CHAPTER -8

HUMAN HEALTH AND DISEASE

INTRODUCTION

HEALTH: The state of complete physical, mental and social well beings is called health. Health simply does not simply mean disease-free condition or physical fitness. In simple terms, Health can be defined as free from all diseases and infections. According to the World Health Organization (**WHO**), health is not only the absence of disease or illness. It is a state of an active and energetic condition including the physical, mental, and social well being

Health is affected by:

- **Genetic disorders** – the defect which child inherits from it parents, or the deficiency with which a child is born.
- **Infection-From microbes**
- **Lifestyle-** includes food and water we take, exercise and rest us give to our bodies, habits that we have or lack etc.

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

Any condition that interferes with the normal functioning of the body and casue disorder of the mind is called **disease**.

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

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

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

Infectious disease	Non-infectious disease
• Diseases which are easily transmitted from one person to another, are called infectious diseases e.g AIDS, common cold, malaria, tuberculosis etc • These occur due to external (extrinsic) factors. • These are cause by the attack of pathogens (viruses, bacteria, fungi, protozoans, worms) • Infection is transmitted through direct contact (physical contact, sexual contact) or through medium (air, water, food, insects etc.)	• Diseases which cannot transmitted from one person to another, are called non- infectious diseases e.g cancer, hypertension, diabetes etc • These generally occur due to internal (intrinsic) factors. • These are caused by factors other than living pathogens. • Infection is not transmitted through direct contact or through medium except in medium hereditary diseases where it occurs from parent offspring.

COMMON HUMAN DISEASES:

PATHOGEN: The disease-causing microorganisms like bacteria, virus, fungus, protozoa, and helminthes are called pathogen.

The pathogen can enter the body by various means and multiply and interfere with normal vital activities resulting in morphological and functional damage.

Infectious diseases

Bacterial	Viral	Fungal	Protozoan	Helminthic
Ex: pneumonia, Plague, typhoid, Diphtheria	Ex: common cold, polio	Ex: ringworm, atheletes's foot	Ex: amoebiasis, malaria	Ex:ascariasis, filariasis, taeniasis

Name of disease /test	Causal organisms	Symptoms	Effects
Typhoid	*Salmonella typhi*	Sustained high fever,	Affects small intestine

		weakness, stomach pain,	and then migrates to other parts of the body through blood.
Pneumonia	*Streptococcus pneumoniae* and *Haemophilus influenzae*	Fever, chills, cough and headache.	Alveoli get filled with fluid leading to severe problems in respiration.
Common cold	Rhino viruses	Nasal congestion and discharge, sore throat, cough and headache.	Infect the nose and respiratory passage.
Malaria	Plasmodium *(P. vivax*, *P. malaria* and *P. falciparum*)	The chill and high fever recurring 3 to 4 days.	Parasite multiply within lever cells and then attack the RBCs.
Amoebiasis or Amoebic dysentery	*Entamoeba histolytica*	Constipation, abdominal pain, cramps, stool with mucous and blood clot.	Infect the large intestine.
Ascariasis	*Ascaris* (Helminthes)	Internal bleeding, muscular pain, fever, anemia etc.	Healthy person get infected through water, vegetable etc.
Elephantiasis or filariasis	Wuchereria (*W. bancrofti and W. malayi*)	Inflammation in the lower limb and genital organs.	Lymphatic vessels of lower limbs get blocked.
Ring worms	*Microsporum*, *Trichophyton* and *Epidermophyton*	Appearance of dry, scaly lesions on various part of body.	Infects the skin, nail and scalp.

BACTERIAL DISEASES

Typhoid:

- Caused by *Salmonella typhi.*
- Affects small intestine and then migrates to other parts of the body through blood.
- Transmitted by contaminated food and water.
- Symptoms- Sustained high fever (39° to 40°C), weakness, stomach pain, constipation, headache and loss of appetite, intestinal perforation and death may occur in severe cases.
- Typhoid fever is confirmed by **Widal test.**

- Mary Mallon, called Typhoid Mary, was a cook and a typhoid carrier who continued to spread the disease for several years through the food prepared by her, before it was discovered.

