HUMAN HEALTH AND DISEASE

Class-XII Chapter-8 (Quick Revision Note)

The state of complete physical, mental and social well beings is called health. Health simply does not simply means disease free condition or physical fitness. Health is affected by-

a. Genetic disorders – the defect which child inherits from it parents.

b. Infection from microbes or other organisms.

c. Life style- includes food and water we take, exercise and rest.

Good health can be maintained by

- Balanced diet.
- Personal hygiene
- Regular exercise
- Awareness about the disease and their effect
- Immunization against the infectious disease
- Proper disposal of wastage
- Control of vectors
- Maintenance of hygienic food and water.

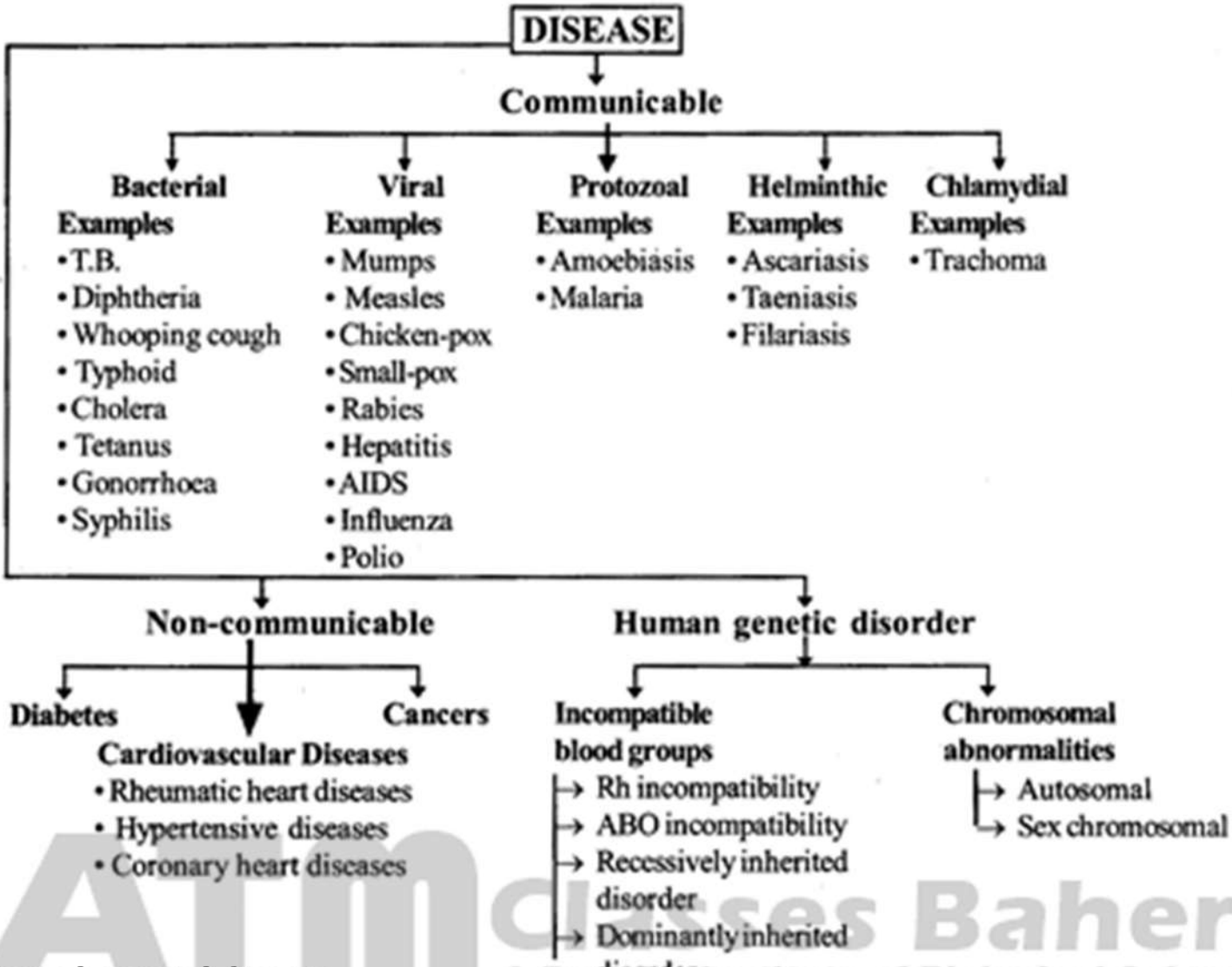
Disease - Diseases can be broadly grouped into infectious and non-infectious.

a) Infectious disease -Diseases which are easily transmitted from one person to another, are called infectious diseases e.g AIDS, common cold, malaria, tuberculosis etc

b) Non-infectious disease – Diseases which cannot transmitted from one person to another, are called non- infectious diseases e.g cancer, hypertension, diabetes etc.

