnosis

- Gram staining of urethral discharge.
- Special media used for gonococcus
- the Thayer Martin media or
- Stuart media or
- armies media.

- Gram staining of urethral discharge show gram negative diplococci



Gonococci in urethral discharge. Gram stain.

# Treatment

- Antibiotics and other preventive measures

# GRANULOMA INGUINALE

- It is a Chronic, infectious, granulomatous disease caused by formerly designated as *Donovania granulomatis* and popularly called Donovan bodies, but now carrying the name *Calymmatobacterium granulomatis*. It is venereal disease,

# Clinical Features

- The primary lesions, of granuloma appear on the external genitalia, anus, and in the inguinal region as papules or nodules, which ulcerate to form clean, granular lesions with rolled margins and occasionally, verrucous, necrotic, or cicatricial lesions have been reported.
- Inguinal ulceration arises initially as a fluctuant swelling known as a pseudobubo.

# Oral Manifestations

- It is most common extragenital form of granuloma inguinale.
- It is Classification into one of three types: ulcerative, exuberant, and cicatricial.
- There may be painful ulcerated lesions, sometimes bleeding, may appear as proliferative granular masses, with intact epithelial covering.
- Scar formation extensive, present in areas such as the cheek or lip, limit mouth opening

# Histologic Features

- one of granulation tissue with infiltration of polymorphonuclear leukocytes and plasma cells.
- Marked overlying pseudoepitheliomatous hyperplasia present.
- Pathognomonic of the disease is the presence of large mononuclear phagocytes, each containing tiny intracytoplasmic cysts within which are found the Donovan bodies. These bodies are tiny, elongated, basophilic and argyrophilic rods and are present in profuse numbers within the macrophages.

# Treatment

- Tetracycline,
- chloramphenicol,
- streptomycin,
- gentamycin
- and cotrimaxazole are effective

# Rhinoscleroma

- it is Caused by the bacillus *Klebsiella rhinoscleromatis*, a gram-negative bacillus.
- The mode of transmission is through infected nasal exudates. the granulomatous, nodular lesions that are found chiefly in the upper respiratory tract, often originating in the nose,
- the proliferative nasal masses may produce 'Hebra nose,'

# Oral Manifestations

- Oral lesions appearing as proliferative granulomas, impairment of the sensation of taste, anesthesia of the soft palate and enlargement of the uvula and upper lip are described.

# Cat-scratch Disease

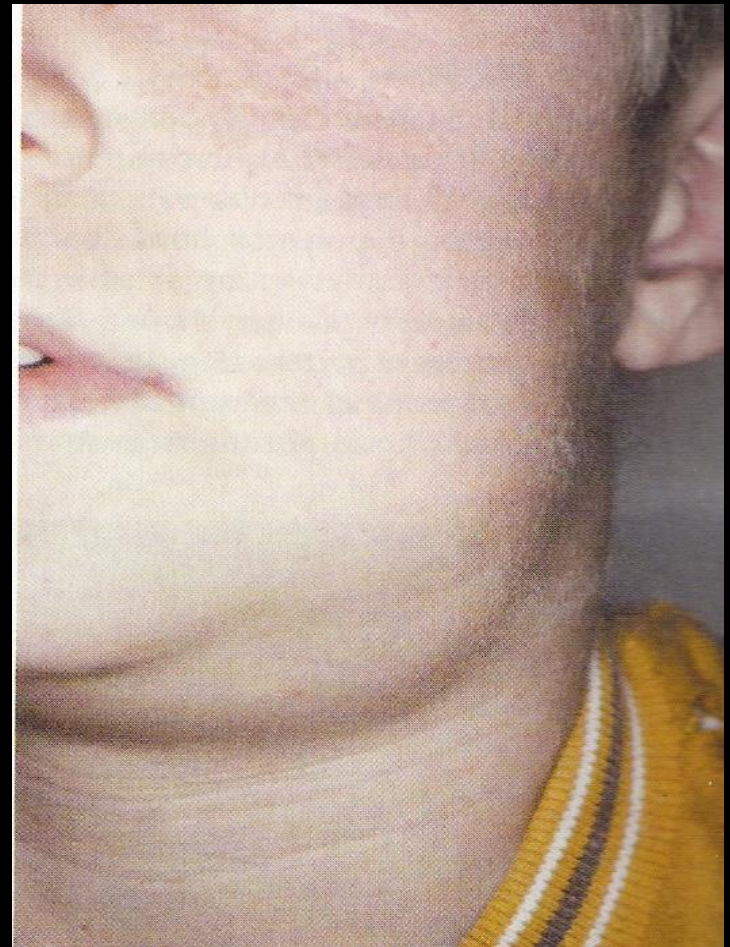
- The causative organism is *Bartonella henselae*, a gram-negative bacillus.
- **Clinical Features.**
- This disease, predominantly in children and young adults, is arising after a traumatic break in the skin due to the scratch or bite of the household cat.