Pneumonia:

- Caused by *Streptococcus pneumoniae* and *Haemophilus influenzae.*
- Affects alveoli of lungs.
- Transmitted by droplets released by infected person, sharing glasses and utensils.
- Decreases respiratory efficiency of the lungs.
- Common symptoms are fever, chills, cough and headache and in severe cases lips and finger nails turn gray to bluish colour.

VIRAL DISEASES

Common cold:

- Caused by Rhino virus.
- Affects nose (nasal epithelium) and respiratory organs but not lungs.
- Their attack lasts for 3-7 days.
- Transmitted by direct inhalation of droplets from cough and sneeze of infected person, through contaminated objects like pen, books, cups etc.
- Nasal congestion and discharge, sore throat, hoarseness, cough are common symptoms.

PROTOZOAN DISEASES

Malaria:

- Caused by *Plasmodium* (*P. vivax, P. malariae and P. falciparum*).
- Affects liver and RBC.
- Transmits by biting of **female anopheles mosquito** which acts as a vector.
- High fever occurring on alternate days, chill, vomiting are the common symptoms.
- Malaria parasite requires two hosts to complete their life cycle-

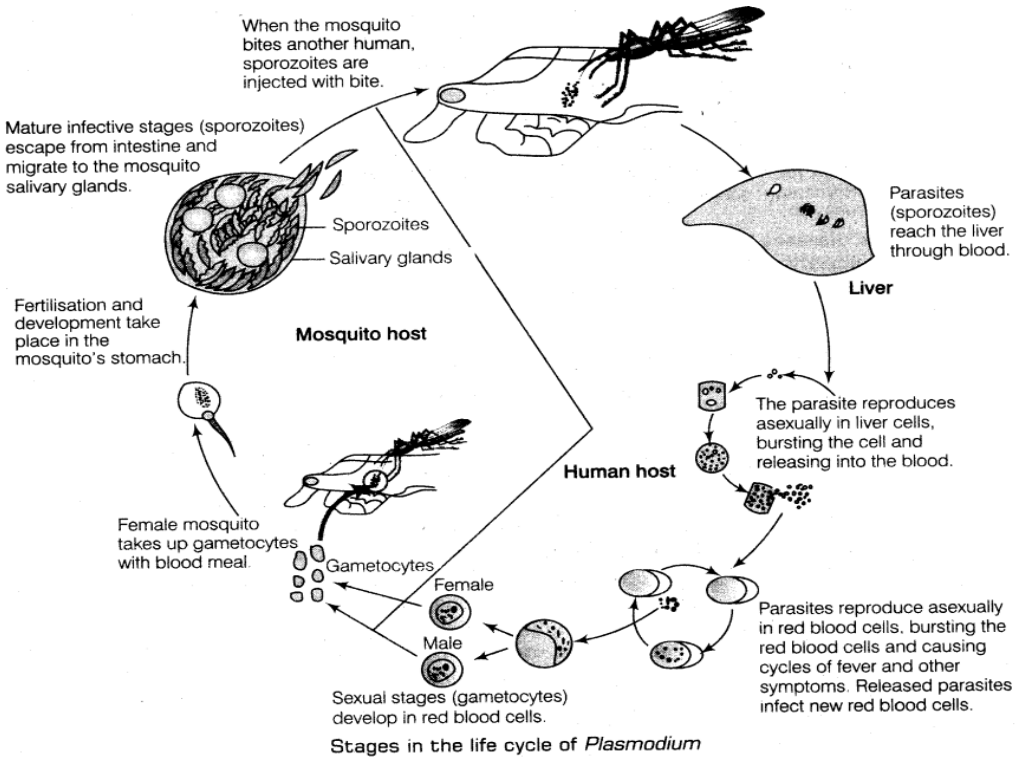
  Human

  Anopheles mosquito.
- Treatment is by antimalaria drugs like quinine, chloroquin

Life cycle of malarial parasite:

- Female Anopheles mosquito bites a healthy human and injects sporozoites (infective stage) with bites.
- The parasites reach the liver by through blood and starts multiplying within the liver cells

- Parasites then attack the red blood cells and reproduce asexually in the red blood cells and rupture the red blood cells which release a toxic substance called **haemozoin** responsible for chill and high fever recurring every 3 to 4 hours.
- Some of the parasites differentiate into male and female gametocytes which are taken up by the mosquito during biting and sucking blood.
- Formation of gametes and fertilization takes place in the intestine of mosquito.
- The zygote develops and forms thousands of sporozoites which migrate into the salivary gland of the mosquito.
- When the mosquito bites another human, the sporozoites are injected.