Common Diseases in Humans:

- The disease causing microorganisms like bacteria, virus, fungus, protozoa, helminthes are called pathogen.
- The pathogen can enter the body by various means and multiply and interfere with



Some bacterial disease -

S. No.	Disease	Pathogen	Habitat	Main Symptoms	Mode of Infection	I. P.
1.	Cholera (Haiza)	Comma shaped -*Vibrio comma (V.cholerae)*	Intestine and parts of digestive tracts	Severe diarrhoea and vomiting	Contaminated food and water	2 to 3 days
2.	Pneumonia	*Diplococcus or Streptococcus pneumoniae*	Lungs	Sudden chill, chest pain, difficulty in breathing	Patient's sputum	1 to 3 days
3.	Typhoid	Rod like motile *Salmonella typhi*	Intestine	Constant fever	Contaminated food and water either directly or through flies.	1 to 3 weeks
4.	Tetanus (Lockjaw)	*Clostridium tetani*	Tissues	Painful muscular spasms and paralysis	Through wounds and burns or by use of improperly sterilized surgical instruments.	4 days to 3 weeks
5.	Diphtheria	*Corynebacterium diphtheriae* (gram + ve)	Mucous membrane of nose, throat & tonsils	Sore throat, difficulty in breathing	Oral & nasal discharges	2 to 5 days

S. No.	Disease	Pathogen	Habitat	Main Symptoms	Mode of Infection	I. P.
6.	Whooping cough (pertussis)	*Bordetella pertussis* or *Haemophilus pertussis*	Respiratory tract	Severe coughing, characteristic gasping 'whoop'	Throat discharges and contact	10 to 16 days
7.	Tuberculosis	*Mycobacterium tuberculosis* (rod shaped). The bacteria damage tissue and releases a toxin named **tuberculin** which produces the diseases.	Lungs	Cough, bloody sputum, chest pain, loss of weight	Patient's sputum	Variable
8.	Plague (Also called **black death)**	*Pasteurella pestis*	Blood and lymph	Painful pubo of lymph nodes	Rat-flea (*Xenopsylla cheopsis*) bite on lower extremities. Head louse *(Pediculus* and bedbug *(Cimex)* may also transmit the germ from man to man	2 to 6 days
9.	Leprosy (Discovered by Hansen)	*Mycobacterium leprae*	Skin, mucous membranes, peripheral nerves	Hypopigmented skin patches, ulcers, deformity of digits	Long and close contact with patients	2 to 5 years
10.	Syphilis	*Treponema pallidium*	Oral, genital, rectal mucosa	Lesions, ulcers on genitalia	Contact	3 to 5 weeks
11.	Gonorrhoea	*Neisseria gonorrhoeae*	Urinogenital mucosa	Burning sensation in micturition	Sexual contact	2 to 5 days
12.	Diarrhoeal diseases	*Shigella dysenteriae, Salmonella, Escherichia coli, Campylobacter*	Intestine	Food poisoning, abdominal cramps, diarrhoea.	Contaminated food, water, hands, fomite	

VIRAL DISEASES -

Viral diseases are transmitted by contact fomite and droplet method. Types of viral disease are-influenza, small pox, etc.

S. No.	Disease	Pathogen	Habitat	Main Symptoms	Mode of Infection	I. P.
1.	Influenza (Flu)	*Myxovirus Influenzae*	Mucous membrane of respiratory tract	Nasal discharge, sneezing, coughing, fever, body ache	By droplets from nose & throat	24 to 72 hours
2.	Smallpox (highly contagious disease)	*Variola virus*		Skin rash changing to pustules, then to scabs	By contact, droplets and fomite	12 days
3.	Chicken pox	*Varicella zoster* (DNA virus)		Skin sores that open & emit fluid	By contact	2 to 5 weeks
4.	Measles	*Rubeola virus*		Fever, inflammation of nasal mucous membrane, loss of appetite. Red watery eyes, skin rash	By droplets from nose & throat	10-14 days

