Name of Unit	Infectious disease, Sexually Transmitted disease and Urinary Tract infection
Subject /Course name	Pathophysiology
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Learning Outcome of Module 05

LO	Learning Outcome	Course Outcome Code
LO 1	To understand about the various infectious diseases	BP204T.5
LO 2	To understand the Infectious Disease- Meningitis and Typhoid	BP204T.5
LO 3	To understand the Infectious Disease- Leprosy and Tuberculosis	BP204T.5
LO 4	To understand the Urinary Tract Infections	BP204T.5
LO 5	To understand the Sexually Transmitted Diseases- AIDS, Syphilis	BP204T.5
LO 6	To understand about Sexually Transmitted Diseases- Gonorrhea	BP204T.5

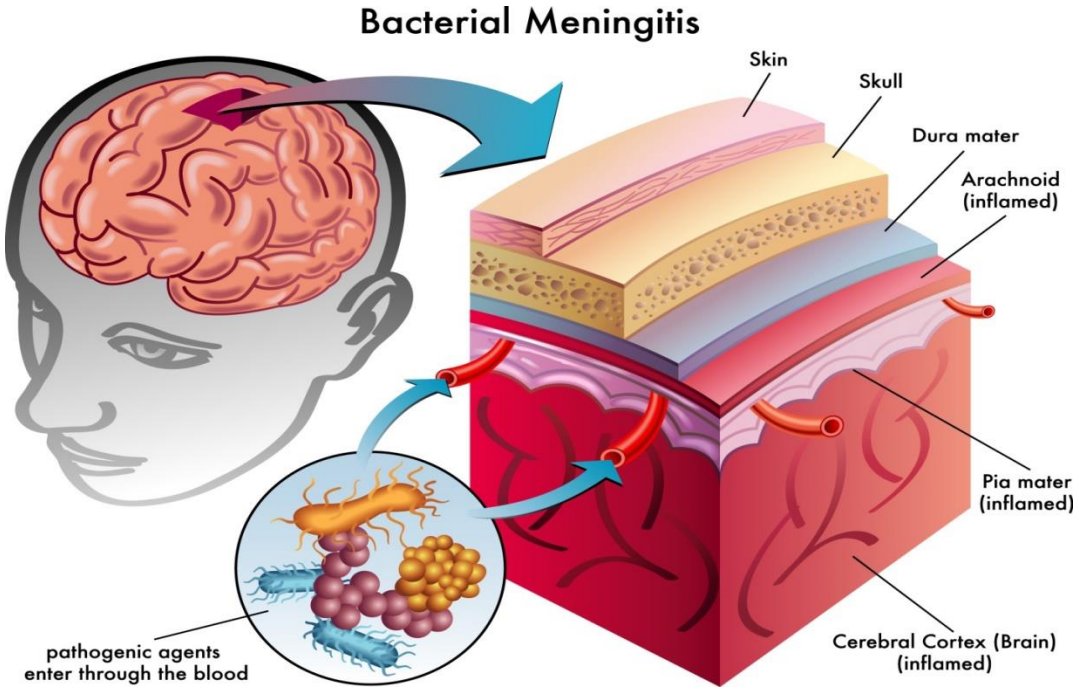
Content Table

MENINGITIS

Meningitis is an inflammation of the fluid and membranes (meninges) surrounding your brain and spinal cord.

The swelling from meningitis typically triggers signs and symptoms such as headache, fever and a stiff neck.

Most cases of meningitis in the United States are caused by a viral infection, but bacterial, parasitic and fungal infections are other causes. Some cases of meningitis improve without treatment in a few weeks. Others can be life-threatening and require emergency antibiotic treatment.



SYMPTOMS

Early meningitis symptoms may mimic the flu (influenza). Symptoms may develop over several hours or over a few days.

Possible signs and symptoms in anyone older than the age of 2 include:

- Sudden high fever
- Stiff neck
- Severe headache that seems different from normal
- Headache with nausea or vomiting
- Confusion or difficulty concentrating
- Seizures

- Sleepiness or difficulty waking
- Sensitivity to light
- No appetite or thirst
- Skin rash (sometimes, such as in meningococcal meningitis)

Newborns and infants may show these signs:

- High fever
- Constant crying
- Excessive sleepiness or irritability
- Difficulty waking from sleep
- Inactivity or sluggishness
- Not waking to eat
- Poor feeding
- Vomiting
- A bulge in the soft spot on top of a baby's head (fontanel)
- Stiffness in the body and neck
- Infants with meningitis may be difficult to comfort, and may even cry harder when held

CAUSES

Viral infections are the most common cause of meningitis, followed by bacterial infections and, rarely, fungal and parasitic infections. Because bacterial infections can be life-threatening, identifying the cause is essential.

Bacterial meningitis

Bacteria that enter the bloodstream and travel to the brain and spinal cord cause acute bacterial meningitis. But it can also occur when bacteria directly invade the meninges. This may be caused by an ear or sinus infection, a skull fracture, or — rarely — some surgeries.

Several strains of bacteria can cause acute bacterial meningitis, most commonly:

- ***Streptococcus pneumoniae (pneumococcus).***
- ***Neisseria meningitidis (meningococcus)***
- ***Haemophilus influenzae (haemophilus)***
- ***Listeria monocytogenes (listeria)***

Viral meningitis

Viral meningitis is usually mild and often clears on its own. Most cases in the United States are caused by a group of viruses known as enteroviruses, which are most common in late summer and early fall. Viruses such as herpes simplex virus, HIV, mumps virus, West Nile virus and others also can cause viral meningitis.

Fungal meningitis

Fungal meningitis is relatively uncommon in the United States. It may mimic acute bacterial meningitis. It's often contracted by breathing in fungal spores that may be found in soil, decaying wood and bird droppings. Fungal meningitis isn't contagious from person to person. Cryptococcal meningitis is a common fungal form of the disease that affects people with immune deficiencies, such as AIDS. It's life-threatening if not treated with an antifungal medication. Even with treatment, fungal meningitis may recur.

RISK FACTORS

Risk factors for meningitis include:

Skipping vaccinations. Risk rises for anyone who hasn't completed the recommended childhood or adult vaccination schedule.

Age. Most cases of viral meningitis occur in children younger than age 5. Bacterial meningitis is common in those under age 20.

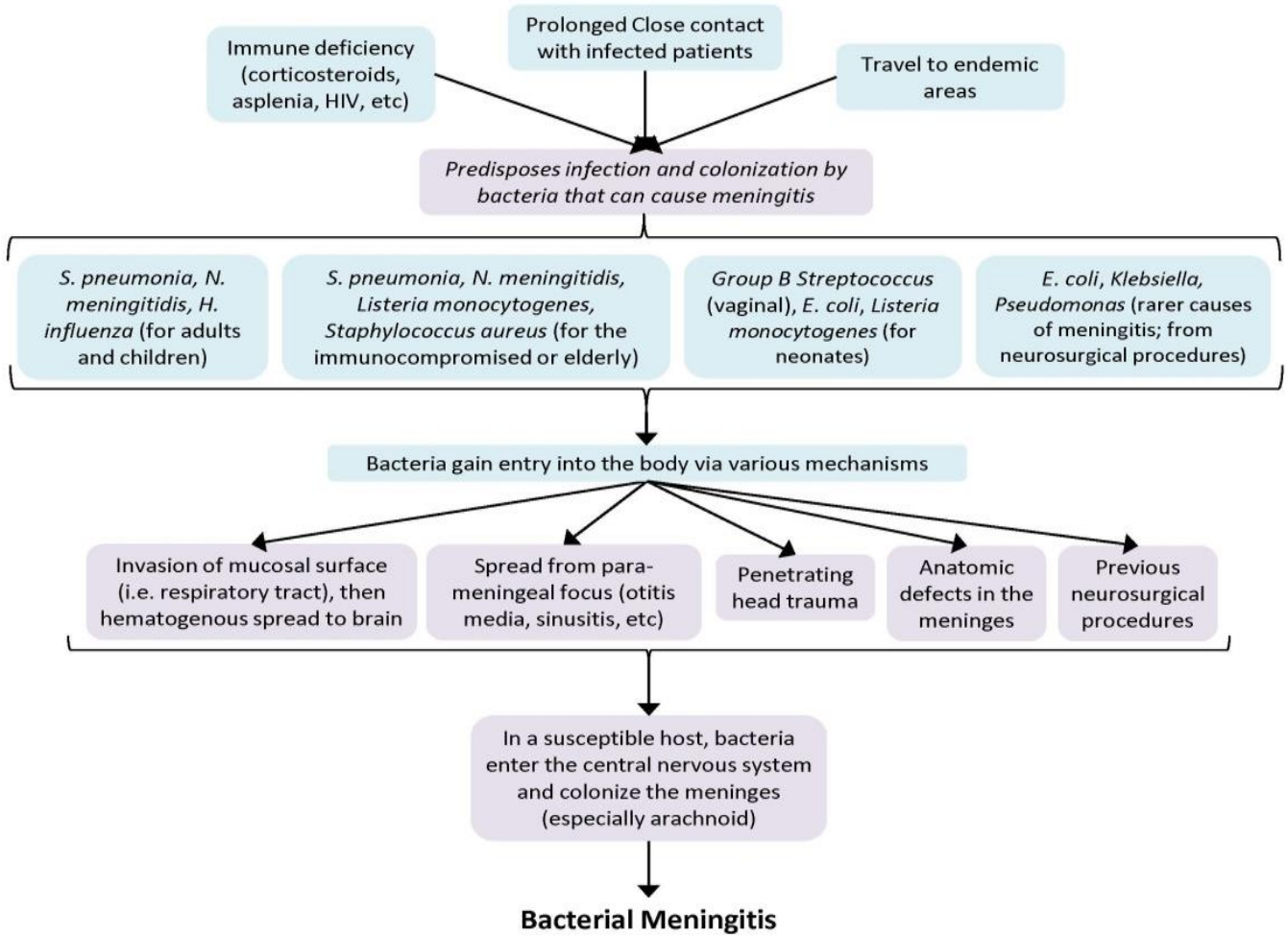
Living in a community setting. College students living in dormitories, personnel on military bases, and children in boarding schools and child care facilities are at greater risk of meningococcal meningitis. This is probably because the bacterium is spread through the respiratory route, and spreads quickly through large groups.

Pregnancy. Pregnancy increases the risk of listeriosis — an infection caused by listeria bacteria, which may also cause meningitis. Listeriosis increases the risk of miscarriage, stillbirth and premature delivery.

Compromised immune system. AIDS, alcoholism, diabetes, use of immunosuppressant drugs and other factors that affect your immune system also make you more susceptible to meningitis. Having your spleen removed also increases your risk, and anyone without a spleen should get vaccinated to minimize that risk.

