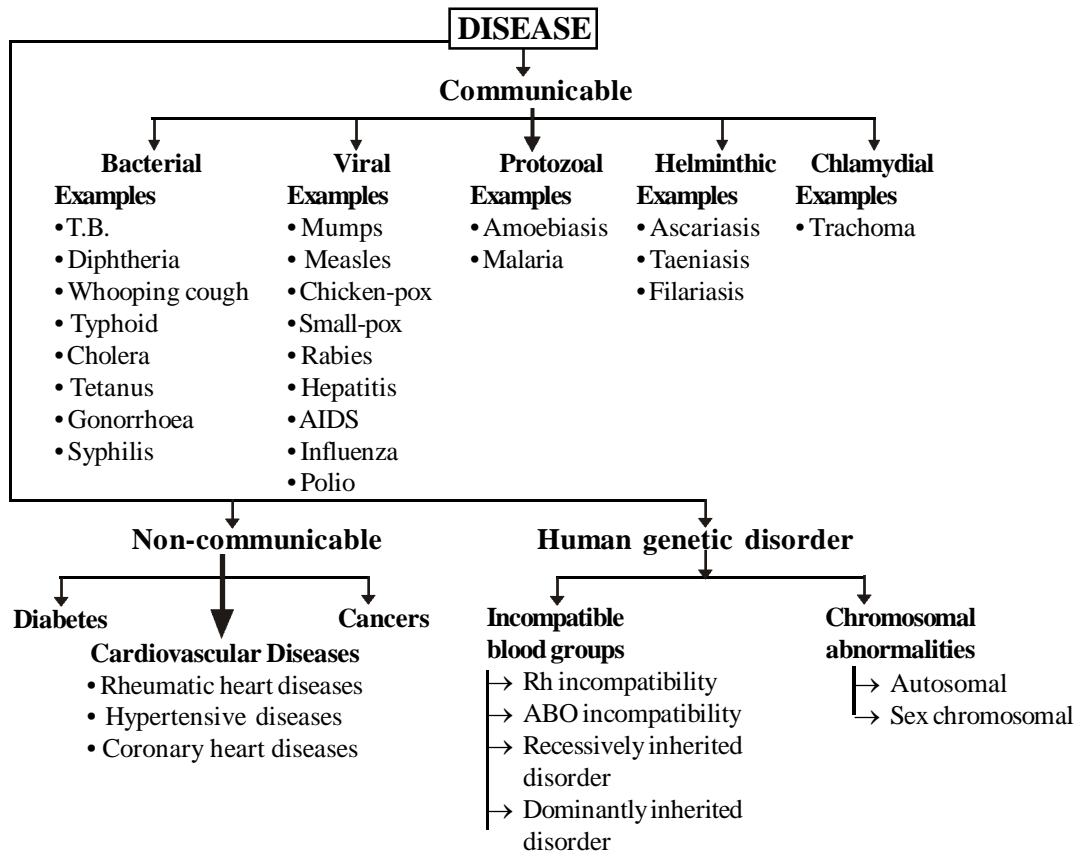


Diseases and their Defence Mechanism

- **Health** is a state of complete physical, social and mental well being and not merely the absence of disease or infirmity.
- **Disease** is any condition which interferes with the normal structure and function of the body that is manifested by a characteristics sets of symptoms and sign.



Bacterial Diseases

- **Typhoid** : Typhoid is caused by *Salmonella typhi*. Typhoid spreads through food, milk and water contaminated with intestinal discharges either directly or through flies and personal hygiene. Typhoid is diagnosed with **widal test**.
- **Pneumonia** : It is caused by *Streptococcus pneumonia* or *Haemophilus influenza*. It infects alveoli of lungs and spread by coughs, sneezes, by sharing drinking glasses and eating utensils with an infected person and contact with used tissue or handkerchiefs.

Viral Diseases

- Rhinoviruses causes one of the most infectious disease called **common cold**. Rhinovirus is spread from one person to another by hand to hand contact or from one person sneezing close by another person.

Protozoan Diseases

Malaria : It is caused by *Plasmodium* species & spread through female *Anopheles* mosquito. Primary host are female mosquito of genus *Anopheles* and humans acts as intermediate host.

- Malaria result in anaemia, toxemia and splenomegaly (enlarged spleen).
- *Plasmodium* enters the human body as sporozoites (**infectious form**) through the bite of infected female *Anopheles* mosquito. *Plasmodium* sporozoites enters the bloodstream and travel to liver where they divide repeatedly & other attack the red blood cells resulting in their rupture.

Amoebic Dysentery or Amoebiasis

- It is caused by *Entamoeba histolytica*. It is a protozoan parasite in the large intestine of human.