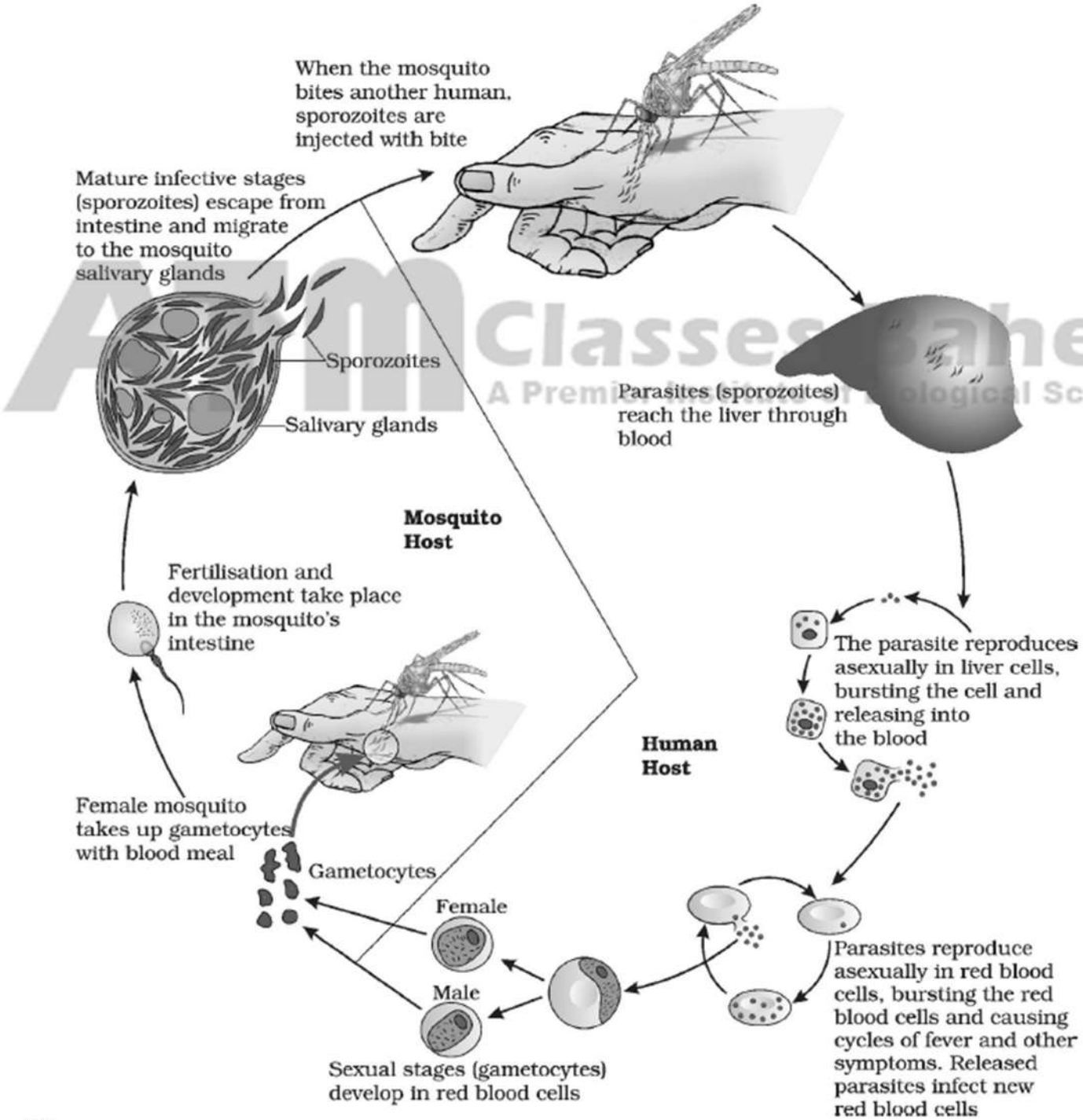
S. No.	Disease	Pathogen	Habitat	Main Symptoms	Mode of Infection	I. P.
5.	Rabies (Hydrophobia)	*Rabies virus*	Brain & spinal cord cells	Biting behaviour, fear of water, inability to swallow. Severe headache.	Biting or saliva of rabid dog, monkey, cat etc.	1 to 3 months
6.	Mumps (Infectious parotitis)	*Paramyxo virus*	Salivary glands	Painful enlargement of parotid glands, difficulty in opening mouth	By contact and droplets from throat	12 to 26 days
7.	Poliomyelitis (polio) (Highly infectious disease of infants and childrens)	*Polio virus*	Nerve cells	Inflammation of nervous system, muscle shrinkage, limb paralysis	By contaminated food & water	7 to 14 days
8.	Trachoma	*Chlamydia trachomatis*	Eyelids, conjunctiva & cornea of eye	Granules on inner surface of eyelids, watery eyes	By contact	5 to 12 days
9.	Dengue	*Arbo virus (RNA)*		Mild conjunctivitis, high fever, backache, nausea, vomiting etc.	Biting of female mosquito. *Aedes aegypti*	4-10 days
10.	Yellow fever	*Arbo* virus		Headache, vomiting, fever, rupture of veins in kidney, spleen, liver etc.	Infected *Aedes aegypti*	3-6 days
11.	Hepatitis (Epidemic jaundice)	Infectious & serum hepatitis viruses (A, B, C, D & E)	Liver	Jaundice due to damaged liver cells	By contaminated food and water	20 to 35 days
	– Hepatitis A (also called catarrhal jaundice)	A virus	Liver	Hepatic anorexia resulting in liver damage	Faecal oral route	2-4 Weeks
	– Hepatitis B	B virus	Liver	Swelling of liver cells	Infected blood, tattoos, contact	2-6 Months
	– Hepatitis C	C-virus	Liver	It may have no symptoms, but can experience abdominal pain depression or weight loss, etc	Contact with infected blood	1-6 Months
	– Hepatitis D	Infection of D-virus and B-virus	Liver	Same as those of hepatitis B	Contact with infected blood	2-5 Months
	– Hepatitis E		Liver	Similar to those of hepatitis A	Faecal contaminated water and food	5-6 weeks

PROTOZOAN DISEASE

These are caused by protists. They include malaria, amoebiasis, giardiasis, kala azar, Ciliary dysentery, trypanosomiasis etc.