Stages in the life cycle of *Plasmodium*

Amoebiasis (amoebic dysentery):

- Caused by *Entamoeba histolytica*.
- Affects large intestine of man.

- Transmitted by house flies which as mechanical carrier and food contaminated with cysts of *Entamoeba*
- Constipation, abdominal pain, cramps, stools with mucous and blood clots are common symptoms.

HELMINTHIC DISEASES

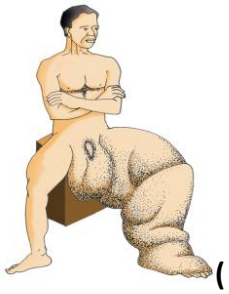
Ascariasis:

- Caused by *Ascaris lumbricoides*
- Affects intestine of man..

- Eggs of parasite are excreted along with faeces of infected person, which contaminate water and plants.
- Transmitted by contaminated water, vegetable fruits etc.
- Abdominal pain, indigestion, internal bleeding, muscular pain, fever, anemia, blockage of intestinal passage are common symptoms.

Filariasis or elephantiasis:

- Caused by *Wuchereria bancrofti* and *Wuchereria malayi*
- Affects lymphatic vessels of the lower limbs, genital organs.
- Transmitted by biting of infected female culex mosquito.
- Chronic inflammation of the organs where they live, abnormal swellings of the lower limbs, scrotum, penis are common symptoms. Lower limbs appear like legs of elephant, thus the name.
- Genital organs may also be affected, leading t deformation.



(Inflammation in one of the lower limbs due to elephantiasis)

FUNGAL DISEASE

Ringworm:

- Caused by *Microsporum, Trichophyton, Epidermophyton.*
- Affects skin, nails, folds of skin, groin.
- Transmitted by sharing towel, clothes, or even comb with infected person.
- Appearance of dry skin, scaly lesions in nails and scalp with intense itching are some of the common symptoms.
- Heat and moisture help these fungi to grow.

Diagram showing ringworm affected area of the skin

PREVENTION AND CONTROL OF INFECTIOUS DISEASE

The following measures can prevent/control the infectious diseases:

- Maintenance of personal hygiene by keeping the body clean drinking water, food, vegetables and fruits.
- Maintenance of public hygiene by proper disposal of wastes and excreta, periodic cleaning and disinfection of water reservoir and pools.
- Eradication of vectors and their breeding places for diseases like malaria and filariasis (transmitted through vector).
    - Avoiding stagnation of water in and around residential areas,
    - Use of mosquito nets.
    - Introducing Gambusia in ponds that feed mosquito larva.
    - Spraying of insecticides in ditches, drainage areas, and swamps.

  The same is also applicable for controlling dengue and chikungunya spread by *Aedes* mosquito.
- Vaccination and immunization programmes for diseases like polio, diphtheria, tetanus, etc.
- Use of antibiotics and drugs to treat the infected person.

CANCER

Cancer is the uncontrolled cell division leading to the formation of a mass of cells called as a tumor. Cancer is one of the most dreaded diseases of human beings and is a major cause of death all over the world.

Characteristics of cancer cells:

Contact inhibition is the property of normal cells by virtue of which contact with other cells inhibits their uncontrolled growth.

Benign Tumor	Malignant Tumor

• It remains confined to the affected organ.	• It also spreads to other organs of the body.
• Rate of growth is usually slow.	• Rate of growth is usually rapid.
• There is no latent stage.	• There is latent stage.
• It causes limited damage to the body.	• The cancer cells migrate to other sites of the body.
• There is no metastasis.	• There is metastasis.
• It is non-cancerous.	• It is cancerous.