Helminthic Diseases

Filariasis

- Filariasis is caused by *Wuchereria bancrofti*.

Fungal Diseases

- Fungi causes diseases and these are known as **mycosis**.
- Microsporum*, *Trichophyton* and *Epidermo-phyton* are responsible for ringworms, which is characterized by appearance of dry scaly lesions of the skin, nails and scalps.

Sexually Transmitted Diseases

- Sexually transmitted diseases (STDs) are a group of communicable diseases that are transmitted mainly by sexual contact. STDs are caused by a wide range of bacterial, viral, protozoal and fungal agents.

STDs

Pathogen

Syphilis	<i>Treponema pallidum</i> (bacterium)
Gonorrhoea	<i>Neisseria gonorrhoeae</i> (bacterium)
Vaginitis	<i>Candida albicans</i> (fungus)
AIDS	Human immunodeficiency virus (virus)

Diabetes mellitus

- It is caused by the deficiency of insulin hormone and is characterized by excessive concentration of sugar in the blood and urine. **Diabetes insipidus**, on the other hand, is characterized by excessive urination, urine being sugar-free and is caused by the deficiency of ADH.

Cancer

- Cancer** is not inheritable.
- The non-regulated growth of the cells that accompanies cellular transformation produces **tumours or neoplasms**, each tumour being the product of proliferation of a single abnormal cell.
- Tumours are of two types – **benign** and **malignant**.
- Benign tumour** cells is a large localized mass of abnormal tissue enclosed in connective tissue which does not spread to distant sites.
- Malignant tumour** cells are cancer cells that spread to and take up residence in neighbouring tissues - a condition called **metastasis**.
- Agents that cause cancers are called **carcinogens**. UV radiations, smoking, mustard gas, soot, viruses, coal tar, aflatoxins and industrial pollutants are known to be carcinogenic.
- Cancer can be detected by**
 - biopsy and histopathological studies of the tissue.
 - blood and bone marrow tests for increased cell counts as in Leukaemia.
 - use of techniques like radiography, magnetic resonance imaging (MRI) and computed tomography (CT) for cancer of internal organs.

Treatment of Cancer

- Therapy used in the treatment of cancer are surgery, radiotherapy, chemotherapy, immuno-therapy, hormonal therapy, etc.

AIDS

- AIDS** is caused by Human Immunodeficiency Virus (HIV) which is retrovirus.

Life Cycle of HIV

- The virus after getting into the body of a person, enters the macrophages.
- The person becomes easily infected by bacteria like mycobacterium, viruses and even parasites like *Toxoplasma*.
- The person is unable to protect himself/herself against any infection.
- AIDS is diagnosed by **ELISA** (Enzyme Linked Immunosorbent Assay).

Prevention of AIDS

- World Health Organisation (WHO) has started a number of programmes to prevent spreading HIV infection; some such steps include :
 - ensuring use of disposable needles and syringes.
 - checking blood for HIV.
 - free distributions of condoms and advocating safe sex.
 - controlling drug abuse.
 - promoting regular check-up for HIV in susceptible populations, etc.
- Treatment with anti-retroviral drugs is only partially effective; they can only prolong the life of the patient and cannot prevent death.

Immunity

- The term **immunity** refers to the specific resistance exhibited by the host towards infections by micro-organisms (pathogens) and their products.

Innate or Natural Immunity

- Innate immunity** is developed in an individual without having the disease or immunization, *e.g.*, recreation of sweat glands contain certain chemical substances which prevent the entry of micro-organisms.
- It is present from birth.
- It is the general defence of body including the following four mechanism —
 - Phagocytosis** of invaders by leucocytes and macrophages (called *cellular barrier*).
 - Resistance of skin to invading micro-organisms (called *physical barrier*).
 - Destruction of micro-organisms swallowed with food by the HCl of gastric juice & by digestive enzymes and tear from eye (called *physiological barriers*).
 - Virus infected cells secrete proteins (called interferons) which protect non-infected cells from further viral infection (*cytokine barriers*).

Acquired Immunity

- It is a third line defence and developed by an animal in response to a disease caused by infections of microbes.
- The resistance against infectious disease that an individual acquires during life is known as **acquired immunity**.

Antibody Mediated Immunity

- B cells produce specialized proteins called antibodies (immunoglobulin) which are glycoproteins.

Classification of Antibodies :

- Ig A** – Protects from inhaled or ingested pathogens.
- Ig D** – Present on lymphocyte surface as receptors, activation of B cells.
- Ig E** – Mediator in allergic response.

Diseases and their Defence Mechanism

- (d) **Ig G** – Stimulation of phagocytes and complement system, passive immunity to foetus.
- (e) **Ig M** – Activation of B cells.