PATHOPHYSIOLOGY OF MANINGITIS

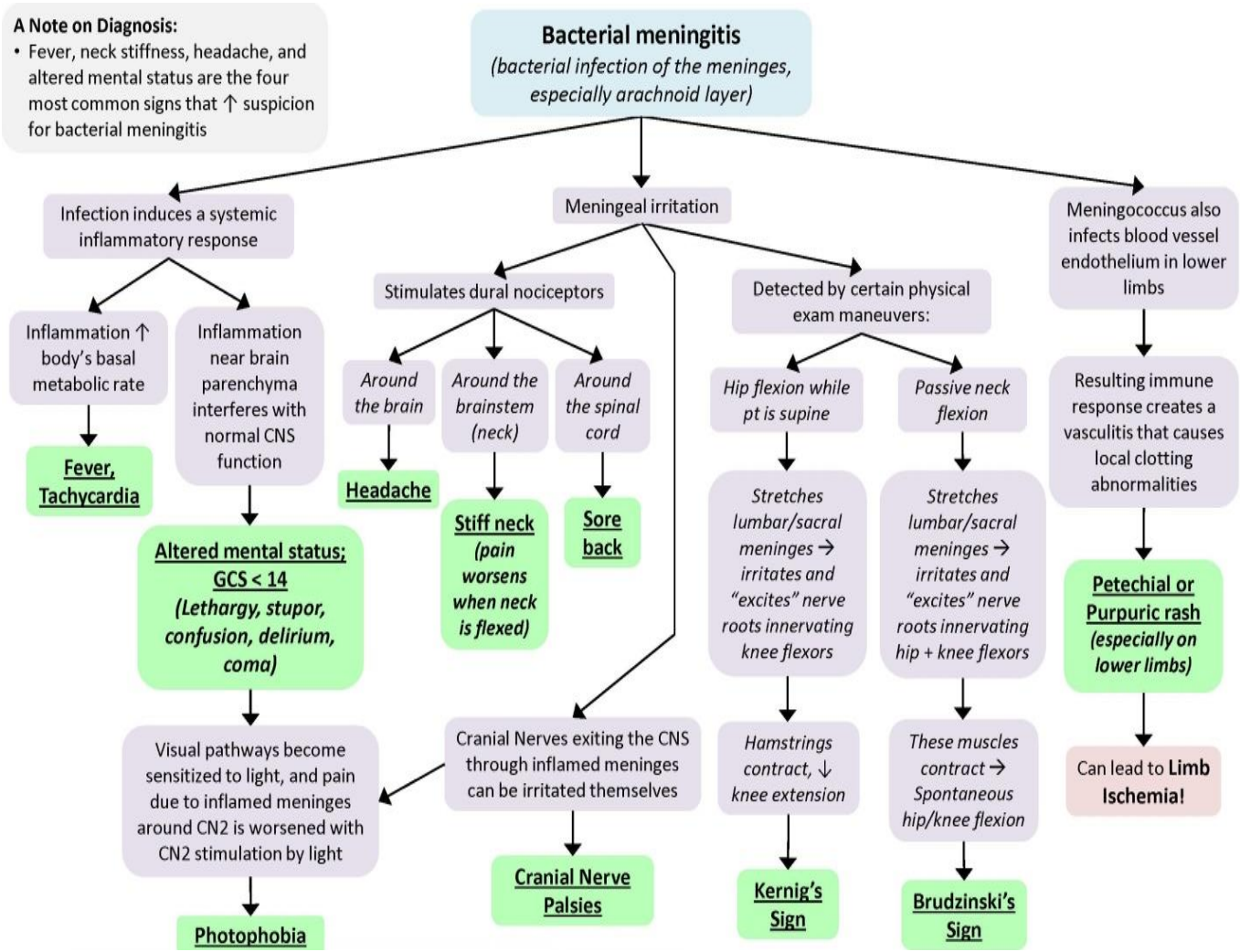
Meningitis is a disease process where the protective layers that cover the brain and spinal cord become inflamed. Meningitis can be infectious or it can be caused by injury, cancer, and other noninfectious causes. Infectious meningitis can be caused by a bacterial, viral, or fungal infection. It can also be caused by parasites or other toxins. Diagnosis of meningitis is dependent upon a physical examination, blood cultures, nose and throat swab, and CSF analysis and cultures



Bacterial Meningitis

Bacterial Meningitis is a life-threatening infection most often caused by the pathogens Meningococcus (Neisseria meningitidis) and Pneumococcus (Streptococcus pneumoniae). Infections occur primarily in adolescents and children under the age of one. The infection is spread through contaminated saliva, respiratory tract secretions and respiratory droplets. Infection occurs when these pathogens are inhaled. As can be seen in Figure 2, the bacteria will

then attach to the epithelial cells in the nasopharynx, cross the mucosal barrier and enter the blood stream. After the bacteria enter the blood stream it will travel to the cerebral blood vessels where it will cross the blood brain barrier and infect the meninges. After the bacteria crosses the blood brain barrier it will multiply rapidly and lyse in the subarachnoid space releasing bacterial endotoxins. This rapid multiplication will attract a large number neutrophils to the area where they will release inflammatory cytokines to fight the infection. This release of endotoxins and cytokines increases the permeability of the blood brain barrier causing cerebral edema and brain tissue damage. The exudate from the inflammatory response will also thicken the CSF, obstructing flow around the brain and spinal cord. This paired with edema will increase the intracranial pressure which if not corrected will lead to cerebral ischemia, necrosis and subsequent cerebral infarction.

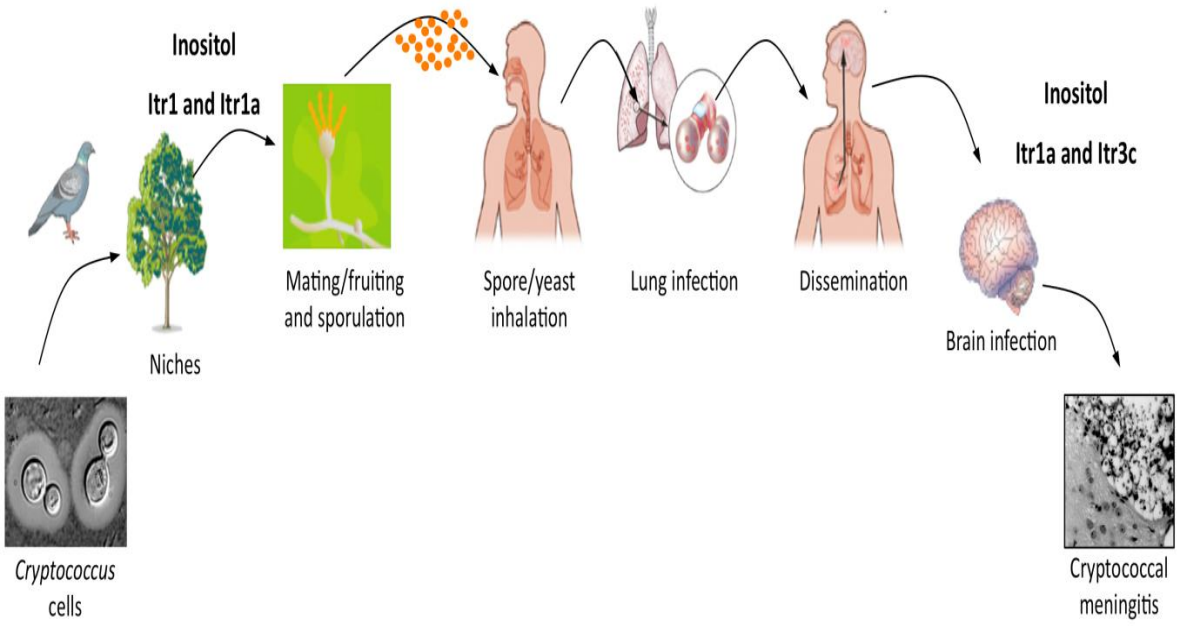


Viral Meningitis (Aseptic Meningitis)

Viral Meningitis is the most common form of meningitis in the United States. The symptoms are typically milder that bacterial meningitis and often the infection will resolve without treatment. In viral meningitis the infection is limited to the meninges, and the CSF will not have an identifiable pathogen. The virus that causes the infection enters the brain through infected leukocytes and will then infect the vascular endothelial cells. The pathogens then enter the subarachnoid space, the subsequent immune response will lead to inflammation and increased permeability of the blood brain barrier which allows more circulating immunoglobulin can enter the CNS to combat the infection.

Fungal Meningitis

Fungal meningitis is a rare form of meningitis that is caused by the inhalation of fungal spores, Fungal meningitis is not communicable from person to person. The infection causes a chronic disease process that can develop gradually but with harmful effects. The fungal infection in the central nervous system can produce a granulomatous reaction which causes the formation of granuloma or gelatinous masses that often will develop in the meninges at the base of the brain. The infection can spread from the meninges into the brain tissue resulting in thrombosis, infarction and communicating hydrocephalus. Fungal meningitis most often affects immune compromised individuals



DIAGNOSIS

Your family doctor or pediatrician can diagnose meningitis based on a medical history, a physical exam and certain diagnostic tests. During the exam, your doctor may check for signs of infection around the head, ears, throat and skin along the spine.

You or your child may undergo the following diagnostic tests:

Blood cultures A blood sample is placed in a special dish to see if it grows microorganisms, particularly bacteria. A sample may also be placed on a slide and stained (Gram's stain), then studied under a microscope to see whether bacteria are present.

Imaging Computerized tomography (CT) or magnetic resonance imaging (MRI) scans of the head may show swelling or inflammation. X-rays or CT scans of the chest or sinuses also may show infection that may be associated with meningitis.

Spinal tap (lumbar puncture) For a definitive diagnosis of meningitis, you'll need a spinal tap to collect cerebrospinal fluid (CSF). In people with meningitis, the CSF often shows a low sugar (glucose) level along with an increased white blood cell count and increased protein.

CSF analysis may also help your doctor identify which bacterium caused the meningitis. If your doctor suspects viral meningitis, he or she may order a DNA-based test known as a polymerase chain reaction (PCR) amplification or a test to check for antibodies against certain viruses to determine the specific cause and proper treatment.

TYPHOID

Typhoid fever is caused by ***Salmonella typhi*** bacteria. Typhoid fever is rare in developed countries. It is still a serious health threat in the developing world, especially for children. Contaminated food and water or close contact with an infected person cause typhoid fever.

Most people who have typhoid fever feel better a few days after they start antibiotic treatment, but a small number of them may die of complications. Vaccines against typhoid fever are only partially effective. Vaccines usually are reserved for those who may be exposed to the disease or who are traveling to areas where typhoid fever is common.

SYMPTOMS

Signs and symptoms are likely to develop gradually — often appearing one to three weeks after exposure to the disease.

Signs and symptoms include:

- Fever that starts low and increases daily, possibly reaching as high as 104.9 F (40.5 C)
- Headache
- Weakness and fatigue
- Muscle aches
- Sweating
- Dry cough
- Loss of appetite and weight loss
- Stomach pain
- Diarrhea or constipation
- Rash
- Extremely swollen stomach

Later illness

Without treatment, you may:

- Become delirious
- Lie motionless and exhausted with your eyes half-closed in what's known as the typhoid state

Life-threatening complications often develop at this time.

In some people, signs and symptoms may return up to two weeks after the fever has subsided.

DIAGNOSIS

Medical and travel history

Your doctor is likely to suspect typhoid fever based on your symptoms and your medical and travel history. The diagnosis is usually confirmed by identifying Salmonella typhi in a culture of your blood or other body fluid or tissue.