(a) Malaria

- Laveran (1880) discovered malarial parasite in blood of malaria patient. Pfeiffer (1892) proposed that malaria is spread by blood sucking insect. Discovery of Plasmodium and its transmission by Anopheles (female) was confirmed by Ronald Ross (1897). Malaria is caused by the toxins produced in the human body by the malarial parasites, Plasmodium. The malarial parasites are carried from the infected to the healthy persons by the female Anopheles mosquito. The mosquito picks up the parasites with the blood, when it bites an infected person. When this infected mosquito bites a healthy person, parasites migrate into his blood with the saliva, which the mosquito injects before sucking up blood to prevent its clotting.



- There are four species of Plasmodium, which cause different kinds of human malaria.

(I) P. vivax : It causes benign tertian malaria, which attacks every third day, i.e., after 48 hours. The fever is mild and seldom fatal. This species is wide-spread in the tropical and temperate regions.

(II) P. ovale : It also causes benign tertian malaria, which recurs every 48 hours. This species is found only in West Africa and South America.

(III) P. malariae : It causes quartan malaria, which recurs every fourth day, i.e., after 72 hours. This species is found in both tropical and temperate regions, but it is not very common.

(IV) P. falciparum : It alone is capable of causing three types of malaria, viz., quartan malaria, which attacks almost daily, malignant tertian malaria, which occurs every 48 hours, but is very severe and often fatal; and irregular malaria. This species is found only in the tropical region.

- Malaria result in anaemia, toxaemia and splenomegaly (enlarged spleen).
- Antimalarial drugs are quinine, chloroquine etc. Dalaprim drug kills the parasitic stages present in both liver cells and RBC's of blood.

(b) Amoebiasis

It is caused by intestinal endoparasitic protozoan Entamoeba histolytica of man.

Infection is transmitted by contamination.

It is characterized by abdominal pain alternating diarrhoea and constipation etc.

Entamoeba secretes cytolysin that erodes the mucous membrane of the intestine.

(c) Giardiasis

Also called backpeper's disease, it is caused by Giardia intestinalis.

It inhabits upper part of small intestine (duodenum and jejunum)

Infection is transmitted by contamination of cysts with food and drinks.

It is characterized by mild diarrhoea.

(d) Kala azar

Kala azar or leishmaniasis is caused by Leishmania donovani and spread by sandfly (Phlebotomus)

It is characterized by fever and enlargement of visceral organs.

It is also known as dum-dum fever.

Leishmania braziliensis causes espundia and oriental sore is caused by L.tropica.

(e) Ciliary dysentery (Balantidiasis)

It is caused by Balantidium coli. It inhabits the human large intestine (colon).

Infection occurs by ingesting cysts with food and drinks.

Balantidium coli causes ulcers in the colon and invades mucous membrane by secreting an enzyme hyalurodinase. Thus, generally results in diarrhoea. Tetracycline or lodoquinol are effective treatment.

(f) Trypanosomiasis

It is caused by different species of Trypanosoma.

It is characterized by high fever, swelling of the neck and armpit, weakness, anaemia, lethargy, unconsciousness etc.

T. gambiense causes Gambian fever of West African sleeping sickness, which is spread by both sexes of tse-tse fly. Rhodesian or East African sleeping sickness, caused by T. rhodesiense is spread by G. morsitans. Chagas disease or South American sleeping sickness is caused by T. cruzi and spread by Panstrongilus sp. It is more common in children and young adults.

- Helminthes are multicellular parasites and includes roundworms and flatworms. Helminthes causes various diseases in man like, filariasis, taeniasis, ascariasis, enterobiasis etc.

(a) Filariasis

- It is caused by Wucheria bancrofti. It is also known as elephantiasis due to excessive enlargement of body parts like leg. Symptoms include fever, proliferation of endothelial cells and deposition of metabolites in the wall of lymph vessels. It is transmitted by Culex or Aedes mosquitoes.

(b) Taeniasis

- It is caused by intestinal endoparasite, Taenia solium. It is characterized by abdominal pain, indigestion, loss of appetite, nausea etc. Cysticercosis larva of Taenia causes cysticercosis which causes damage to different body parts, blindness etc.

(c) Ascariasis

- It is caused by Ascaris lumbricoides. Vectors for this disease are flies and cockroaches. It is characterized by colic pain, indigestion, diarrhoea, vomiting, weakness etc. Scratch test, dermal test and stool test can be done to detect the roundworm infection.

(d) Enterobiasis (oxyuris)

- It is caused by Enteriobius vermicularis (pin or seat worm). Its transmission is direct by contaminated food. It causes anal itching, appendicitis, nervous problem.

(e) Ancylostomiasis

- It is caused by Ancylostoma duodenale. It is transmitted by infected larva via contaminated food and vegetables. Symptoms include chronic blood loss, depletion of body's iron stores leading to anaemia, inflammation of skin etc.