Immunization

- Inoculation of vaccines to prevent diseases is called **immunization**.
- **Vaccines** are preparations of living or killed micro-organisms or their products. Vaccines are of two types – live vaccines and killed vaccines.

- **Genetic vaccines** involve one or more genes from diseases carrying agent (pathogen) and splicing these gene into plasmids (closed rings of DNA). These rings are then delivered into small groups of cell, often by infection into muscle cells or by propulsion into *via* so called '**gene gun**'.

Allergy and Autoimmunity

- Allergy is an important side effect of immunity.
- Autoimmune disease result when the immune system attack and destroys 'self' cells and molecules. Eg., rheumatoid arthritis.

Drugs and Alcohol Abuse

Major groups of psychotropic drugs, their examples and effects

Types of drug	Examples	Effects
1. Sedatives and tranquilizers (depressants)	Benzodiazepines (<i>e.g.</i> Valium), Barbiturates	(i) Depress brain activity (ii) Produce feelings of calmness, relaxation, and drowsiness
2. Opiate narcotics	Opium, Morphine, Heroin, Pentidine, Methadone	(i) Suppress brain function (ii) Relieve intense pain (iii) Causes loss of weight, sterility and lack of interest in work.
3. Stimulants	Caffeine (very mild), Cocaine, Amphetamines	(i) Stimulates the nervous system (ii) Make a person more wakeful (iii) Increase alertness and activity (iv) Produce excitement
4. Hallucinogens	LSD, Marijuana, Charas, Bhang, Hashish	(i) Alter thoughts, feelings and perceptions.

EXERCISE

- Vaccines are
 - treated bacteria or viruses or one of their proteins
 - MHC (major histocompatibility complex) proteins
 - curative medicines
 - monoclonal antibodies
- Which of the following is a sexually transmitted disease ?
 - Q fever
 - Leprosy
 - Whooping cough
 - Gonorrhoea
- Which of the following is a pair of viral diseases?
 - Common cold, AIDS
 - Dysentery, common cold
 - Typhoid, tuberculosis
 - Ringworm, AIDS
- Which of the following is most infectious disease?
 - Hepatitis - B
 - AIDS
 - Amoebiasis
 - Malaria
- The formation of antibodies within our body is called
 - active immunity
 - passive immunity
 - innate immunity
 - acquired immunity
- 'Malaria' a common disease world wide is caused by a
 - bacterium
 - virion
 - protozoa
 - fungi
- Which of the following diseases is due to an allergic reaction?
 - Goitre
 - Skin cancer
 - Hay fever
 - Enteric fever
- Which immunoglobulin (Ig) is produced in primary immune response?
 - IgA
 - IgE
 - IgG
 - IgM
- Expand ELISA
 - Enzyme Linked Immuno - Sorbent Assay
 - Enzyme Linked Ion Sorbent Assay
 - Enzyme Linked Inductive Assay
 - None of the above
- Which one of the following is an Indian medicinal plant ?
 - Saccharum officinarum*
 - Rauwolfia serpentina*
 - Oryza sativa*
 - Solanum melongena*
- AIDS is caused by HIV that principally infects
 - all lymphocytes
 - activator B cells
 - cytotoxic T cells
 - T₄ lymphocytes
- Widal test is used for the diagnosis of
 - malaria
 - pneumonia
 - tuberculosis
 - typhoid
- Who invented vaccine for small pox ?
 - Robert Koch
 - Robert Hooke
 - Edward Jener
 - Louis Pasteur
- Which of the following diseases is also known as infantile paralysis?
 - Lock jaw
 - Rabies
 - Polio
 - Chicken pox
- Which of the following is not a communicable disease ?
 - Typhoid
 - Malaria
 - AIDS
 - Goitre