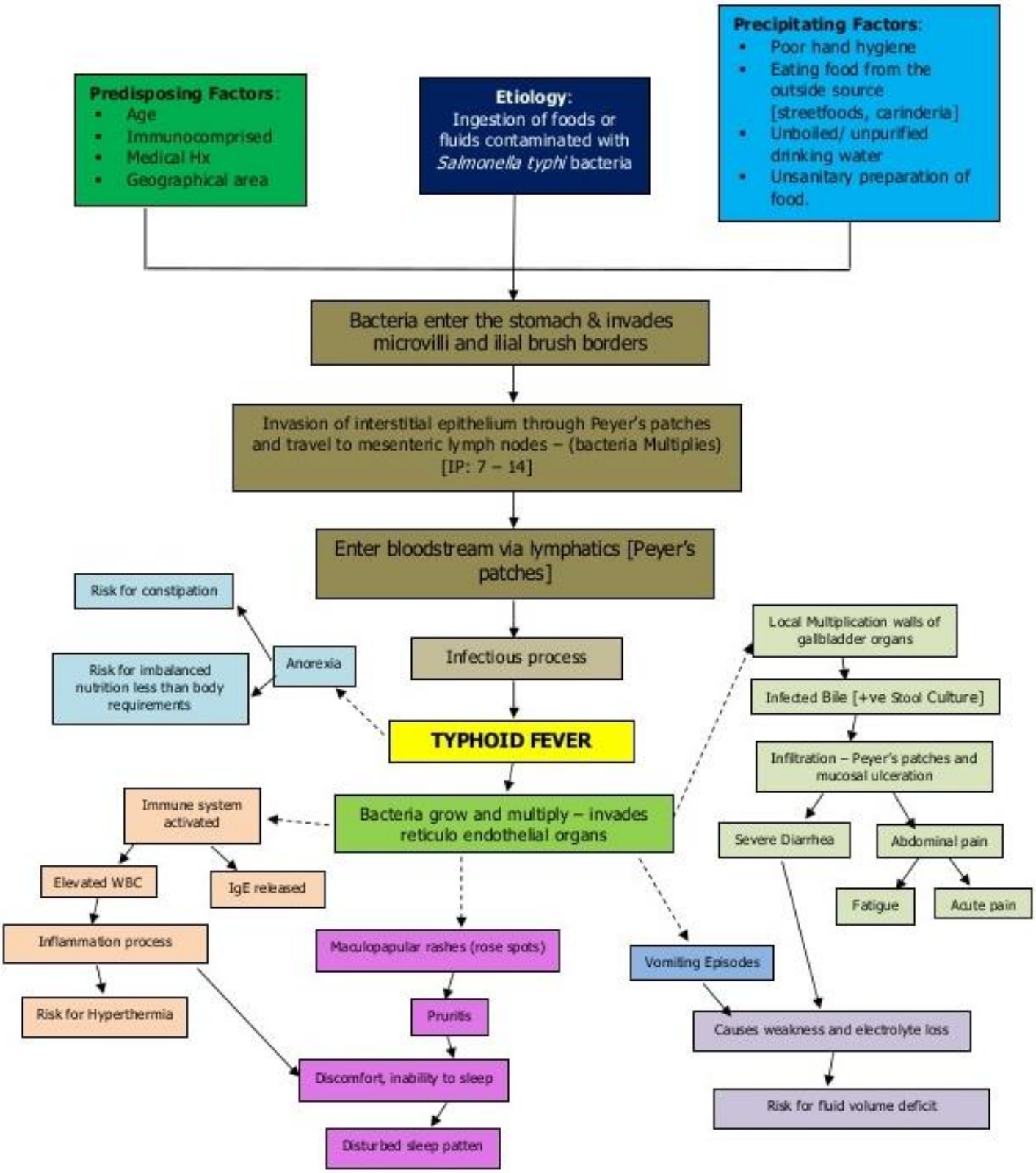
Body fluid or tissue culture

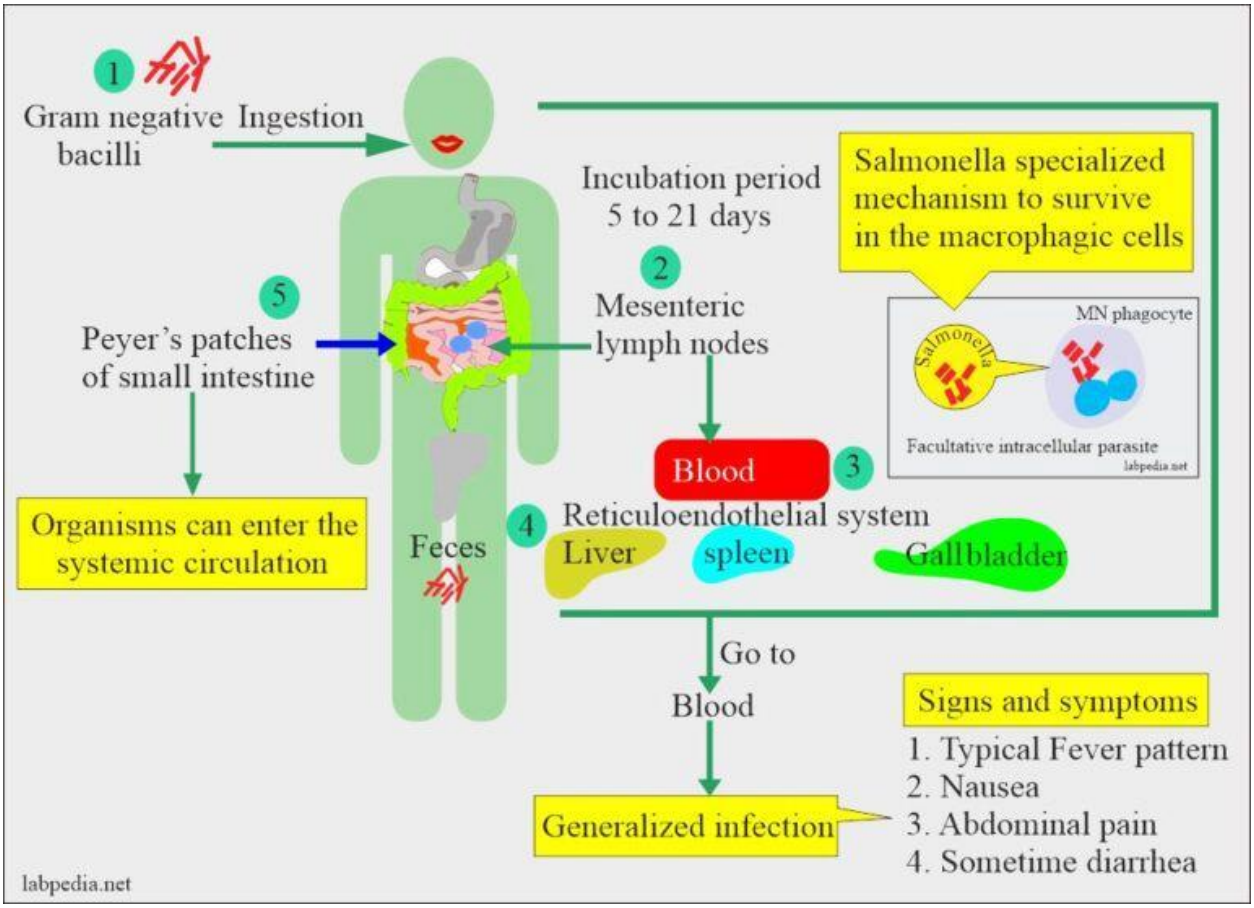
For the culture, a small sample of your blood, stool, urine or bone marrow is placed on a special medium that encourages the growth of bacteria. The culture is checked under a microscope for the presence of typhoid bacteria**.**

Blood test: Blood sample or stool culture is used to detect the presence of bacteria.

Widal test: Identifies antibodies against Salmonella antigens.

ETIOLOGY AND PATHOPHYSIOLOGY





LEPROSY (HANSEN'S DISEASE)

INTRODUCTION

"Leprosy is a chronic infection that affects the skin, mucous membrane, and nerves, and causes discolouration, lumps, disfigurement and deformities in skin."

- Leprosy (Hanson's disease) is a chronic infection caused by the bacteria ***Mycobacterium Laprae*** or ***Mycobacterium Lapromatosis***. Its principal lesion occur in the cooler tissues of body; Skin , superficial nerves , nose and larynx , pharynx ,etc.
- The Leprosy disease mainly affects the peripheral nerves, skin, upper respiratory tract and the eyes. The most prevalent possibility of transmission is through the respiratory route. Leprosy is also transmitted through insects.
- Leprosy is a chronic infection that affects the skin, mucous membrane, and nerves, and causes discoloration, lumps, disfigurement and deformities in skin."

- This disease is caused by bacteria, "***Mycobacterium leprae***" which is slow-growing. Leprosy is also termed as Hansen's disease after the name of the scientist – *Dr Gerhard Henrik Armauer* Hansen who discovered this infectious disease in the year 1873.

INCIDENCE

- Worldwide, two to three million people are estimated to be permanently disabled because of leprosy.
- India has the greatest number of cases , with brazil second and Indonesia third.
- Children are more susceptible then adult.
- A family history of leprosy probably means highest susceptibility to infection .

TYPES OF LEPROSY

Lapromatous leprosy: Generalized form of disease and is found in individuals with low degree of resistance. Skin lesion appear as yellow or brown infiltrated nodules that effect the mucus membranes of the eyes, nose, and throat .

Tuberculoid leprosy: This is a localized form of disease and is found in patients with high degree or resistance. Skin lesions appear as light red or purplish spots.

Borderline type : In this type of leprosy the lesions produced possess characteristics of both lapromatus and tuberculoid lesions .

Indeterminate type : In this type of leprosy the lesions produced often resemble maculo – anesthetic patches which are neither characteristics of lepromatous nor tuberculoid type .

CAUSES OF LEPROSY

Mycobacterium leprae - Cause of Leprosy

Genetics : several genes have been associated with a susceptibility to leprosy .

Risk factors :

- Living in areas with polluted water and poor diet.
- Immunocompromised people .
- Travel to an area that has experienced a leprosy attack.
- People who handle certain animal that are known to carry the bacteria (african chimpanzee , armadillos) are at high risk . 5) Those who live in the areas where leprosy is endemic.