(f) Schistosomiasis (Bilharzia)

- It is caused by Schistosoma haematobium. It is transmitted by snail. It is found in urinary bladder, blood vessels and causes itching, rashes, aches, fever etc.

FUNGAL DISEASES

These are caused by fungi, the non green heterotrophic organisms. They include ringworm and athlete's foot.

(a) Ringworm

- Ringworm is caused by different genera of fungi - Microsporum, Trichophyton and Epidermophyton. It is an infection of skin, hair and nails. Its symptoms includes red scaly patch or bump. Ringworm is contagious and is easily spread from one person to another, so avoid touching an infected area on another person.

(b) Athletes foot

- It is caused by a fungus called Tinea pedis. It is a very common skin condition that affect the sole of the foot and the skin between the toes. Common symptoms include various degrees of itching and burning.

NON COMMUNICABLE (NON-INFECTIOUS) DISEASES

-These diseases remain confined to the person who develops them and do not spread to others. The main non-communicable diseases are diabetes, inflammatory diseases of joints such as arthritis, gout, cardiovascular diseases and cancer.

(a) Diabetes Mellitus

- Diabetes is characterized by chronic hyperglycemia which is excessive concentration of glucose in the blood. Diabetes is primarily a result of relative or complete lack of insulin secretion by the ß cells of islets of Langerhans in pancreas. Diabetes is established by blood and urine sugar levels.

(b) Arthritis

- Arthritis is any inflammatory condition of the joints characterized by pain and swelling.

Types of arthritis are : rheumatoid arthritis, osteoarthritis and gout. There is no cure for arthritis, drugs are available which relieve pain.

1. Rheumatoid arthritis

- It is characterized by inflammation of the synovial membrane. A kind of rheumatoid arthritis that occurs in younger people is Still's disease. It usually starts in the small joints in the hand and progress to other body joints.

2. Osteoarthritis

- It is a common disease among the elderly persons resulting from erosion of articular cartilage. In osteoarthritis, the secretion of lubricating synovial fluid between the bones at the joint stops. The joints become inflammed, its movement becomes painful and its function is diminished. It is common in old person, mainly affecting weight bearing joints.

3.Gout

- Gout results from accumulation of uric acid crystals in the synovial joints. Gout is a disease associated with an inborn error of uric acid metabolism that increases production or interferes with excretion of uric acid. It is very painful, particularly at night and make movement difficult. Gout generally affects the great toe.

IMMUNE SYSTEM

Immunity – the ability of host cells to fight the disease causing microorganism due to immune system is called immunity. There are two types of immunity-

Innate immunity - non-specific types of defence presents at the time of birth and provide different kinds of barriers to the entry of foreign agents into the body. it consists of four types of barrier-

a. Physical barrier- skin, mucus coating of epithelium lining the respiratory, gastrointestinal and urogenital tract.

b. Physiological barrier- acid in stomach and saliva in mouth.

c. Cellular barrier- leucocytes, neutrophils, monocytes.

d. Cytokine barriers- virus infected cells secretes protein called interferon.

No	Innate Immunity	Acquired (Adaptive) Immunity
1	Present from birth itself	Develops during life time
2	The immunity remains throughout life.	Can be short lived or lifelong.
3	Contact or exposure with pathogen or its antigen is not essential.	Contact with pathogen or its antigen is essential.
4	Innate immunity is inheritable.	Acquired immunity cannot be passed to the next generation except for a brief period to neonates.
5	It protects the individuals from contraction of diseases of other organisms.	It protects the individuals from pathogens present on other members of the same species.

Acquired Immunity- pathogen specific defence characterised by memory. When our body encounters a pathogen first time produces a response called primary response of low intensity. Subsequent encounter by same pathogen produce highly intensified response called secondary response or anamnestic response due to memory of first encounter.

Primary and secondary responses are carried out with the help of B-lymphocytes and T-lymphocytes. B-lymphocytes produce army of protein called antibodies each having two light and two heavy chains.

It involves two types of lymphocytes –

- B lymphocytes: Show humoral immune response (HI)
- T lymphocytes: Show cell mediated immunity (CMI)

Structure of Antibodies

- The antibodies are protein molecules called immunoglobulins and are of various types like IgA, IgM, IgE, IgG.

- Each antibody molecule consists of four polypeptide chains, two are long called heavy chains and other two are short called light chains. Both are arranged in the shape of 'Y', hence an antibody is represented as H2L2.

