PARMAR SSC

DISEASES

Lecture - 11

BY PARMAR SIR

DISEASE

- A disease can be defined as any disturbance in the internal structure and function of any organ or part of the body, which is usually associated with specific signs and symptoms.

Classification of Diseases on Basis of Time

Acute Diseases	Chronic Diseases
They last for a short period of time, cause major effects on health in a short time	They last for a longer period of time and takes a long time to cause major effects on health
E.g. Fever, cold, cough, etc.	**E.g.** Diabetes, TB (tuberculosis), Elephantiasis, etc.

Communicable and Non-Communicable Diseases

Communicable Diseases	Non-Communicable Diseases
These are diseases which spread from one person to another	These are diseases which do not spread from one person to another
They are caused by pathogens	They are caused by deficiency of nutrients or due to some allergy or proliferation of abnormal cells
E.g. Malaria, AIDS, TB, chicken pox, COVID, etc.	E.g. Diabetes, arthritis, asthma, cancer, etc.

- **Zoonotic diseases** are the diseases that are transmitted from animals to humans.
- **Example:** Rabies and Bird flu.

Pathogens Responsible for Diseases

- Pathogens are disease-causing agents, that are responsible for causing infections and diseases in their hosts, often by entering the body and causing physiological disruptions.
- **Pathogens include:** Virus, Bacteria, Protozoa, Fungus.

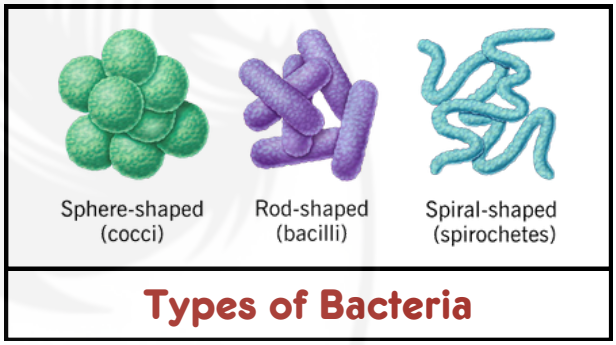
Virus

- They are small infectious agents that need a host cell to replicate and cause diseases like the common cold, flu, and HIV.
- In virus, the genetic material is included in a protein envelope known as **Capsid.**
- Genetic material in viruses are made up of **RNA (retrovirus with single stranded RNA)** or **DNA (with double stranded DNA).**
- Antibiotics work against the formation of cell wall. Viruses are surrounded by a protective protein coating; they don't have cell walls that can be attacked by antibiotics like bacteria do.
- Viruses are considered semi-living. They cannot reproduce on their own, so they spread through a host cell.

- **COVID-19 virus** (Severe Acute Respiratory Syndrome Coronavirus 2 - **SARS-CoV-2**) is primarily an **RNA virus**, which means its genetic material is made of RNA.
- The COVID-19 virus uses the cells of the lungs as 'host cells' to spread.

Bacteria

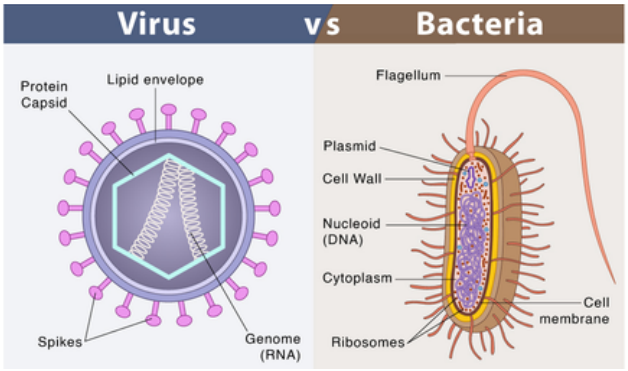
- They are single-celled organisms that can reproduce and cause diseases like pneumonia, strep throat, and food poisoning.
- **Bacteria** are **prokaryotic** and belong to the Kingdom Monera.