SYMPTOMS OF LEPROSY

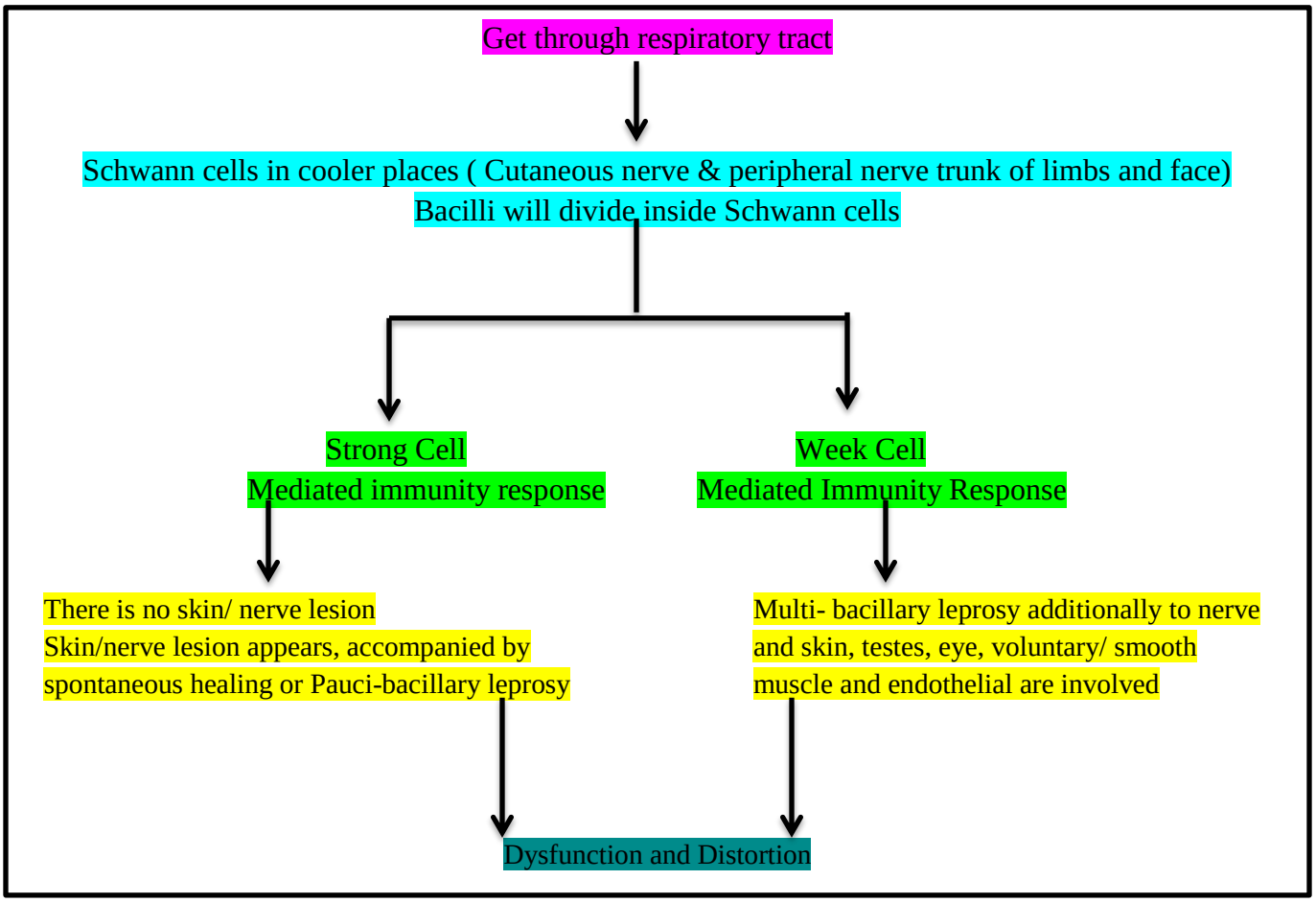
Leprosy firstly affects the skin and then moves on to nerves present outside the brain and spinal cord which is known as the peripheral nerves.

The time period between being exposed and the appearance of symptoms is known as the incubation period. If this period increases then, it is very difficult for doctors to diagnose the disease.

Following are some of the symptoms of leprosy:

- Severe pain.
- Bleeding Nose.
- Growth on skin.
- Enlarged nerves.
- Stiff, dry, and thick skin.
- Ulcers on the soles of the feet.
- Paralysis or muscle weakness.
- Non-sensitive lesions on the body.
- Numbness in hands, arms, feet, and legs.
- Eye problems that might even cause blindness.

PATHOPHYSIOLOGY



DIAGNOSIS

Specimens and Tests

Depending on the form of leprosy suspected by the treating physician, the following specimens may be collected:

- Skin smears from the earlobes, elbows, and knees
- Skin biopsy from edges of active patches
- Nerve biopsy from thickened nerves

Skin and nerve biopsy

Biopsies are needed to definitively confirm a diagnosis of Hansen's disease and to classify the disease, and slit skin smear may also be helpful in diagnosing those with mutlibacillary disease.

Acid fast staining

The Ziehl-Neelson method using 5% sulphuric acid as decolorizing agent is used. The presence of acid-fast bacilli confirms the diagnosis of Hansen's disease.

TUBERCULOSIS

INTRODUCTION

- Tuberculosis (TB) is one of the most prevalent infections of human beings and contributes considerably to illness and death around the world.
- It is spread by inhaling tiny droplets of saliva from the coughs or sneezes of an infected person. It is a slowly spreading, chronic, granulomatous bacterial infection, characterized by gradual weight loss.
- TB is the world's second most common cause of death from infectious disease after HIV/AIDS.
- Tuberculosis (TB) is a potentially serious infectious disease that mainly affects the lungs. The bacteria that cause tuberculosis are spread from person to person through tiny droplets released into the air via coughs and sneezes.

DEFINITION Tuberculosis is the infectious disease primarily affecting lung parenchyma is most often caused by ***Mycobacterium Tuberculosis***. It may spread to any part of the body including meninges, kidney, bones and lymph-nodes. Tuberculosis (TB) is a potentially fatal contagious disease that can affect almost any part of the body but is mainly an infection of the lungs. Neo-latin word: - Round nodule/Swelling - Condition "Tubercle" "Osis".

Causative Organisms *Mycobacterium tuberculosis and Mycobacterium Bovis* Human Animals

Other causative organisms

Mycobacterium africanum

Mycobacterium microti Non-Mycobacterium Genus

Mycobacterium leprae

Mycobacterium avium

INCEDENTS

- With the increased incidence of AIDS, TB has become a great problem in the U.S., and the world.
- India is the highest TB burden country in the world, home to 20 percent of cases occurring globally.
- Each year 1.8 million develop TB.
- In India 0.37 million people die because of TB every year.

TYPES OF TUBERCULOSIS Lung is the main organ affected in tuberculosis. Depending upon the type of tissue response and age, the infection with tubercle bacilli is of 2 main types:

1. Primary tuberculosis
2. Secondary tuberculosis

PRIMARY TUBERCULOSIS

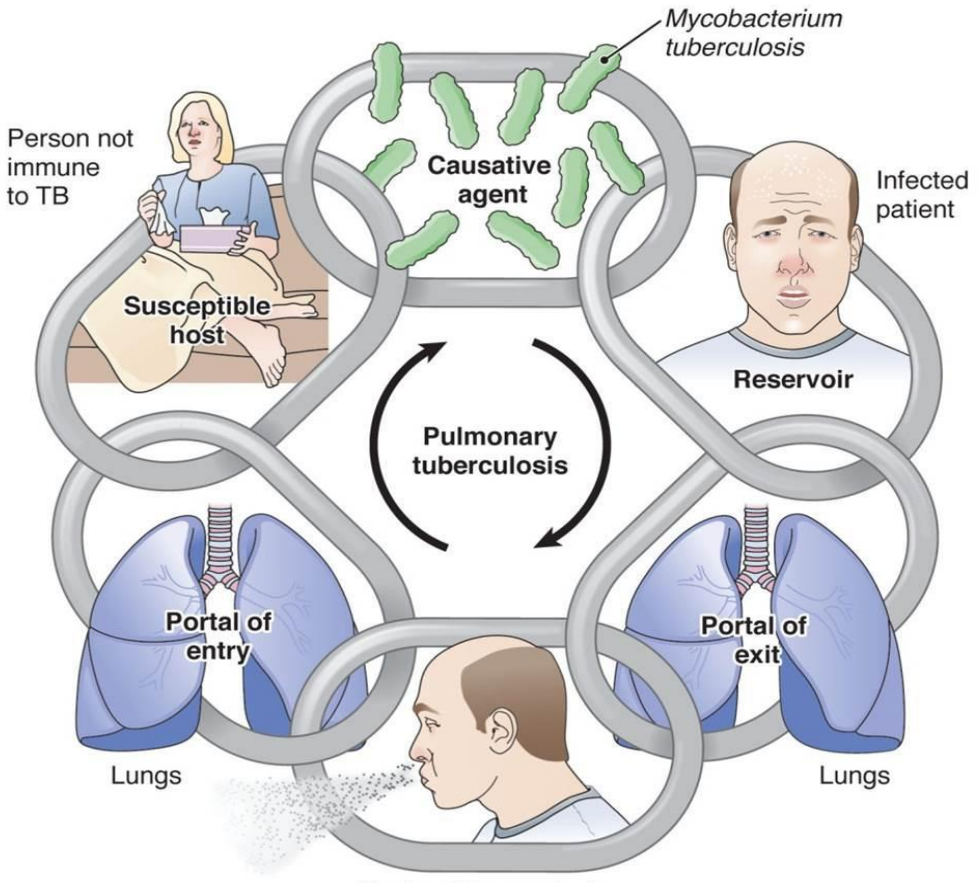
- It occurs on the first exposure to tubercle bacilli especially when droplets can avoid normal mucociliary defenses and enter in the terminal of alveoli of lungs.
- The infection begins with the multiplication of bacilli in the lungs, usually in the upper lobe particularly towards the apex.
- It is more often reported in children and in immune compromised patients

SECONDARY TUBERCULOSIS

- The infection of an individual who has been previously infected or sensitized is called secondary, or post-primary or reinfection, or chronic tuberculosis.
- The infection may be: Endogenous source such as reactivation of dormant primary complex.
- Exogenous source such as fresh dose of reinfection by the tubercle bacilli.
- Secondary tuberculosis occurs most commonly in lungs in the region of apex.
- Other sites and tissues which can be involved are tonsils, pharynx, larynx, small intestine and skin

MODE OF TRANSMISSION

- Human beings acquire infection with tubercle bacilli by one of the following routes:
- Inhalation of organisms present in fresh cough droplets or in dried sputum from an open case of pulmonary tuberculosis.
- Ingestion sputum of an open case of pulmonary tuberculosis, or ingestion of bovine tubercle bacilli from milk of diseased cows.
- Inoculation of the organisms into the skin may rarely occur from infected postmortem tissue. Tran's placental route results in development of congenital tuberculosis in fetus from infected mother and is a rare mode of transmission.