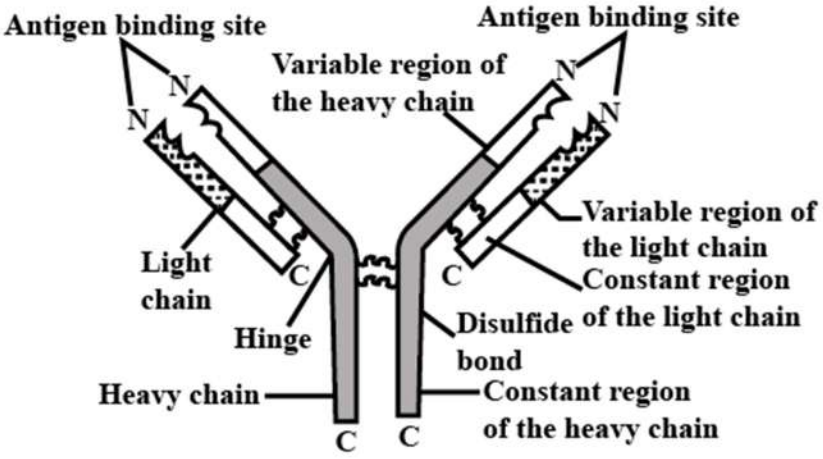


Fig. Structure of antibody

On the basis of production of antibodies, immunity can be further categorised as –

- Active immunity: Body produces its own antibodies against antigens
- Passive immunity: Readymade antibody is transferred from one individual to another
- Colostrum (contains antibodies IgA) is an example of passive immunity provided by the mother to her child.

Different types of antibodies produce in blood include IgA, IgM, IgEete. They are called humoral immune response due to presence in blood.

Human immune system can distinguish between self and foreign molecules or foreign bodies. Sometimes, due to genetic or unknown reasons, the body attack self-cells. This results in damage to the body and called auto-immune disease. Rheumatoid arthritis is due to this effect

Allergies – the exaggerated response of immune system to certain antigens present in the environment is called allergy. The substance to which such immune response is produced is called allergens. The antibodies produced due to these are IgE types. Allergy is due to secretion of chemicals like histamine and serotonin from the mast cells.

Immune system in the body- the human immune system includes lymphoid organs, tissue,

cells and soluble molecules like antibodies.

Lymphoid organs are the organs where origin and maturation and proliferation of lymphocytes occur. Primary lymphoid organs include bone marrow and thymus.

After maturation lymphocytes migrate to secondary lymphoid organ like spleen, lymph nodes, tonsils, peyer's patches of small intestine and appendix. They provide the sites for interaction lymphocyte with antigens.

There is lymphoid tissue also located within the lining of respiratory, digestive and urogenital tract called mucosal associated lymphoid tissue (MALT). It constitute 50% of lymphoid tissues in human body.

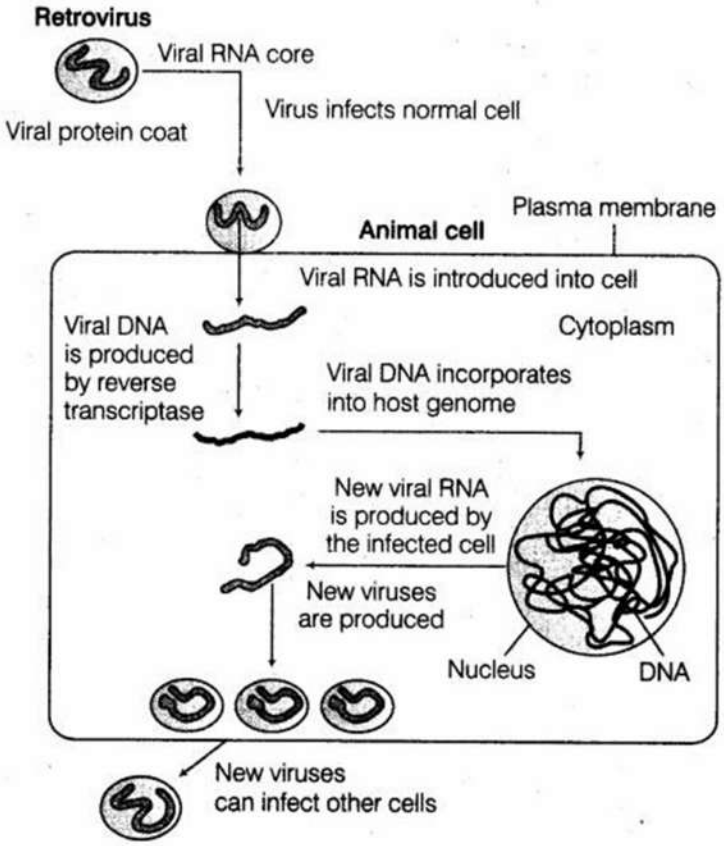
AIDS (Acquired Immuno Deficiency Syndrome) was first reported in 1981. It is caused by HIV (human Immuno deficiency virus), a retrovirus. Transmission of HIV virus occurs by-