- The primary lesion is a papule, pustule or vesicle, which develops at the site of the injury.
- Within one to three weeks later, a regional lymphadenitis without lymphangitis develops.
- The cat serves carrier of the disease.
- The nodes are painful and the overlying skin may be inflamed. This lymphadenopathy may persist for one to six months
- there may be low-grade fever, headache, chills, nausea, malaise, or even abdominal pain.
- Parotid swelling, conjunctivitis also occurs.



**Cat-scratch Disease:** papule develops at the site of the injury.

**Cat-scratch  
Disease:  
Showing  
lymphadenopathy**



# Diagnosis

- It is established by a positive intradermal skin test of antigen from a patient with proved cat – scratch disease.
- Indirect immunofluorescent antibody assay is used for detecting antibodies to *Bartonella henselae*.

# Histologic Features

- Involved lymph nodes manifest reticuloendothelial hyperplasia;
- later destruction of lymph node architecture with focal granulomas, suppuration, and necrosis.

# Treatment & Prognosis

- the disease is self- limiting no treatment require.

# Pyogenic Granuloma

- it originates as a response of the tissues to a nonspecific infection. It is a tumor-like growth that is considered an exaggerated, conditioned response to minor trauma.

# Etiology

- The pyogenic granuloma arises as a result of some minor trauma to the tissues, which provides a pathway for the invasion of nonspecific types of microorganisms.
- The tissues respond in characteristic manner to these organisms of low virulence by the overzealous proliferation of a vascular type of connective tissue.

- Some investigators think that penetration of microorganisms into the tissues does not occur or is negligible, since microorganisms can seldom be demonstrated deep in the lesion with appropriate bacterial staining techniques.
- The surface of the pyogenic granuloma, especially in areas of ulceration have typical colonies of saprophytic organisms.

- This tissue response follows the well-known biologic principle that any irritant applied to living tissue may act either as a stimulus or as a destructive agent, or as both.
- In the formation of pyogenic granuloma, destruction of the fixed tissue cells is slight, but the stimulus to proliferation of the vascular endothelium persists.

# Clinical Features

- The arises most frequently on the gingiva.
- It may also occur on the lips, tongue and buccal mucosa
- lesion is usually an elevated, pedunculated or sessile, vascular mass with a smooth, lobulated, or even a warty surface, which commonly is ulcerated and shows a tendency for hemorrhage either spontaneously or upon slight trauma.



**Pyogenic Granuloma:** lesion appears as an elevated, pedunculated, vascular mass with a smooth, lobulated surface on gingiva



**Pyogenic Granuloma:** lesion appears as sessile mass with a smooth, surface on tongue

- The lesions are more common in the facial aspect than the lingual or palatal aspects.
- It is deep red or reddish purple, depending upon its vascularity, painless, and rather soft in consistency.
- It may develop rapidly, reach full size and then remain static for an indefinite period.
- The lesion is more common in the maxillary anterior region than the posterior region.

- The lesions vary in size, ranging from a few millimeters to a centimeter.
- 60 per cent lesions occurred in persons between 11 and 40 years of age, and that over 70 per cent involved females.
- Female predilection is because of vascular effects of female hormones.

# Histologic Features

- The histological appearance of the pyogenic granuloma is similar to that of granulation tissue except that it is exuberant and is usually well localized .
- The overlying epithelium, if present, is generally thin and atrophic, but may be hyperplasic.
- If the lesion is ulcerated, it shows a fibrinous exudates of varying thickness over the surface.

- Occurrence of vast numbers of endothelium-lined vascular spaces and the extreme proliferation of fibroblasts and budding endothelial cells,
- in addition, there is usually a moderately intense infiltration of polymorphonuclear leukocytes, lymphocytes, and plasma cells,
- the connective tissue stroma is typically delicate.

- If the lesion is not surgically excised, there is gradual obliteration of the many capillaries, and it assumes a more fibrous appearance. Both clinically and microscopically , an old lesion may resemble a fibroepithelial polyp or even a typical fibroma,

# Pregnancy tumor

- **Pregnancy tumor** is histologically identical to pyogenic granuloma of the gingiva frequently occurs during pregnancy.
- it appears about the third month of pregnancy or sometimes later, gradually increases in size and, after delivery, may or may not regress.
- If surgically removed during pregnancy, it frequently recurs.



**Pregnancy tumor**

- The pregnancy tumor is simply a pyogenic granuloma which occurs as a result of local minor trauma or irritation and in which the tissue reaction is probably intensified by the endocrine alternation occurring during pregnancy.

# Treatment

- Surgical excision is treatment of choice. The lesion occasionally recurs because it is not encapsulated.
- Scale the adjacent tooth and make certain that it is free of calculus, since the calculus may act as the irritation leading to recurrence of the lesion.

**Thank you**