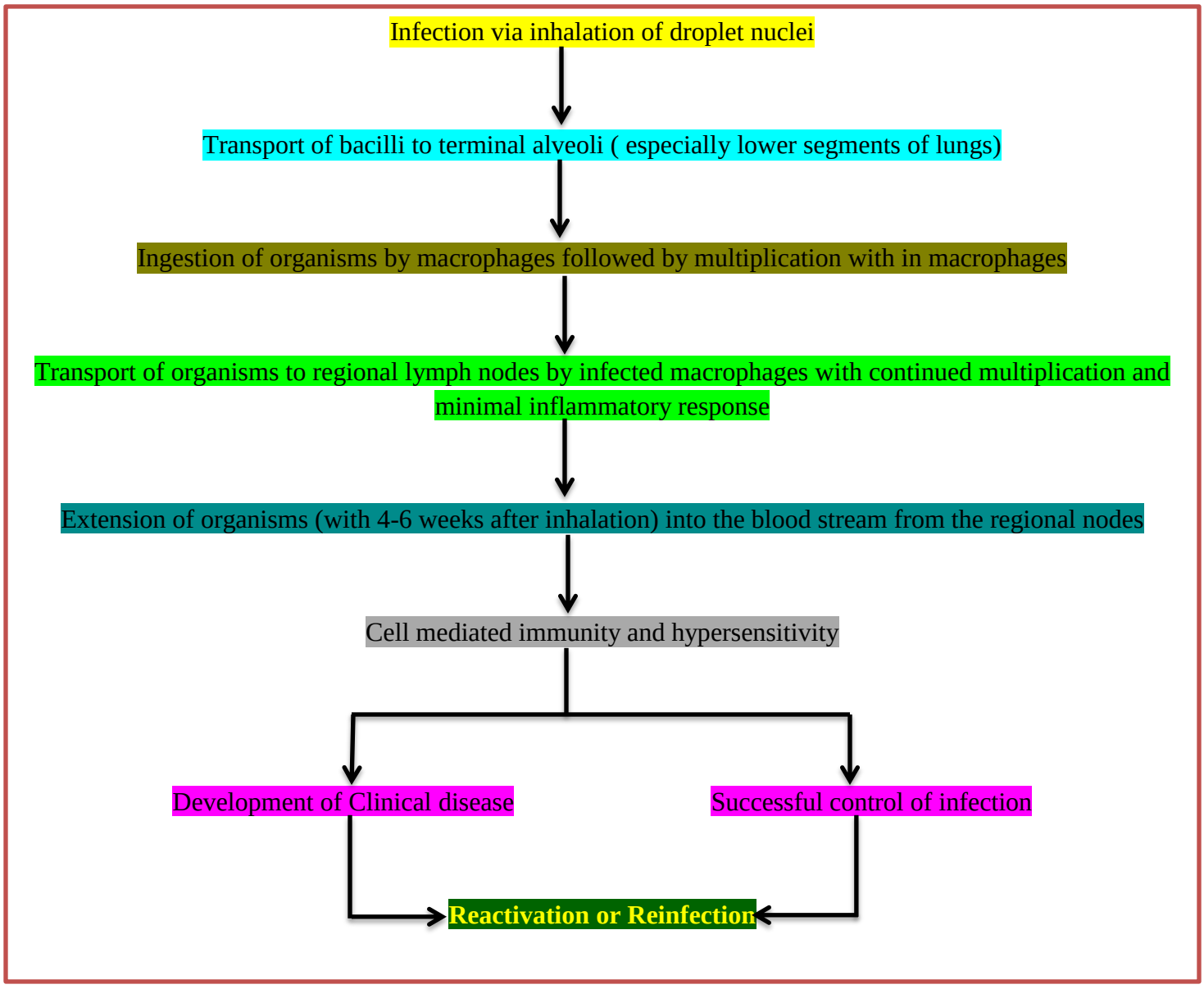


Signs and symptoms of active TB include	
Coughing for three or more weeks	Fatigue
Coughing up blood or mucus	Fever
Chest pain, or pain with breathing or coughing	Loss of appetite
Unintentional weight loss	Night sweats

RISK FACTORS

- Close contact with someone who have active TB.
- Immune compromised status (elderly, cancer)
- Drug abuse and alcoholism.
- People lacking adequate health care.
- Preexisting medical conditions (diabetes mellitus, chronic renal failure).
- Institutionalization (long term care facilities)
- Living in substandard conditions.
- Occupation (health care workers)

PATHOPHGENESIS OF TUBERCULOSIS



DIAGNOSIS

During the physical exam, your doctor will check your lymph nodes for swelling and use a stethoscope to listen to the sounds your lungs make when you breathe.

The most commonly used diagnostic tool for tuberculosis is a skin test, though blood tests are becoming more commonplace. A small amount of a substance called tuberculin is injected just below the skin on the inside of your forearm. You should feel only a slight needle prick.

Blood tests

Blood tests can confirm or rule out latent or active tuberculosis. These tests measure your immune system's reaction to TB bacteria.

These tests require only one office visit. A blood test might be useful if you're at high risk of TB infection but have a negative response to the skin test, or if you've recently received the BCG vaccine.

Imaging tests

If you've had a positive skin test, your doctor is likely to order a chest X-ray or a CT scan. This might show white spots in your lungs where your immune system has walled off TB bacteria, or it might reveal changes in your lungs caused by active tuberculosis.

Sputum tests

If your chest X-ray shows signs of tuberculosis, your doctor might take samples of your sputum — the mucus that comes up when you cough. The samples are tested for TB bacteria.Sputum samples can also be used to test for drug-resistant strains of TB. This helps your doctor choose the medications that are most likely to work. Getting results of these tests can take four to eight weeks.

URINARY TRACT INFACTION

A urinary tract infection (UTI) is an infection in any part of your urinary system — your kidneys, ureters, bladder and urethra. Most infections involve the lower urinary tract — the bladder and the urethra.

A urinary tract infection (UTI) is an infection of the urinary system. This type of infection can involve your urethra (a condition called urethritis), kidneys (a condition called pyelonephritis) or bladder, (a condition called cystitis).

Women are at greater risk of developing a UTI than are men. Infection limited to your bladder can be painful and annoying. However, serious consequences can occur if a UTI spreads to your kidneys.

Urinary Tract

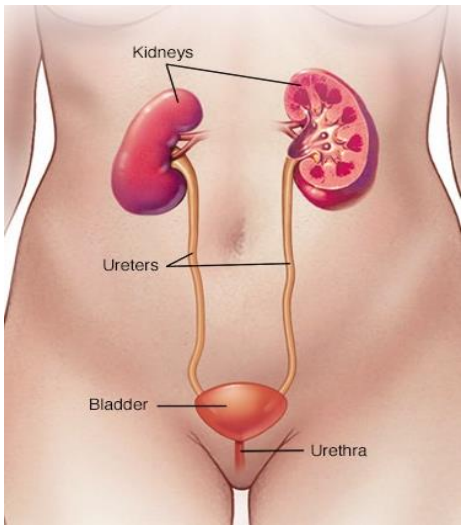
The urinary tract makes and stores urine, one of the body's liquid waste products. The urinary tract includes the following parts:

Kidneys: These small organs are located on back of your body, just above the hips. They are the filters of your body — removing waste and water from your blood. This waste becomes urine.

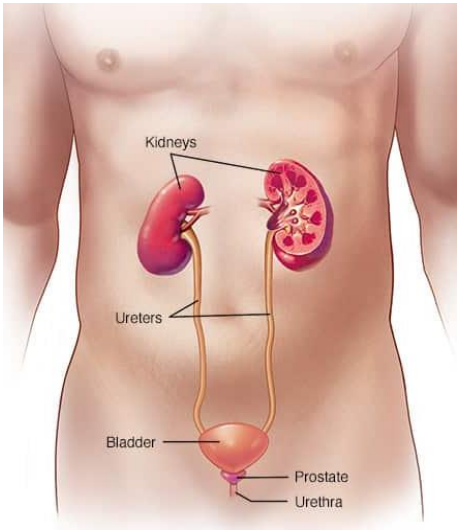
Ureters: The ureters are thin tubes that carry urine from the kidneys to your bladder.

Bladder: A sac-like container, the bladder stores your urine before it leaves the body.

Urethra: This tube carries the urine from your bladder to the outside of the body.



Female urinary system



Male urinary system

SYMPTOMS

A urinary tract infection causes the lining of the urinary tract to become red and irritated (inflammation), which may produce some of the following symptoms:

- Pain in the side (flank), abdomen or pelvic area.
- Pressure in the lower pelvis.
- Frequent need to urinate (frequency), urgent need to urinate (urgency) and Incontinence (urine leakage).
- Painful urination (dysuria) and blood in the urine.

- The need to urinate at night.
- Abnormal urine color (cloudy urine) and strong or foul-smelling urine.

Other symptoms that may be associated with a urinary tract infection include:

Pain during sex, Penis pain, Flank (side of the body) pain or lower back pain, Fatigue, Fever (temperature above 100 degrees Fahrenheit) and chills, Vomiting, Mental changes or confusion.

Types of urinary tract infection

Each type of UTI may result in more-specific signs and symptoms, depending on which part of your urinary tract is infected.

Part of urinary tract affected	Signs and symptoms
Kidneys (acute pyelonephritis)	Back pain or side (flank) pain High fever Shaking and chills Nausea Vomiting
Bladder (cystitis)	Pelvic pressure Lower abdomen discomfort Frequent, painful urination Blood in urine
Urethra (urethritis)	Burning with urination Discharge

CAUSES

Urinary tract infections are caused by microorganisms — usually bacteria — that enter the urethra and bladder, causing inflammation and infection. Though a UTI most commonly happens in the urethra and bladder, bacteria can also travel up the ureters and infect your kidneys.

More than 90% of bladder infection (cystitis) cases are caused by E. coli, a bacterium normally found in the intestines. The most common UTIs occur mainly in women and affect the bladder and urethra.

- **Infection of the bladder (cystitis).** This type of UTI is usually caused by Escherichia coli (E. coli), a type of bacteria commonly found in the gastrointestinal (GI) tract. However, sometimes other bacteria are responsible.

Sexual intercourse may lead to cystitis, but you don't have to be sexually active to develop it. All women are at risk of cystitis because of their anatomy — specifically, the short distance from the urethra to the anus and the urethral opening to the bladder

- **Infection of the urethra (urethritis).** This type of UTI can occur when GI bacteria spread from the anus to the urethra. Also, because the female urethra is close to the vagina, sexually transmitted infections, such as herpes, gonorrhea, chlamydia and mycoplasma, can cause urethritis.

PATHOPHYSIOLOGY

Acute pyelonephritis is an exudative purulent localized inflammation of the renal pelvis (collecting system) and kidney. The renal parenchyma present in the interstitium abscesses (suppurative necrosis), consisting in purulent exudate (pus) neutrophils, fibrin, cell debris and central germ colonies. Tubules are damaged by exudate and may contain neutrophil casts. In the early stages, glomeruli and vessels are normal. Chronic infections can result in fibrosis and scarring. Risk is increased in the following situations

- **Mechanical:** any structural abnormalities to the kidneys and the urinary tract, calculi (kidney stones), urinary tract catheterization, urinary tract stents or drainage procedures (eg nephrostomy), pregnancy, neuropathic bladder (e.g. due to spinal cord damage, spina bifida or multiple sclerosis) and prostate disease in men.
- **Constitutional:** Diabetes mellitus, immunocompromised states
- **Behavioural:** Change in sexual partner within the last year, spermicide use
- **Positive family history** (close family members with frequent urinary tract infections)

DIAGNOSIS

Ultrasound: In this test, sound waves create an image of the internal organs. This test is done on top of your skin, is painless and doesn't typically need any preparation.