a. Sexual contact with infected person

b. Transfusion of contaminated blood and blood products

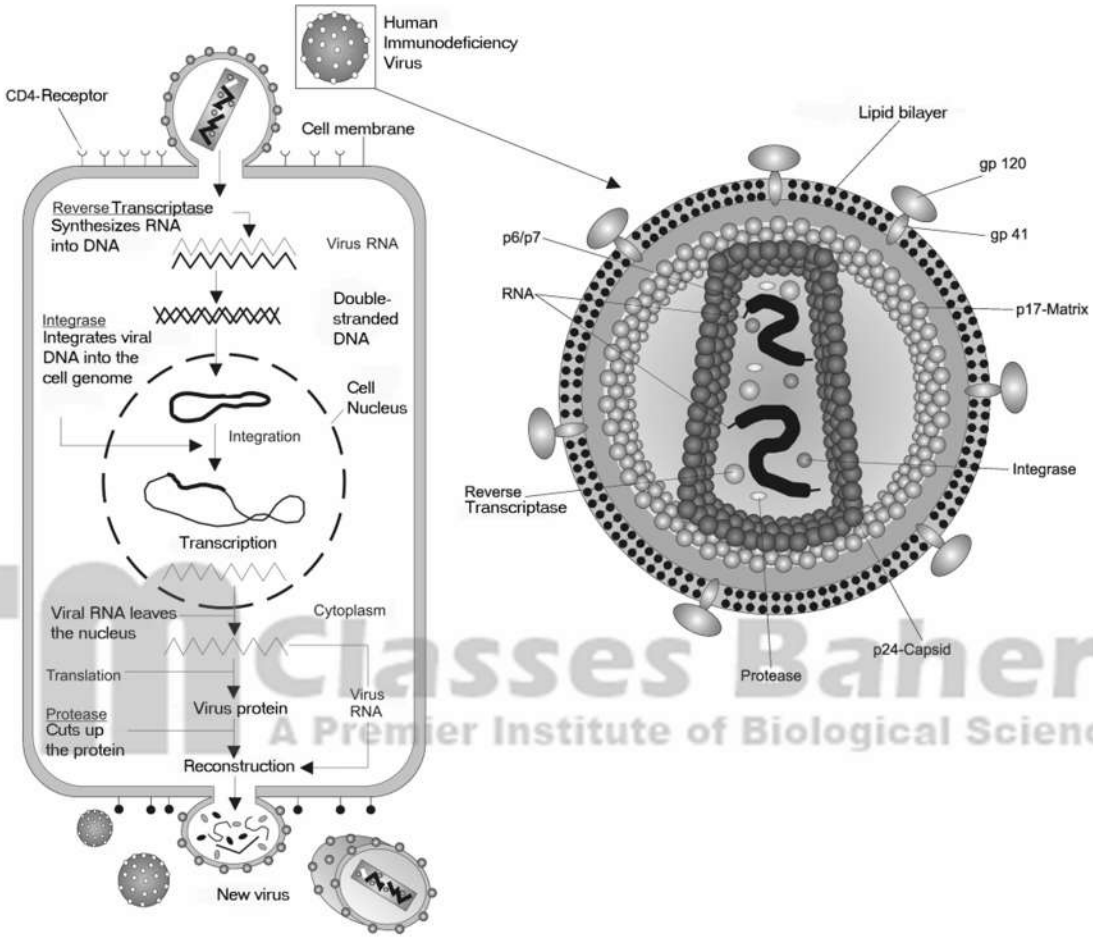
c. Sharing infected needles as in intravenous drug abusers

d. Infected mother to her child through placenta.



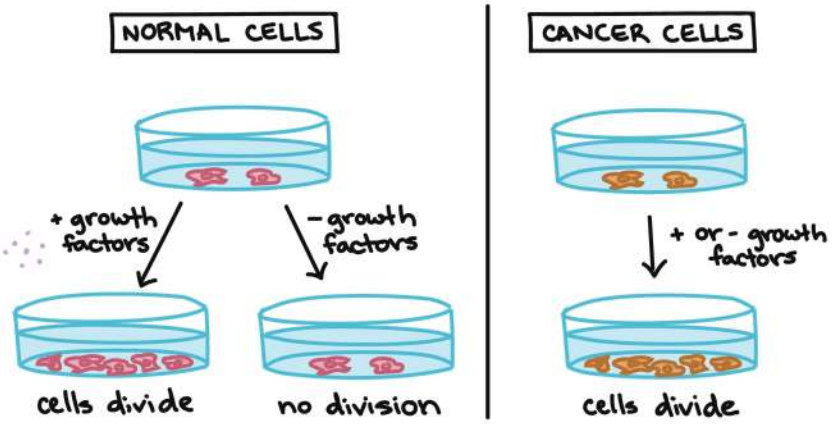
AIDS/HIV does not spread by physical contact. It spread only through body fluids. There is always time lag between infection and appearance of symptoms that may vary from 5-10 years.

Diagnostic test for AIDS is ELISA (enzyme-linked Immuno-sorbent assay). The treatment of this disease with anti-retroviral drug is partially effective and just prolonged the life but not prevents the death.