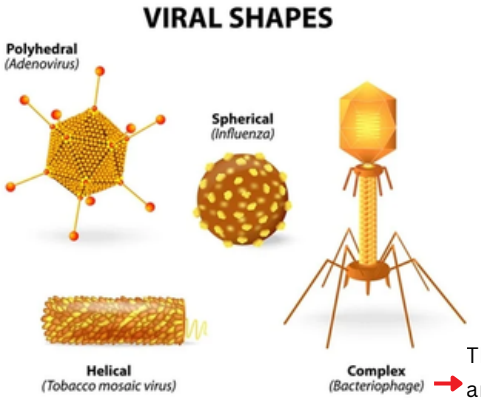


Types of Bacteria

Virus VS Bacteria

Virus	Bacteria
Genetic material: DNA/RNA + Protein (capsid)	They are prokaryotes, they lack true nucleus and membrane bound organelles. Instead, they have nucleoid and their genetic material is called Genophore (bacterial DNA)
Non-living entity	Unicellular and living entity
It needs a host cell to replicate	It divides on its own
Parasitic in nature	Parasitic/Saprophytic in nature
Antibiotics cannot be used to treat viral infections	Antibiotics can be used to treat bacterial infections
Smaller (20-400nm)	Larger (1000nm)

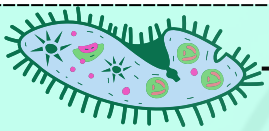




→ The virus that infects and affects bacteria

Protozoa

- They are one-celled organisms that can cause various diseases, including intestinal infections, amoebiasis, giardiasis, toxoplasmosis.
- There often spread through contaminated water or by insect bites.



Paramecium → They have hair-like structures called cilia, which are used for movement.

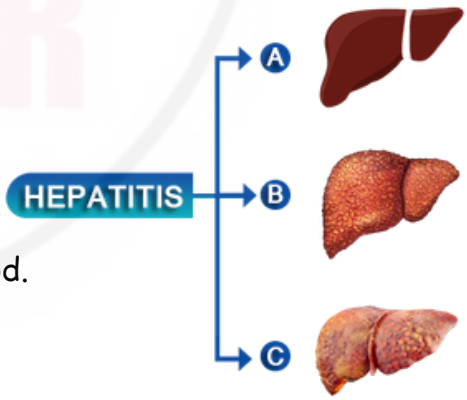
- Penicillin is the first antibiotic, discovered in 1928 by Alexander Fleming from Penicillium (fungus).

Fungus

- A group of eukaryotic organism that can cause diseases like athlete's foot and yeast infections.

DISEASES CAUSED BY VIRUS

Hepatitis (Type a, b & C)



- **Affects:** Liver.
- **Symptom:** Jaundice (mainly affects liver).
- **Hepatitis A:** Transmitted through food.
- **Hepatitis B:** Sexually transmitted through bodily fluids.
- **Hepatitis C:** Transmitted when in contact with infected blood.
- **India's first indigenous Hepatitis-A vaccine:** Havisure.

Mumps

- Viral disease affecting parotid salivary glands (cheek and jaw area).

Flu

- Caused by Influenza viruses Types A, B, and C. Also known as "evil influence of stars".

Common Cold

- Caused by Rhinovirus.
- **Symptoms:** Runny nose, fever, Fainting, sore throat, headache, and weakness.

Polio

- **Caused by:** Poliomyelitis/Polio virus.
- **Status:** Totally eradicated from India (declared in 2014).
- **Affects:** Nervous system (nerves in spinal cord or brain stem cells).
- **First polio vaccine was created by:** Dr. Jonas Salk.
- India launched the Pulse Polio Immunisation Programme on October 2, 1995.

Cervical Cancer

- **Caused by:** Human Papillomavirus (HPV).
- **Affects:** Cervix region in women.
- **Detected through:** PAP Smear Test.

Chicken Pox

- Caused by Varicella Zoster Virus.

Small Pox

- **Caused by:** Variola Virus.
- **Vaccine:** By Edward Jenner (1796).
- **Status:** Eradicated from India in 1977.

- **Swine flu** is a zoonotic disease and the name of its virus is **H1N1**.
- **Bird flu** is also a zoonotic disease, but the name of its virus is **H5N1**.
- **Encephalitis** is an inflammation of the brain, which can be caused by the **Herpes Simplex Virus**.

Dengue

- Caused by Flavivirus.
- Dengue spreads through a vector called the female Aedes aegypti mosquito.

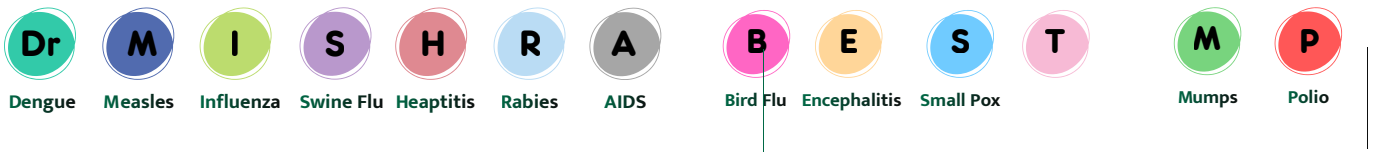
Rabies

- **Caused by:** Lyssavirus.
- **Affects:** Central Nervous System (CNS), leading to hydrophobia.