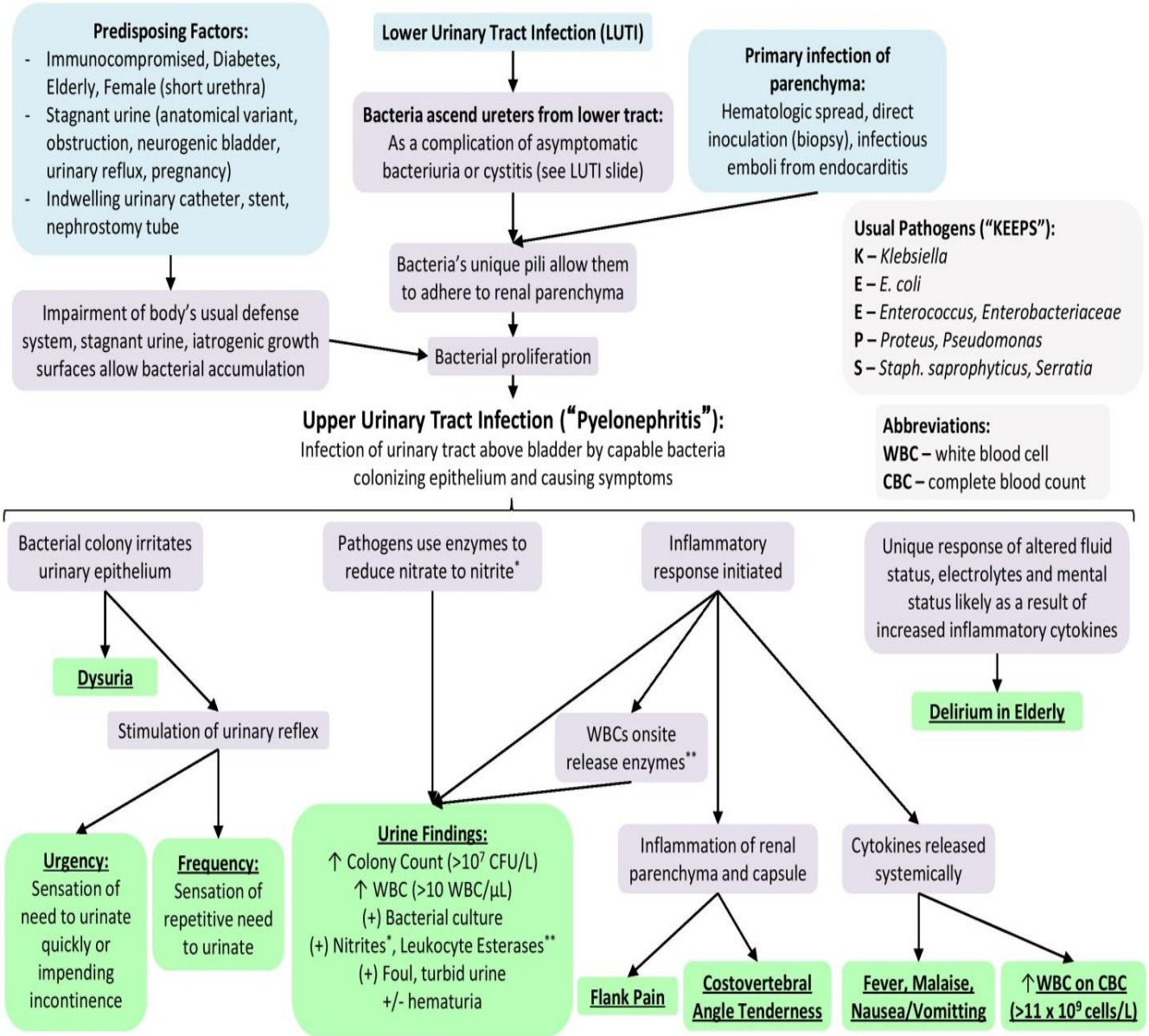
Cystoscopy: This test uses a special instrument fitted with a lens and a light source (cystoscope) to see inside the bladder from the urethra

Urinalysis: This test will examine the urine for red blood cells, white blood cells and bacteria. The number of white and red blood cells found in your urine can actually indicate an infection.

Urine culture: A urine culture is used to determine the type of bacteria in your urine. This is an important test because it helps determine the appropriate treatment.

If your infection does not respond to treatment or if you keep getting infections over and over again, your doctor may use the following tests to examine your urinary tract for disease or injury:

CT scan: Another imaging test, a CT scan is a type of X-ray that takes cross sections of the body (like slices). This test is much more precise than typical X-rays



SEXUALLY TRANSMITTED DISEASES

AIDS (ACQUIRED IMMUNODEFICIENCY SYNDROME)

Acquired immunodeficiency syndrome (AIDS) is a chronic, potentially life-threatening condition caused by the ***Human Immunodeficiency Virus*** (HIV). By damaging your immune system, HIV interferes with your body's ability to fight infection and disease. HIV is a sexually transmitted infection (STI). It can also be spread by contact with infected blood or from mother to child during pregnancy, childbirth or breast-feeding. Without medication, it may take years before HIV weakens your immune system to the point that you have AIDS.

There's no cure for HIV/AIDS, but medications can dramatically slow the progression of the disease. These drugs have reduced AIDS deaths in many developed nations.

Symptoms

The symptoms of HIV and AIDS vary, depending on the phase of infection.

Primary infection (Acute HIV)

Some people infected by HIV develop a flu-like illness within two to four weeks after the virus enters the body. This illness, known as primary (acute) HIV infection, may last for a few weeks.

Possible signs and symptoms include	
Fever	Night sweats
Headache	Muscle aches and joint pain
Rash	Sore throat and painful mouth sores
Cough	Swollen lymph glands, mainly on the neck
Diarrhea	Weight loss

These symptoms can be so mild that you might not even notice them. However, the amount of virus in your bloodstream (viral load) is quite high at this time. As a result, the infection spreads more easily during primary infection than during the next stage.

Clinical latent infection (Chronic HIV)

In this stage of infection, HIV is still present in the body and in white blood cells. However, many people may not have any symptoms or infections during this time.

This stage can last for many years if you're not receiving **antiretroviral therapy** (ART). Some people develop more severe disease much sooner.

Symptomatic HIV infection

As the virus continues to multiply and destroy your immune cells — the cells in your body that help fight off germs — you may develop mild infections or chronic signs and symptoms such as:

Fever	Weight loss
Fatigue	Diarrhea
Swollen lymph nodes-often one of the first signs of HIV infection	Shingles (herpes zoster)
Oral yeast infection (thrush)	Pneumonia

Progression to AIDS

Thanks to better antiviral treatments, most people with HIV in the U.S. today don't develop AIDS. Untreated, HIV typically turns into AIDS in about 8 to 10 years.

When AIDS occurs, your immune system has been severely damaged. You'll be more likely to develop opportunistic infections or opportunistic cancers — diseases that wouldn't usually cause illness in a person with a healthy immune system.

The signs and symptoms of some of these infections may include:

Sweats	Chills	Recurring fever
Chronic diarrhea	Swollen lymph glands	Persistent, unexplained fatigue
Weakness	Weight loss	Skin rashes or bumps
Persistent white spots or unusual lesions on your tongue or in your mouth		

CAUSES

HIV is caused by a virus. It can spread through sexual contact or blood, or from mother to child during pregnancy, childbirth or breast-feeding.

How does HIV become AIDS?

HIV destroys CD4 T cells — white blood cells that play a large role in helping your body fight disease. The fewer CD4 T cells you have, the weaker your immune system becomes.

You can have an HIV infection, with few or no symptoms, for years before it turns into AIDS. AIDS is diagnosed when the CD4 T cell count falls below 200 or you have an AIDS-defining complication, such as a serious infection or cancer.

MODE OF TRANSMISSION

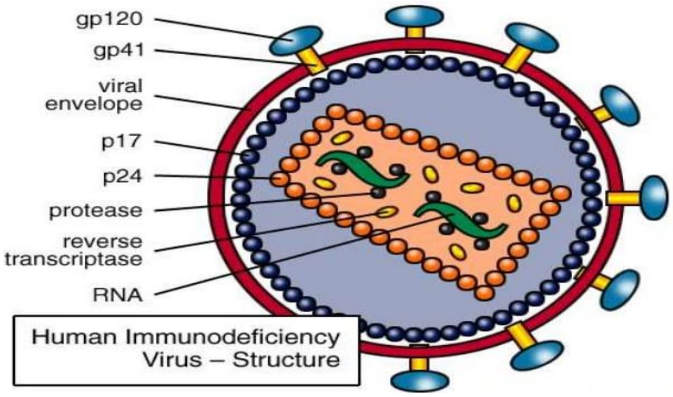
To become infected with HIV, infected blood, semen or vaginal secretions must enter your body. This can happen in several ways:

1. **By having sex.** You may become infected if you have vaginal, anal or oral sex with an infected partner whose blood, semen or vaginal secretions enter your body. The virus can enter your body through mouth sores or small tears that sometimes develop in the rectum or vagina during sexual activity.
2. **By sharing needles.** Sharing contaminated IV drug paraphernalia (needles and syringes) puts you at high risk of HIV and other infectious diseases, such as hepatitis.
3. **From blood transfusions** In some cases, the virus may be transmitted through blood transfusions. American hospitals and blood banks now screen the blood supply for HIV antibodies, so this risk is very small.
4. **During pregnancy or delivery or through breast-feeding** Infected mothers can pass the virus on to their babies. Mothers who are HIV-positive and get treatment for the infection during pregnancy can significantly lower the risk to their babies.

MORPHOLOGY OF HIV

- Spherical, enveloped virus
- Genome composed of 2 identical single stranded RNA copies.
- Gene coding for structural proteins: gag gene encodes for the core & shell of virus. Main core protein is p24. env gene encodes the synthesis of the envelop glycoprotein gp160. pol gene codes for the polymerase reverse transcriptase proteins p31, p51 and p66.
- HIV is highly vaiable virus. Based on molecular & antigenic differences 2 types of HIV : HIV 1 & HIV 2.
- HIV1 is the original isolate and it has at least 10 subtypes (A-J). In India & China C subtype is common mainly spread through heterosexual contact. And in USA b subtype is common transmitted via blood.
- Thermoliable and can be inactivated in 10 minutes at 60 degree C in seconds at 100 degree C.
- At room temperature (20-25°C) in dried blood, may survive for upto 7 days.
- At atopsy, HIV has been isolated from various tissues upto 16 days after death.

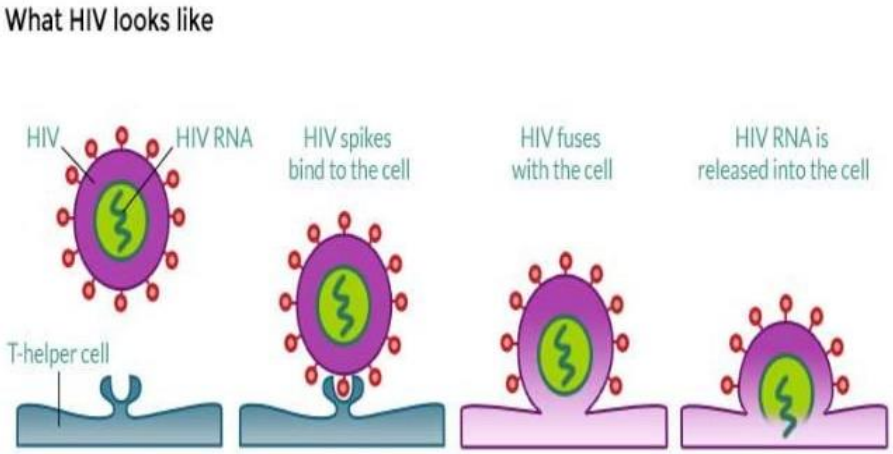
- For its surface decontamination standard recommendation is a hypochlorite sol. At the concentration of 0.5%.