Cancer cells lost the property of **contact inhibition** and as a result of this, cancerous cells continue to divide giving rise to masses of cells called tumors.

Tumors are of two types: **benign and malignant.**

- **Benign tumors** normally remain confined to their original location and do not spread to other parts of the body.
- **The malignant tumors** are a mass of proliferating cells called neoplastic or tumor cells.

  Malignant tumors grow very rapidly and invade and ultimately damage surrounding tissues.

The property by which cancer cells moves to distant places from their origin by blood and invade the normal cells and make them cancerous is called as **metastasis.**

Cell Characteristics	**Normal Cells**	**Cancer Cells**
Morphology	Normal cells have uniform shapes and sizes	Cancer cells have a large variety of sizes and shapes The nucleuses have irregular structure

		and have relatively small cytoplasm.
Reproduction and Cell Death	Cells stop dividing when too much of its kind are present. These cells grow and divide in a controlled manner and follow a predictable life cycle. Normal cells undergo the process of apoptosis – self destruction if they detect abnormalities and damage in their organelles.	Cancer cells don't stop growing resulting to appearance of a tumor (a cluster of mutant cells)
Communication	Normal cells communicate with each other for proper functioning.	Cancer cells do not communicate with each other
Adhesion and Invasion	These cells have external membranes that allow them to bond with other cells.	Cancer cells lose the molecules that keep cells bonded together. These cells have the ability to invade or spread to other parts of the body by travelling through the blood stream or the lymphatic system – metastasis.
Specialization	Normal cells start out as immature cells and mature with certain specialized functions.	Cancer cells do not mature, and undergo apoptosis. Instead these cells become immature overtime. Cancer cells are primitive and they don't have specialized functions.
Signal Recognition	Normal cells recognize signals. They know when there are enough new cells and stops dividing.	Cancer cells don't recognize signals. Hence these cells erratically reproduce mutated cells.

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.

Transformation of normal cells into cancerous cells may be induced by physical, chemical or biological agents called as **carcinogens.**

- **Physical carcinogens:** ionizing radiation like X-rays, gamma rays and non-ionizing radiations like UV radiation of sun.
- **Chemical carcinogens:** tobacco smoke and some other chemicals.
- **Biological carcinogens:** Oncogenic virus and some parasites**.**

Detection of cancer:

Early detection of cancers is essential as it allows the disease to be treated successfully in many years.

- **Biopsy and histo-pathological:** A piece of the suspected tissue cut into thin sections is stained and examined under microscope by a pathologist.
- **Blood and bone marrow tests** for increased cell counts in case of leukemia.
- **Radiography by using X-rays** to detect cancer of internal organ.
- **CT (computed tomography):** It uses X-rays to generate a three dimensional image of the internal of an organ.
- **MRI** (magnetic resonance imaging): Non ionizing radiation and strong magnetic field are used to accurately detect pathological and physiological changes in the living tissue.
- Use of antibodies against cancer-specific antigens (**monoclonal antibodies**).

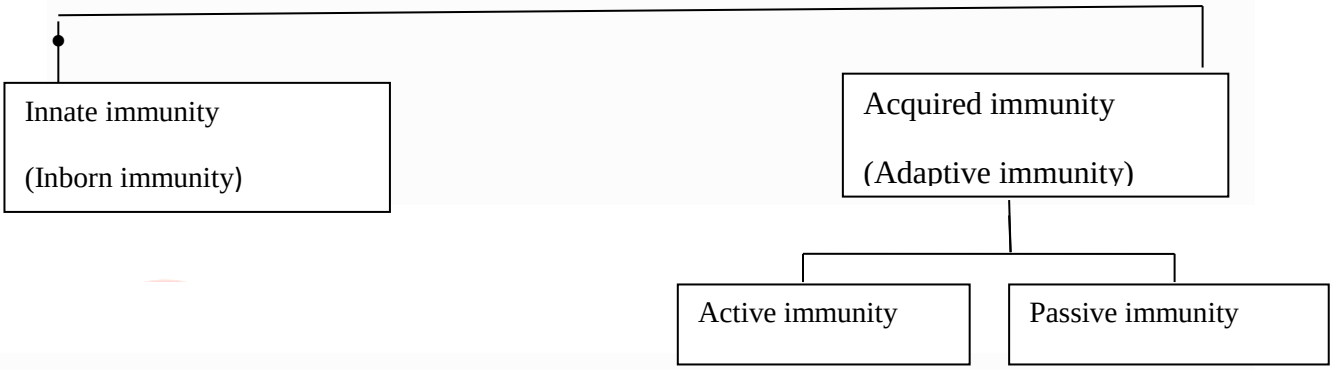
Treatment of cancer:

- **Surgery:** The tumour cells are removed with the help of surgery to check the spread of cancerous cells.
- **Radiation therapy**: A lethal irradiation of tumour cell is done, taking proper care of the normal tissues surrounding the tumour mass.
- **Chemotherapy:** Use of chemotherapeutic drugs. These exhibit side effects likehair loss, anemia.

- **Biological response modifiers:** alpha-interferon which activate the immune system and help in destroying the tumour cell.

IMMUNITY

- **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: These are 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-

- **Physical barriers**: skin, mucus coating of epithelium lining the respiratory, gastrointestinal and urinogenital tracts trapping microorganisms.
- **Physiological barriers**: Sweat tear, acid in stomach and saliva in mouth prevent microbial growth.
- **Cellular barriers**: WBC (polymorphonuclear leukocytes and monoctytes, natural killer lymphocytes) and macrophages phagocytose and destroy microbes.
- **Cytokine barriers**: virus infected cells secretes protein called interferon and protectnon infected cells.

Innate Immunity	Acquired (Adaptive) Immunity
Present from birth itself.	Develops during life time.

The immunity remains throughout life.	Can be short lived or lifelong.
Contact or exposure with pathogen or its antigen is not essential.	Contact with pathogen or its antigen is essential.
Innate immunity is inheritable.	Acquired immunity cannot be passed to the next generation except for a brief period to neonates.
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 characterized 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.**

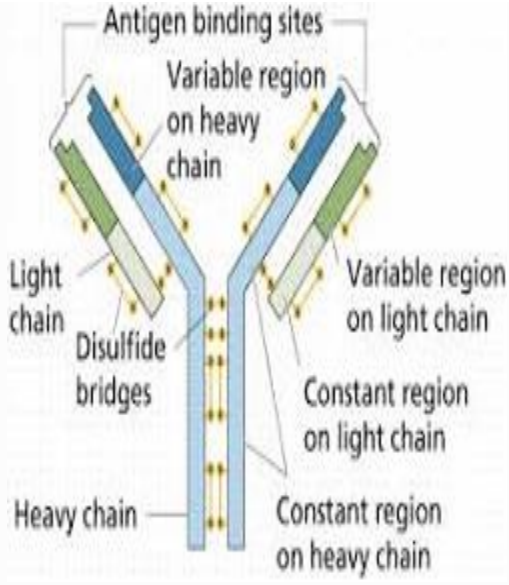
Primary and secondary responses are carried out with the help of B-lymphocytes and T-lymphocytes. B-lymphocytes produce army of protein called **antibodies** each having two light and two heavy chains.