AIDS

- Acquired Immunodeficiency Syndrome
- **Caused by:** HIV (Human Immunodeficiency Virus – retrovirus).
- **Transmission:** Sexual contact, blood transfusions, mother to baby.
- **Test:** ELISA Test (Enzyme-linked Immunosorbent Assay)
- **AIDS DAY:** December 1st.

TRICK: Dr. MISHRA BEST MP



DISEASES CAUSED BY BACTERIA

Plague

- **Caused by:** Yersinia pestis.
- **Death due to plague known as:** Black Death.
- **1897-1906:** 12 Million deaths in India was reported.

Bubonic Plague:

- **Agent:** Yersinia pestis bacterium.
- **Carrier:** Through the bite of infected fleas or rats.
- **Symptoms:** Painful swelling in the lymph nodes (buboes).
- **Risk:** Extremely high mortality rate.

Leprosy

- **Caused by:** Mycobacterium leprae.
- Leprosy affects skin and is also known as Hansen's Disease.

Cholera

- **Caused by:** Vibrio cholera.
- It is a water borne disease.
- Death caused due to cholera is known as "Blue Death".

Bronchitis

- **Caused by:** Bordetella pertussis.
- It causes inflammation of the lining of bronchial tubes, which carry air to and from the lungs.

Pneumonia

- **Caused by:** Streptococcus pneumoniae.
- Pneumonia is a condition in which the alveoli of the lungs get filled with fluid or pus.

TB (Tuberculosis Bronchitis)

- **Caused by:** Mycobacterium tuberculosis.
- **Vaccine provided against it:** BCG (Bacillus Calmette-Guerin).
- In TB, the lung cells are severely affected and cavities (empty spaces) are formed in the lung tissues.

Diphtheria

- **Caused by:** Corynebacterium diphtheriae.
- It affects the respiratory system (mucous membranes of nose and throat).

Diarrhoea

- **Caused by:** E. Coli (Escherichia coli).

Typhoid

- **Caused by:** Salmonella typhi.
- It affects small intestine (gut).
- Typhoid is a serious infection that mainly spreads through the consumption of contaminated food and water.
- **Test to detect Typhoid:** Widal Test.

Peptic Ulcers

- **Caused by:** Helicobacter pylori.
- **Excessive acid production:** In some cases, the body produces too much digestive acid, which burns the inner lining of the stomach.

Acne

- **Caused by:** Staphylococcus bacteria.

Tetanus

- **Causative agent:** It is caused by a bacterium called Clostridium tetani.
- **Source:** Infection occurs through wounds that come in contact with soil, dust, or rusty iron.
- **Affected system:** It affects the nervous system.
- **Main symptom:** Severe muscle stiffness and spasms. It is also called "lockjaw" because the jaw becomes rigid and cannot open properly.
- **Prevention:** Taking a tetanus injection immediately after an injury.

TRICK: TWo GoL PoTATo ChiPS Di

T	Wo	Go	L	Po	T	A	To	S	Chi	S	Di
Tetanus	Whooping Cough	Gonorrhoea	Leprosy	Pneumonia	Typhoid	Anthrax	Tuberculosis	Cholera	Plague	Syphillis	Diptheria

DISEASES CAUSED BY FUNGUS

Baldness

- A fungal infection specifically tinea capitis, also known as scalp ringworm, can cause patchy hair loss.

Athlete's foot

- A type of ring worm disease that affects the feet

TRICK: BARSA

B	A	R	S	A
Baldness	Athlets's foot	Ring worm	Scabies	Asthma

Ring Worm

- A common skin infection that can cause a red, itchy rash.

Asthma

- Fungal exposure can be a significant trigger or contributor to asthma symptoms.
- Genetic factors play a major role in Asthma.

Scabies

- Caused by: Sarcoptes scabiei (a microscopic mite).
- This mite burrows into the skin, where it lays eggs that hatch into adult mites.
- The mites cause an itchy rash.

DISEASES CAUSED BY PROTOZOA

Malaria

- **Malaria Day**: 25th April.
- **Protozoa**: Plasmodium.
- **Carrier**: Female Anopheles mosquito.
- **Treatment**: Quinine (found in bark of cinchona tree).

Sleeping Sickness

- **Protozoa**: Trypanosoma.
- **Carrier**: Tse Tse fly.