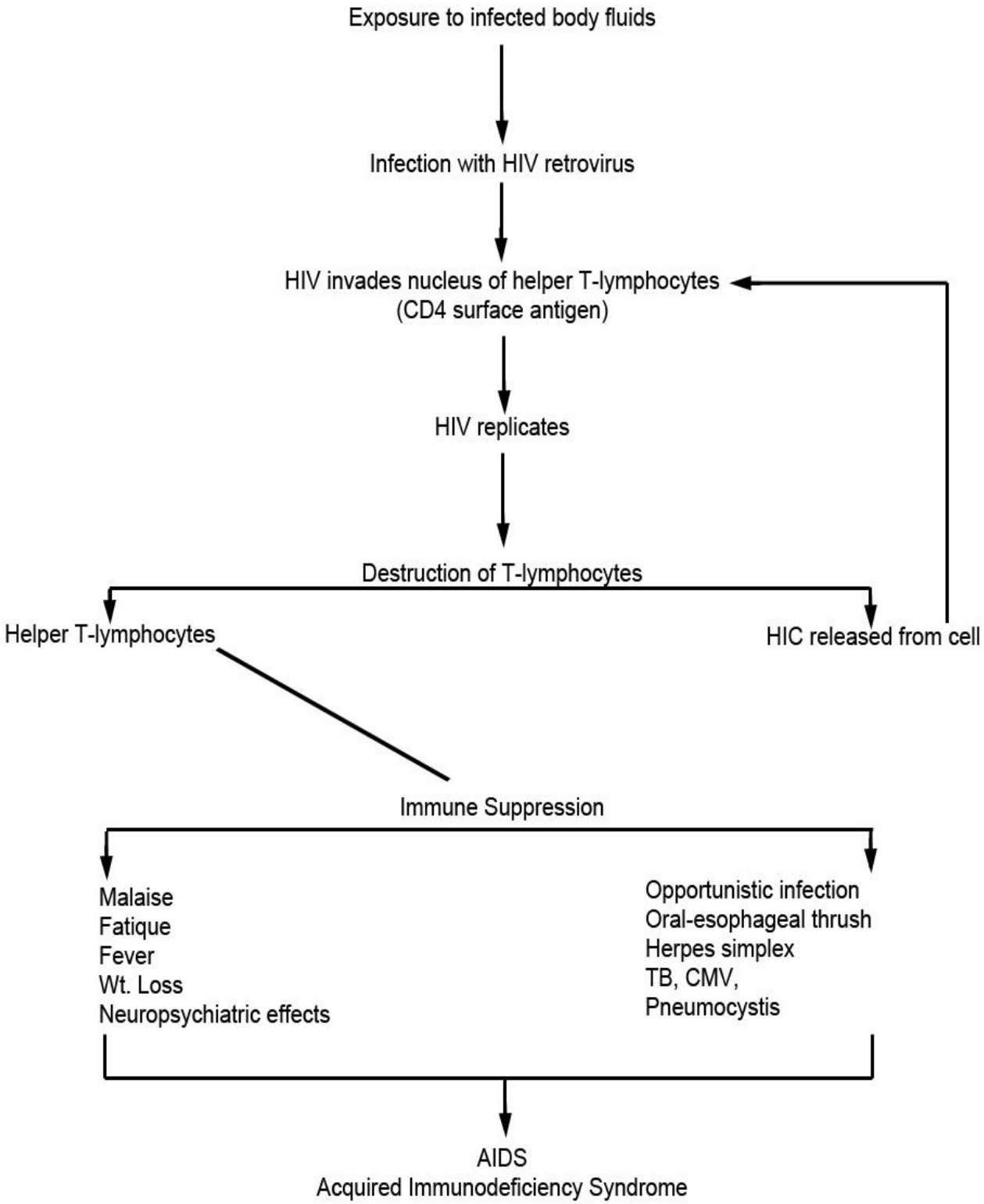


- For treatment of contaminated medical instruments. A 2% sol. Of glutaraldehyde is useful.

PATHOGENESIS

- HIV virus enters in the blood of foetus through the placenta of infected mother OR through anyother mode of transmission.
- Than the virus comes in contact with CD4 lymphocytes.
- It binds with CD4 antigen present on the T lymphocytes and B lymphocytes.
- After binding the virus enters the cell.
- Inside the cell, the virus genome uncoats and with the help of reverse transcriptase, converts the single RNA into double stranded DNA.
- This DNA integrates into the infected cell genome.
- This integration causes the formation of HIV virus progeny with the help of host cell.




Exposure to infected body fluids
Infection with HIV retrovirus
HIV invades nucleus of helper T-lymphocytes
(CD4 surface antigen)
HIV replicates
Destruction of T-lymphocytes
Helper T-lymphocytes
HIC released from cell
Immune Suppression
Malaise
Fatique
Fever
Wt. Loss
Neuropsychiatric effects
Opportunistic infection
Oral-esophageal thrush
Herpes simplex
TB, CMV,
Pneumocystis
AIDS
Acquired Immunodeficiency Syndrome

DIAGNOSIS

HIV can be diagnosed through blood or saliva testing. Available tests include:

Antigen/antibody tests These tests usually involve drawing blood from a vein. Antigens are substances on the HIV virus itself and are usually detectable — a positive test — in the blood within a few weeks after exposure to HIV.

Antibodies are produced by your immune system when it's exposed to HIV. It can take weeks to months for antibodies to become detectable. The combination antigen/antibody tests can take two to six weeks after exposure to become positive.

Antibody tests These tests look for antibodies to HIV in blood or saliva. Most rapid HIV tests, including self-tests done at home, are antibody tests. Antibody tests can take three to 12 weeks after you're exposed to become positive.

Nucleic acid tests (NATs) These tests look for the actual virus in your blood (viral load). They also involve blood drawn from a vein. If you might have been exposed to HIV within the past few weeks, your doctor may recommend NAT. NAT will be the first test to become positive after exposure to HIV.

Talk to your doctor about which HIV test is right for you. If any of these tests are negative, you may still need a follow-up test weeks to months later to confirm the results.

Tests to stage disease and treatment

If you've been diagnosed with HIV, it's important to find a specialist trained in diagnosing and treating HIV to help you:

- Determine whether you need additional testing
- Determine which HIV antiretroviral therapy (ART) will be best for you
- Monitor your progress and work with you to manage your health

CD4 T cell count: CD4 T cells are white blood cells that are specifically targeted and destroyed by HIV. Even if you have no symptoms, HIV infection progresses to AIDS when your CD4 T cell count dips below 200.

Viral load (HIV RNA): This test measures the amount of virus in your blood. After starting HIV treatment the goal is to have an undetectable viral load. This significantly reduces your chances of opportunistic infection and other HIV-related complications.

SYPHILIS

Syphilis is a bacterial ***(Treponema palladium)*** infection usually spread by sexual contact. The disease starts as a painless sore — typically on your genitals, rectum or mouth. Syphilis spreads from person to person via skin or mucous membrane contact with these sores.

After the initial infection, the syphilis bacteria can remain inactive (dormant) in your body for decades before becoming active again. Early syphilis can be cured, sometimes with a single shot (injection) of penicillin. Without treatment, syphilis can severely damage your heart, brain or other organs, and can be life-threatening. Syphilis can also be passed from mothers to unborn children.

SYMPTOMS

Syphilis develops in stages, and symptoms vary with each stage. But the stages may overlap, and symptoms don't always occur in the same order. You may be infected with syphilis and not notice any symptoms for years.

Primary syphilis

The first sign of syphilis is a small sore, called a chancre (SHANG-kur). The sore appears at the spot where the bacteria entered your body. While most people infected with syphilis develop only one chancre, some people develop several of them. The chancre usually develops about three weeks after exposure. Many people who have syphilis don't notice the chancre because it's usually painless, and it may be hidden within the vagina or rectum. The chancre will heal on its own within three to six weeks.

Secondary syphilis

Within a few weeks of the original chancre healing, you may experience a rash that begins on your trunk but eventually covers your entire body — even the palms of your hands and the soles of your feet. This rash is usually not itchy and may be accompanied by wartlike sores in your mouth or genital area. Some people also experience hair loss, muscle aches, a fever, a sore throat and swollen lymph nodes. These signs and symptoms may disappear within a few weeks or repeatedly come and go for as long as a year.

Latent syphilis

If you aren't treated for syphilis, the disease moves from the secondary stage to the hidden (latent) stage, when you have no symptoms. The latent stage can last for years. Signs and symptoms may never return, or the disease may progress to the third (tertiary) stage.

Tertiary syphilis

About 15% to 30% of people infected with syphilis who don't get treatment will develop complications known as late (tertiary) syphilis. In the late stage, the disease may damage your brain, nerves, eyes, heart, blood vessels, liver, bones and joints. These problems may occur many years after the original, untreated infection.

Neurosyphilis

At any stage, syphilis can spread and, among other damage, cause damage to the brain and nervous system (Neurosyphilis) and the eye (ocular syphilis).

Congenital syphilis

Babies born to women who have syphilis can become infected through the placenta or during birth. Most newborns with congenital syphilis have no symptoms, although some experience a rash on the palms of their hands and the soles of their feet. Later signs and symptoms may include deafness, teeth deformities and saddle nose — where the bridge of the nose collapses.

However, babies born with syphilis can also be born too early, be born dead (stillborn) or die after birth.

CAUSES

The cause of syphilis is a bacterium called ***Treponema pallidum***. The most common route of transmission is through contact with an infected person's sore during sexual activity. The bacteria enter your body through minor cuts or abrasions in your skin or mucous membranes. Syphilis is contagious during its primary and secondary stages, and sometimes in the early latent period.

Less commonly, syphilis may spread through direct unprotected close contact with an active lesion (such as during kissing) or through infected mothers to their babies during pregnancy or childbirth (congenital syphilis).

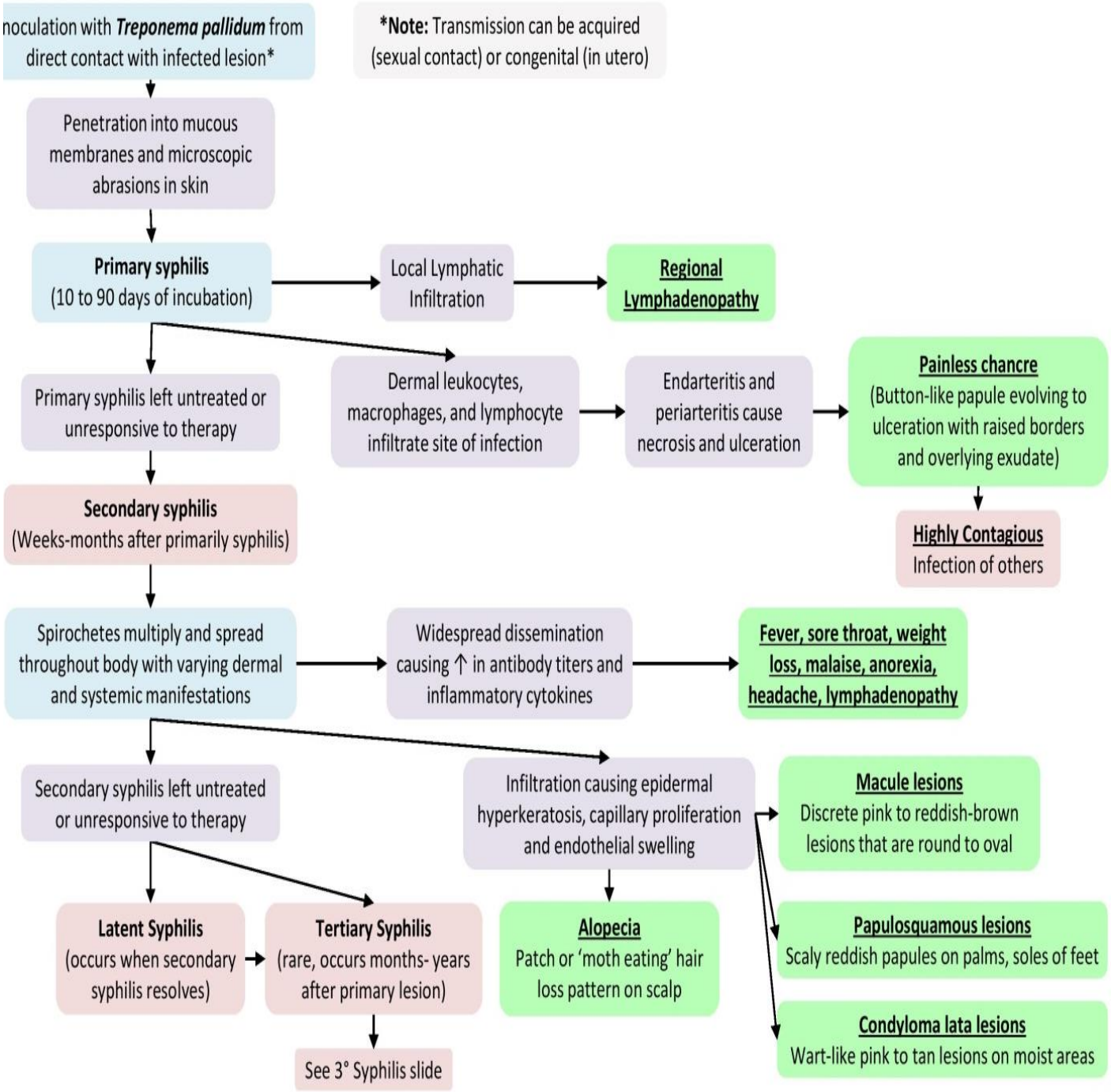
DIAGNOSIS

Blood Test. Blood tests can confirm the presence of antibodies that the body produces to fight infection. The antibodies to the syphilis-causing bacteria remain in your body for years, so the test can be used to determine a current or past infection.