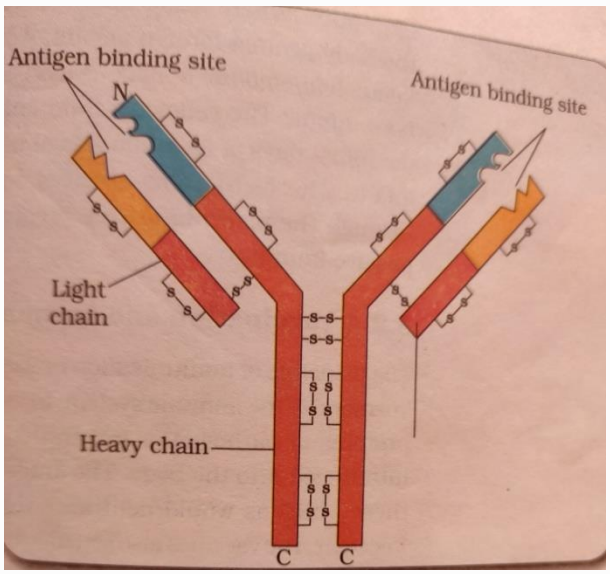
It involves two types of lymphocytes –

- **B lymphocytes or B-cells**: Show humoral immune response (HI) or antibody mediated immunity (AMI). Produce an army of proteins called antibodies in blood, in response to pathogens.
- **T lymphocytes**: Show cell mediated immunity (CMI) or cell mediated response. It is responsible for graft rejection in organ transplant because of its ability to differentiate between self and non self.

Structure of an Antibody:

- The antibodies are protein molecules called immunoglobulins (Ig) 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 H_2L_2.





Structure of an antibody molecule

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)**: It is an example of passive immunity provided by the mother to her child.

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

VACCINATION AND IMMUNISATION

Vaccination is the process of introduction of vaccines into the body to produce antibodies against the antigens to neutralize the effect of pathogens during actual infection.

Vaccines are the dead or weakened pathogens introduced into the body.

The dead or weakened pathogen leads to the production of antibodies which neutralizes the pathogenic agents during actual infection with the same pathogen.

Immunization is the process where performed antibodies against the toxin are introduced into the body.

A person if infected with some deadly microbes to which quick immune response is required as in case of tetanus, directly antibodies can be injected.

Example- performed antibody injection against snake venom (**passive immunisation**) in case of snake bites.

Using recombinant DNA technology antigenic polypeptides of pathogens in bacteria or yeast.

Example- hepatitis B vaccine produced from yeast.

Vaccination provides immunization after a long gap.

Both vaccination and immunization are based on the property called **memory** of the immune system. The vaccine generates memory B and T cells that recognize the pathogen on subsequent exposure and produce an intense immune response.

ALLERGY

The exaggerated response of the immune system to certain antigens present in the environment is called **allergy**.

The substances to which immune response is produced are called **allergens**.
Common examples of allergens are mites in dust, pollens, animal dander etc.

Allergy is due to the release of chemicals like histamine and serotonin from the mast cells.

The antibodies produced to these are of IgE type.

Symptoms of allergic reactions include sneezing, watery eyes, running nose and difficulty in breathing.

The patient is diagnosed by injecting or exposing the patient to very small doses of allergens.

Drugs like anti-histamine, adrenalin and steroids quickly reduce the symptoms of allergy.

AUTO IMMUNITY

The immune system of body can is able to identify and differentiate between self and non self.

Due to genetic and other unknown reasons, the body attacks self-cell which results in damage to the body and is called **auto-immune disease**.

Rheumatoid arthritis is an auto-immune disease.

IMMUNE SYSTEM IN THE BODY

Immune system consists of:

- Lymphoid organs

- Lymphoid tissues
- B- cells and T-cells

Lymphoid organs:

The organs where origin and/or maturation and proliferation of lymphocytes occur are called **lymphoid organs**.

Lymphoid organs are of two types-

- Primary lymphoid organs
- Secondary lymphoid organs.

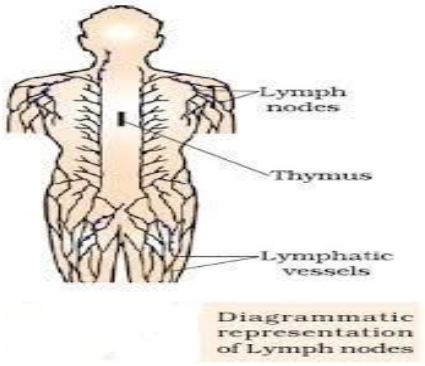
The primary lymphoid organs are bone marrow and thymus where immature lymphocytes differentiate into antigen-sensitive lymphocytes.

- The **bone marrow** is the main lymphoid organ where all blood cells including lymphocytes are produced. It provides the micro environment for the development and maturation of B-lymphocytes.
- The **thymus** is a lobed organ located near the heart and beneath the breastbone.