TRICK: MaSk



Kala Azar

- **Protozoa**: Leishmania.
- **Carrier**: Sandfly.
- **Symptoms**: Enlargement of the spleen (Splenomegaly), and darkening of the skin on the hands, feet, and face.
- **Testing**: ELISA Test (Enzyme-Linked Immunosorbent Assay).

Water-borne Diseases	Air-borne Diseases
Hepatitis A	Influenza
Diarrhoea	Tuberculosis
Typhoid	Measles
Cholera	Pertussis
Giardiasis	Chickenpox
	Covid-19

GENETIC Disorders

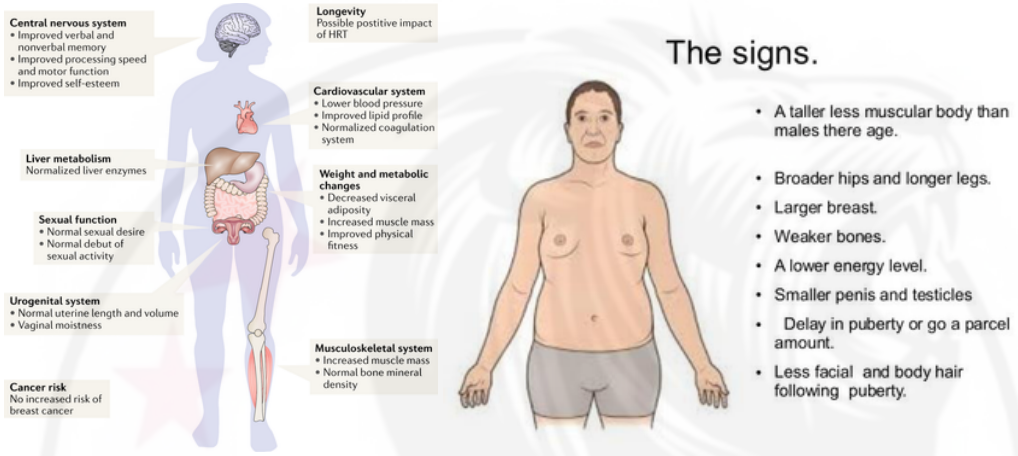
1. **Chromosomes**: Disorders in chromosomes.

- **Autosomal disorders-**
  - A genetic disorder that occurs when a gene on a **non-sex chromosome** is muted.
  - **E.g.** Down's syndrome: The person has an extra copy (or partial copy) of chromosome 21 (Trisomy 21) for a total of 47 chromosomes instead of 46; Albinism (the body makes little or no melanin).

- **Sex linked disorders-**
  - Disorders that affect the sex chromosomes.
  - **E.g.**
    - **Turner's syndrome**: One X chromosome is missing in females (XO);
    - **Klinefelter's syndrome**: One extra X chromosome is present in males (XXY).
  - **Haemophilia** affects the recessive gene located on X chromosome. It is a rare disorder in which the blood does not clot.

Chromosomes are primarily composed of DNA and proteins.

Turner's Syndrome **Klinefelter's Syndrome**



2. **Mendelian Disorders**: Disorders that may occur mainly by the alteration or mutation in a single gene.
   - **E.g.** Sickle cell anaemia, Thalassemia, Colour blindness, Haemophilia, etc.

Glaucoma

- It is a disease that damages the eye's optic nerve leading to vision loss or blindness (usually a genetic disorder).
- Glaucoma is caused when there is an increase in eye fluid pressure
- (Trachoma is another disease in which fluid pressure of eye increases but due to a bacteria called Chlamydia trachomatis).

A **tonometer** is a medical device used to measure the pressure inside the eye, known as **Intraocular Pressure (IOP)**.

Pandemic, Epidemic, Endemic

Pandemic	Epidemic	Endemic
Sudden increase in cases across several countries, continents, or the world	Sudden increase in cases spreading through a large population	The diseases that are constantly present in a population or region with relatively low spread

Some other diseases

Wilson Disease

- Wilson disease is a rare, autosomal recessive disorder caused by abnormal copper accumulation in the body particularly involving the brain, liver, and cornea.

Mad Hatter Disease

- Mad hatter's disease refers to neurological symptoms of mercury poisoning (also responsible for Minamata Disease) over a long period of exposure.

Siderosis Disease

- It is caused due to excessive deposition of iron in body tissue.

Itai Itai

- It is caused due to cadmium deposition.

Blue Baby Syndrome

- It is caused due to nitrate deposition.