Cerebrospinal fluid. If it's suspected that you have nervous system complications of syphilis, your doctor may also suggest collecting a sample of cerebrospinal fluid through a procedure called a lumbar puncture (spinal tap).

Through the Centers for Disease Control and Prevention, your local health department offers partner services, which will help you notify your sexual partners that they may be infected. That way, your partners can be tested and treated and the spread of syphilis can be limited.

PATHOPHYSIOLOGY



GONORRHEA

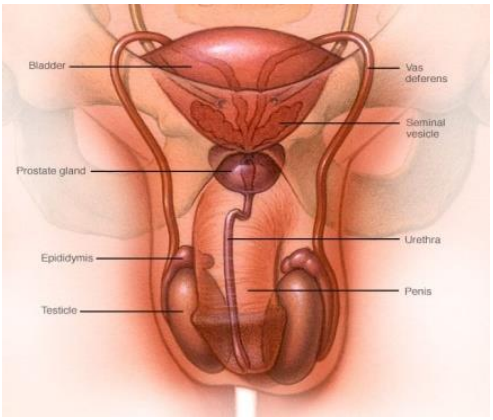
Gonorrhea is an infection caused by a sexually transmitted bacterium that infects both males and females. Gonorrhea most often affects the urethra, rectum or throat. In females, gonorrhea can also infect the cervix.

Gonorrhea is most commonly spread during vaginal, oral or anal sex. But babies of infected mothers can be infected during childbirth. In babies, gonorrhea most commonly affects the eyes.

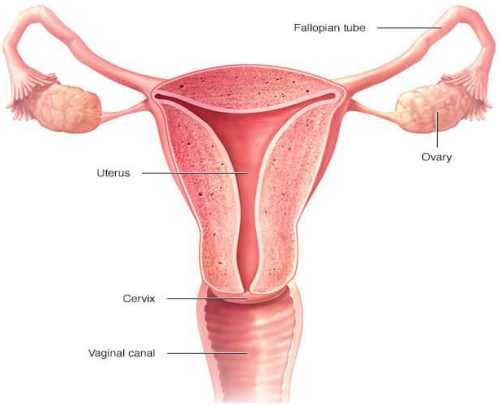
Abstaining from sex, using a condom if you have sex and being in a mutually monogamous relationship are the best ways to prevent sexually transmitted infections.

SYMPTOMS

In many cases, gonorrhea infection causes no symptoms. Symptoms, however, can affect many sites in your body, but commonly appear in the genital tract.



Male reproductive system



Female reproductive System

Gonorrhea affecting the genital tract

Signs and symptoms of gonorrhea infection in men include:

- Painful urination
- Pus-like discharge from the tip of the penis
- Pain or swelling in one testicle

Signs and symptoms of gonorrhea infection in women include:

- Increased vaginal discharge
- Painful urination
- Vaginal bleeding between periods, such as after vaginal intercourse
- Abdominal or pelvic pain

Gonorrhea at other sites in the body

Gonorrhea can also affect these parts of the body:

Rectum. Signs and symptoms include anal itching, pus-like discharge from the rectum, spots of bright red blood on toilet tissue and having to strain during bowel movements.

Eyes. Gonorrhea that affects your eyes can cause eye pain, sensitivity to light, and pus-like discharge from one or both eyes.

Throat. Signs and symptoms of a throat infection might include a sore throat and swollen lymph nodes in the neck.

Joints. If one or more joints become infected by bacteria (septic arthritis), the affected joints might be warm, red, swollen and extremely painful, especially during movement.

CAUSES

Gonorrhea is caused by the bacterium ***Neisseria Gonorrhoeae***. The gonorrhea bacteria are most often passed from one person to another during sexual contact, including oral, anal or vaginal intercourse.

Risk factors

Sexually active women younger than 25 and men who have sex with men are at increased risk of getting gonorrhea.

- Other factors that can increase your risk include:
- Having a new sex partner
- Having a sex partner who has other partners
- Having more than one sex partner
- Having had gonorrhea or another sexually transmitted infection

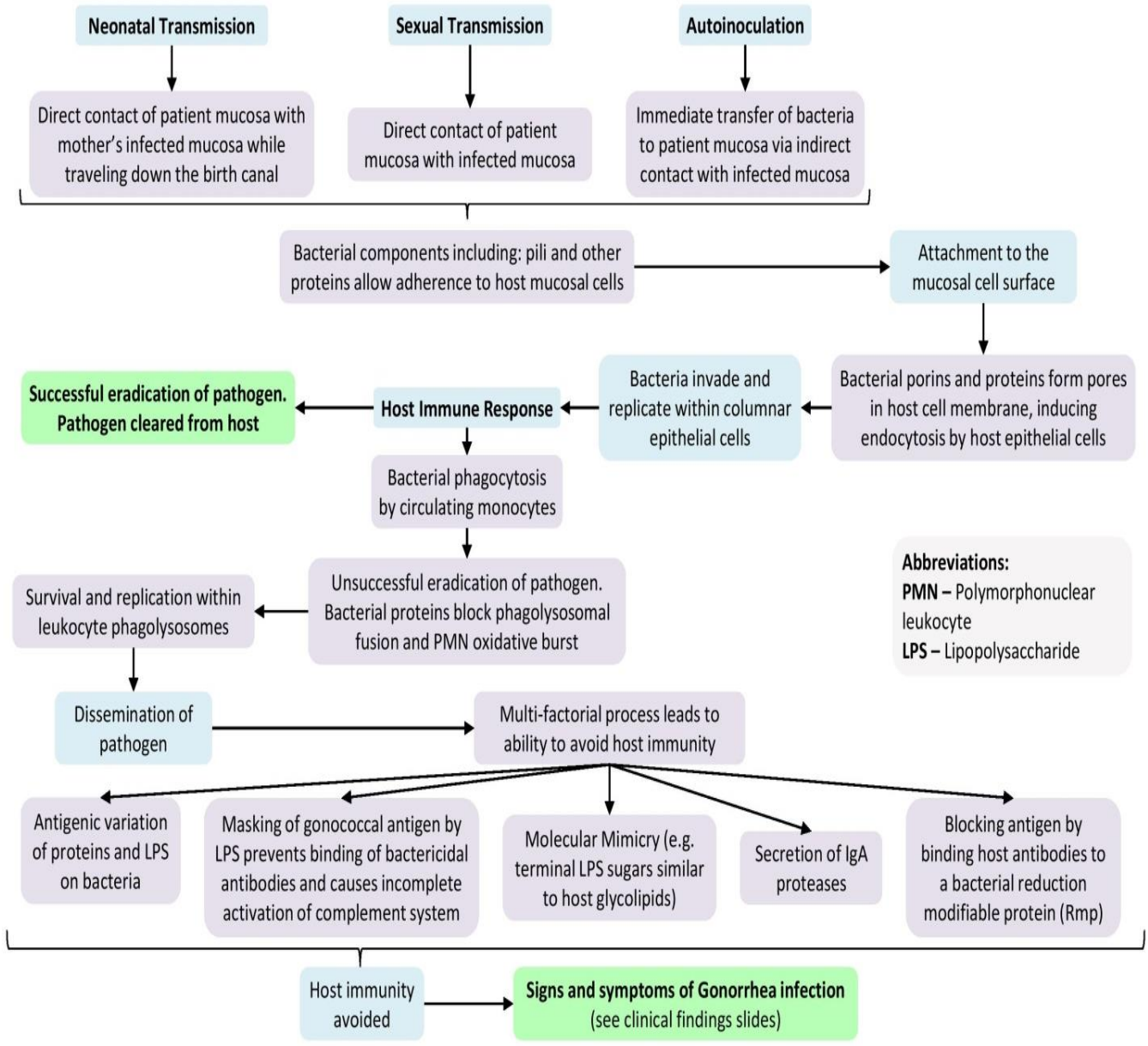
Complications Untreated gonorrhea can lead to major complications, such as:

- **Infertility in women.** Gonorrhea can spread into the uterus and fallopian tubes, causing pelvic inflammatory disease (PID). PID can result in scarring of the tubes, greater risk of pregnancy complications and infertility. PID requires immediate treatment.
- **Infertility in men.** Gonorrhea can cause a small, coiled tube in the rear portion of the testicles where the sperm ducts are located (epididymis) to become inflamed (epididymitis). Untreated epididymitis can lead to infertility.
- **Infection that spreads to the joints and other areas of your body.** The bacterium that causes gonorrhea can spread through the bloodstream and infect other parts of your body,

including your joints. Fever, rash, skin sores, joint pain, swelling and stiffness are possible results.

- **Increased risk of HIV/AIDS.** Having gonorrhea makes you more susceptible to infection with human immunodeficiency virus (HIV), the virus that leads to AIDS. People who have both gonorrhea and HIV are able to pass both diseases more readily to their partners.
- **Complications in babies.** Babies who contract gonorrhea from their mothers during birth can develop blindness, sores on the scalp and infections.

PATHOPHYSIOLOGY



DIAGNOSIS

To determine whether you have gonorrhea, your doctor will analyze a sample of cells. Samples can be collected by:

Urine test this can help identify bacteria in your urethra.

Swab of affected area A swab of your throat, urethra, vagina or rectum can collect bacteria that can be identified in a lab.

For women, home test kits are available for gonorrhea. They include vaginal swabs for self-testing that are sent to a specified lab for testing. You can choose to be notified by email or text message when your results are ready. You can view your results online or receive them by calling a toll-free hotline.

Long answer questions (10 marks)

1. Write a detail note on Urinary Tract Infections.
2. Explain in details about Sexually Transmitted Diseases.
3. Discuss about signs and symptoms, etiology, pathophysiology and diagnosis of Tuberculosis.

Short answer questions (05 marks)

1. Explain the etiology, pathogenesis, diagnosis of Tuberculosis.
2. Explain the etiology, pathogenesis, signs, and symptoms of Leprosy.
3. Describe the pathology of sexually transmitted diseases.

Very short answer questions (02 marks)

1. Name the causative organism for Urinary tract infection.
2. Name the causative agent, mode of transmission, signs, and symptoms for Typhoid.
3. Name the causative agent, mode of transmission, signs, and symptoms for Gonorrhea.
4. Write the causative agent, mode of transmission, signs, and symptoms of Leprosy.
5. Write the causative agent, mode of transmission, signs, and symptoms of Meningitis
6. List any two STD and their causative organisms.
7. Write the causative agent, mode of transmission, signs, and symptoms of Urinary tract Infection.
8. Write the diagnostic tests for Typhoid.
9. Write the laboratory diagnosis of Leprosy and Syphilis.
10. Write the diagnostic tests for HIV infection.