16. Against which of the following does *interferon* act ?
(a) Bacteria (b) Virus
(c) Fungi (d) Snake venom
17. Which of the following disease is a hormonal disorder ?
(a) Anaemia (b) Cholera
(c) Diabetes (d) Goitre
18. AIDS day is
(a) June 1 (b) May 1
(c) December 1 (d) December 20
19. Which one of the following pairs of disease can spread through blood transfusion?
(a) Cholera and hepatitis
(b) Hepatitis and AIDS
(c) Diabetes mellitus and malaria
(d) Hay fever and AIDS
20. Which of the following diseases is caused by Protozoa ?
(a) Chicken pox (b) Measles
(c) Filariasis (d) Sleeping sickness
21. Cancer of blood is called
(a) Leukemia (b) Lymphoma
(c) Sarcoma (d) Hybridoma
22. DPT vaccine is given for
(a) Tetanus, polio, plague
(b) Diphtheria, whooping cough and leprosy
(c) Diphtheria, pneumonia, tetanus
(d) Diphtheria, whooping cough, tetanus
23. Which is an autoimmune disease?
(a) Cancer (b) Asthma
(c) *Erythroblastosis foetalis* (d) *Rheumatoid arthritis*
24. The jaundice is a physiological liver disease. It is caused by a
(a) Bacterium (b) Virus
(c) Protozoan (d) Helminth
25. A certain patient is suspected to be suffering from Acquired Immuno Deficiency Syndrome. Which diagnostic technique will you recommend for its detection?
(a) ELISA (b) MRI
(c) Ultra sound (d) Widal test
26. Tobacco smoke contains carbon monoxide which
(a) reduces the oxygen-carrying capacity of blood
(b) Causes gastric ulcers
(c) Raises blood pressure
(d) is carcinogenic
27. In persons addicted to alcohol, the liver gets damaged because it
(a) has to detoxify the alcohol
(b) stores excess of glycogen
(c) is over stimulated to secrete more bile
(d) accumulates excess of fats
28. Community health aims at
(a) better health and family planning
(b) better hygiene and clean environment
(c) removing communicable diseases
(d) All of the above
29. Tuberculosis is caused by
(a) Bacterium (b) Virus
(c) Protozoan (d) Malnutrition
30. 'Plague' is transmitted by
(a) House fly (b) Tse-tse fly
(c) Rat flea (d) Mosquito
31. 'Black death' is related with
(a) Plague (b) Cancer
(c) Tuberculosis (d) Measles
32. Cholera, leprosy and diphtheria are
(a) Bacteria diseases (b) Viral diseases
(c) Fungal diseases (d) Functional diseases
33. The group of diseases spread by houseflies is
(a) Malaria, Cholera, Scabies
(b) Rabies, Rickets, Diarrhoea
(c) Typhoid, Dysentery, Tuberculosis
(d) Ringworm, Scurvy, Vomiting
34. Which of the following is a communicable disease?
(a) Leucoderma (white patches on the skin)
(b) Diabetes mellitus
(c) Beri-beri
(d) Dysentery
35. Which scientist is credited with the development of medical vaccinations?
(a) Robert Koch (b) Charles Darwin
(c) Edward Jenner (d) William Harvey

ANSWER KEY

1	(a)	6	(c)	11	(d)	16	(b)	21	(a)	26	(a)	31	(a)
2	(d)	7	(c)	12	(d)	17	(c)	22	(d)	27	(c)	32	(a)
3	(a)	8	(d)	13	(c)	18	(c)	23	(c)	28	(d)	33	(c)
4	(a)	9	(a)	14	(c)	19	(b)	24	(a)	29	(a)	34	(a)
5	(a)	10	(b)	15	(d)	20	(d)	25	(a)	30	(c)	35	(c)

HINTS AND SOLUTIONS

1. (a) Vaccine contains dead, attenuated form or antigen of a pathogen which can be injected to provide immunity towards that pathogen. Monoclonal antibodies are homogenous immunological reagents of defined specificity, so that these can be utilized for diagnosis and screening with certainty.
2. (d) A common sexually transmitted disease most often affecting the genitourinary tract and occasionally, the pharynx, conjunctiva, or rectum.
4. (a) We know that HBV causes serum hepatitis. It is most frequently transmitted by blood or by blood contaminated instruments.
7. (c) Hay fever is due to some fungal spores sensitivity, which is an allergic disease with symptoms of bronchial asthma and skin rashes and also with increase in eosinophil (white cells) of blood.
10. (b) *Rauwolfia serpentina* belong to family Apocynaceae, its roots yield a chemical useful for high blood pressure.
11. (d) AIDS virus infects T_4 lymphocytes (also called Helper cells). Cytotoxic T cells called T_8 lymphocytes.
12. (d) Widal test is used for the diagnosis of typhoid. It is an agglutination test for the presence of antibodies against the *Salmonella* organisms, which cause typhoid fever.
13. (c) Edward Jenner is known as father of Immunology.
14. (c) Polio results in paralysis of limbs in infants.
15. (d) Goitre is caused due to deficiency of Iodine.
16. (b) The host cell invaded by a virus produces an antiviral protein called interferon which prevents the viral multiplication.
17. (c) Diabetes is caused due to increased glucose level in blood when insulin is not produced by pancreas in required amount.
20. (d) Sleeping sickness is caused by *Trypanosoma*.
25. (a) ELISA is an fundamental tool of clinical immunology and is used as an initial screen for HIV detection.
35. (c) Edward Jenner was the first person to vaccinate people against disease.