Patau syndrome

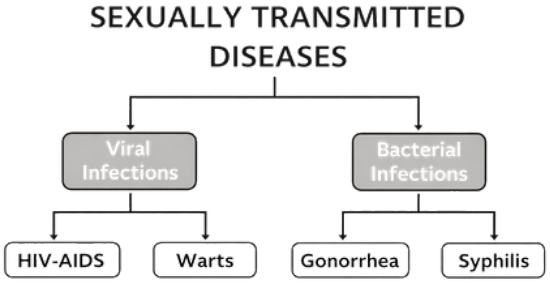
- Patau syndrome, also known as trisomy 13, is a genetic disorder caused by having an extra copy of chromosome 13.

Charcot-Marie-Tooth disease

- Charcot-Marie-Tooth disease is caused by duplication of the peripheral myelin protein-22 (PMP22) gene on chromosome 17.

SEXUALLY TRANSMITTED DISEASE

- Warts are small, hard bumps on the skin caused by an infection with the Human Papillomavirus (HPV).
- Gonorrhea is a bacterial infection that primarily affects the mucous membranes of the reproductive tract.
- Syphilis is a serious sexually transmitted infection (STI) caused by the bacterium called Treponema pallidum. initially affecting skin and mucous membranes and later multiple organs.



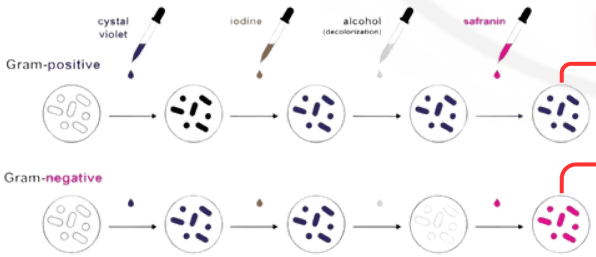
DISEASES IN PLANTS

Disease	Causal Organism	Affects
Citrus canker	Bacteria	Affects Citrus fruits
Rust of wheat	Fungus	-
Yellow vein mosaic	Virus	Affects okra plants
Aster Yellow	Bacteria	-
Crown Gall	Bacteria	-
Ergot	Fungus	Affects bajra plants
Snow mold	Fungus	-
Black knot	Fungus	-
Blight	Fungus/Bacteria	-
Tobacco mosaic virus	Fungus	Tobacco plant

GRAM STAINING OF BACTERIA

- Gram staining is a major technique used to identify bacteria. It divides them into two groups based on the structure of their cell wall.
  - **Gram-positive (purple/blue):** Thick peptidoglycan layer.
  - **Gram-negative (pink/red):** Thin peptidoglycan layer + outer lipid membrane.

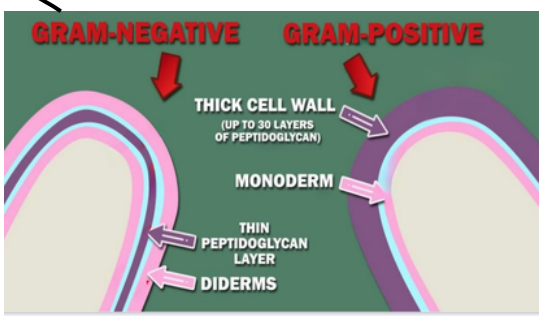
Gram Staining of Bacteria



It retains its purple colour.

It turns pink in colour.

They are more resistant to antibiotics.



Examples:

- **Gram-positive:** Staphylococcus, Streptococcus, Bacillus.
- **Gram-negative:** Escherichia coli, Salmonella, Vibrio cholerae.

Father of Microbiology – Antonie van Leeuwenhoek



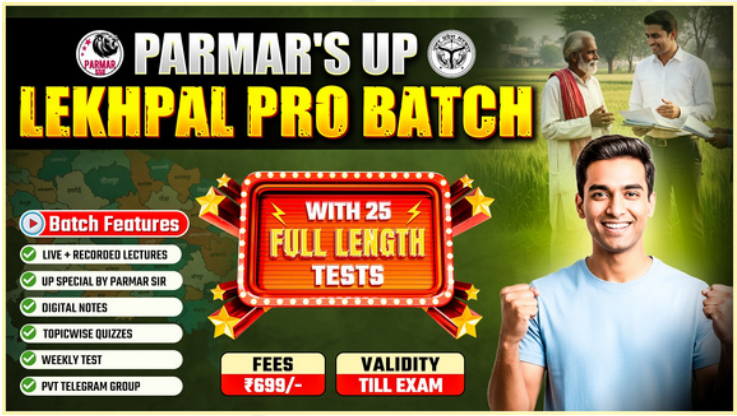


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