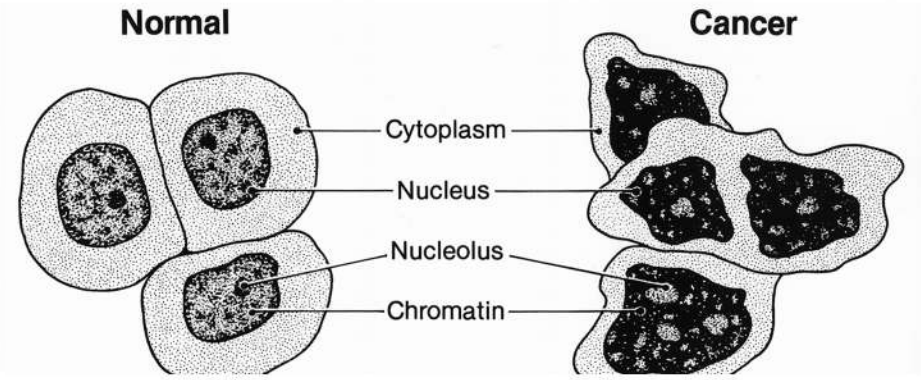


Cancer

Cancer is one of the most dreaded diseases of human beings and is a major cause of death all over the world. Normal cells show a property called contact inhibition by virtue of which contact with other cells inhibit their uncontrolled growth. Cancer cells lost this property.



	Normal cell	Cancerous cell
(i)	Normal cells divide in regulated manner.	Cancer cells divide in unregulated, uncontrolled manner.
(ii)	These cells show the property of contact inhibition *i.e.* contact with other cells inhibits their uncontrolled growth.	These cells do not respond to control mechanisms and do not show contact inhibition.
(iii)	Dividing cells remain confined to the part of the body where they are formed.	These cells show metastasis, *i.e.*, they have ability to invade new sites.
(iv)	Cells require extracellular growth factors.	These do not require extracellular growth factors.
(v)	Tumours are not formed.	They tend to form tumours.
(vi)	Normal cells have a definite life span.	Cancer cells do not have a definite life span and resist induction of cell death which promotes development of tumours.



Cancerous cells continue to divide giving rise to masses of cells called tumors. There are two kind so tumors-

(a) Benign tumors

(b) Malignant tumors

Benign Tumor	Malignant Tumor
1. It remains confined to the affected organ.	1. It also spreads to other organs of the body.
2. Rate of growth is usually slow.	2. Rate of growth is usually rapid.
3. There is no latent stage.	3. There is latent stage.
4. It causes limited damage to the body.	4. The cancer cells migrate to other sites of the body.
5. There is no metastasis.	5. There is metastasis.
6. It is non-cancerous.	6. It is cancerous.

Causes of cancer – cancerous neoplastic cell may be induced by physical, chemical and biological agents called carcinogens. Cancer causing viruses called oncogenic virus have

gene called viral oncogenes. Several genes called cellular oncogenes (c-onc) or proto oncogenes have been identified in normal cells which, when activated under certain conditions, could lead to oncogenic transformation of the cells.

Cancer detection and diagnosis-cancer detection is based on biopsy and histopathological study of the tissues, blood and bone marrow test for increased cell counts. Radiography, CT (computed tomography), MRI (magnetic resonance imaging) are very useful to cancers of internal organs.

Treatment of Cancer-

1. Surgical – cancerous tissues are surgically removed.
2. Radiotherapy – tumor cells are irradiated lethally by radiation.
3. Chemotherapy – drugs are used to kill cancerous cells, but shows side effects like hair loss, anemia, etc.
4. Immunotherapy – patients are given with alpha-interferon which activate their immune system and help in destroying the tumor

Drugs and Alcohol Abuse

Commonly abused drugs include opioids, cannabinoids and coca alkaloids obtained from flowering plants and a few from fungi.

Opioids are the drugs which bind to specific opioids receptors present in our central nervous system and gastrointestinal tract. Heroin commonly called smack is chemically diacetylmorphine which is a white, odourless, bitter crystalline compound. It is extracted from the latex of poppy plant (Papaversomniferum).Generally taken by snorting and injection, heroin is a depressant and slows down body functions.

Cannabinoids are a group of chemicals which interact with cannabinoid receptors present in the brain. Natural cannabinoids are obtained from the inflorescence of the plant cannabis sativa. They include marijuana, hashish, charas and gangja. They generally taken by inhalation and oral ingestion, these are known for their effects on cardiovascular system of the body.

Coca alkaloid or cocaine is obtained from coca plant Erythroxylum coca, native to South America. It interferes with the transport of the neuro-transmitter dopamine. Cocaine,

commonly called coke or crack is usually snorted. It has a potent stimulating action on central nervous system, producing a sense of euphoria and increased energy.

Adolescence and Drug abuse

- Adolescence is the period during which the child becomes matured.
- It is between 12 – 18 years of age.

Causes of drug abuse –

- Curiosity
- Adventure
- Excitement
- Experimentation
- Stress or pressure to excel in examination

Effects of drug/alcohol abuse –

- Reckless behaviour
- Malicious mischief
- Violence
- Drop in academic performance
- Depression, isolation, aggressiveness, etc.

Dependence is the tendency of the body to manifest a characteristic and unpleasant withdrawal syndrome if regular dose of drug/alcohol is abruptly discontinued that includes anxiety, shakiness, nausea and sweating.

Prevention avoid undue peer pressure, education & counselling, seeking helps from parents and peers, seeking professional and medical help etc.