The secondary lymphoid organs provide the sites for interaction of lymphocytes with the antigen, which then proliferate to become effectors cells.

Ex: Spleen, tonsil, lymph node, Peyer's patches of small intestine and appendix are secondary lymphoid organs where proliferation of lymphocytes takes place.

- The **spleen** is a large bean shaped organ mainly contains lymphocytes and phagocytes which acts as a filter of the blood by trapping blood-borne microorganisms and has a large reservoir of erythrocytes.
- The **lymph nodes** are small solid structures located at different points along the lymphatic system. Lymph nodes serve to trap the antigens and these antigens trapped are responsible for the activation of lymphocytes and cause the immune response.
- The **mucosal associated lymphoid tissues (MALT)** are formed of masses of lymphoid tissue lining mucosa of respiratory, digestive and urinogenital tracts. 50% of the lymphoid tissue in human body is formed by MALT.



Diagrammatic representation of Lymph nodes

AIDS

The term AIDS stands for **Acquired Immuno Deficiency Syndrome.**

It was first reported in USA in 1981.

The disease is acquired during life time.

- AIDS is caused by **human immune deficiency virus (HIV).**
- HIV is a retrovirus having **RNA** as the genetic material.

Mode of transmission:

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.

- Sexual contact with infected persons.
- By transfusion of contaminated blood and blood products.
- By sharing infected needles as in the case of intravenous drug abusers.
- From infected mother to her child through placenta.

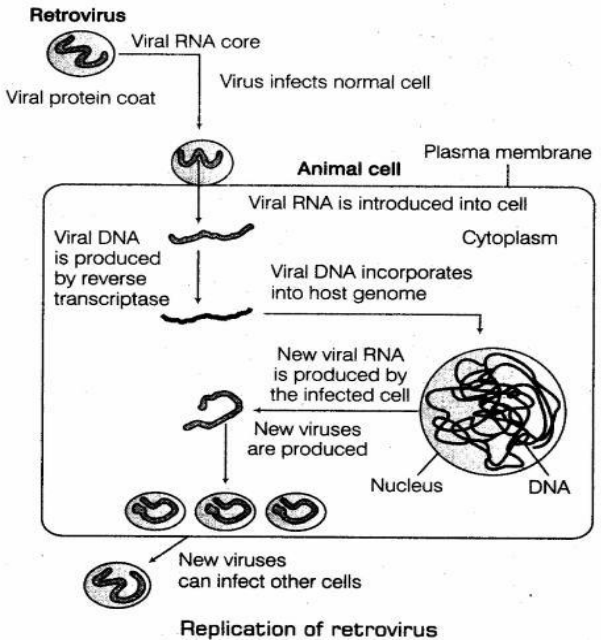
High risk individuals:

- Those having multiple sexual partners.
- Drug addicts taking drugs intravenously.
- Individuals who require repeated blood transfusion.
- Children born to an HIV infected mother**.**

Life cycle of HIV:

- After getting into the body the virus enters into macrophages or T-helper cells.

- The viral RNA genome replicated to form viral DNA with the enzyme called **reverse transcriptase.**
- The viral DNA gets incorporated into the host cell's DNA and directs the infected cells to produce virus particles and the macrophages continue to produce virus.
- Viruses released from macrophages attack T-lymphocytes T-helper cells (T_H) and cause a progressive reduction in the number of T-helper cells and due to which the person starts suffering from infections with several other microorganisms.
- The person is unable to produce any immune response even against common bacteria like ***Mycobacterium***, parasites like ***Taxoplasma***, viruses and fungi.
- Diagnosed by **ELISA (enzyme linked immune-sorbent assay).**
- Treated with anti-retroviral drugs but that is only partially effective.



Replication of retrovirus

Prevention of AIDS:

National AIDS Control Organisation **(NACO)** established in 1981 and other nongovernmental organizations (NGOs) educate people about AIDS.

WHO has started a number of programmes to prevent the spreading of HIV infection that includes:

- To follow safe blood transfusion.

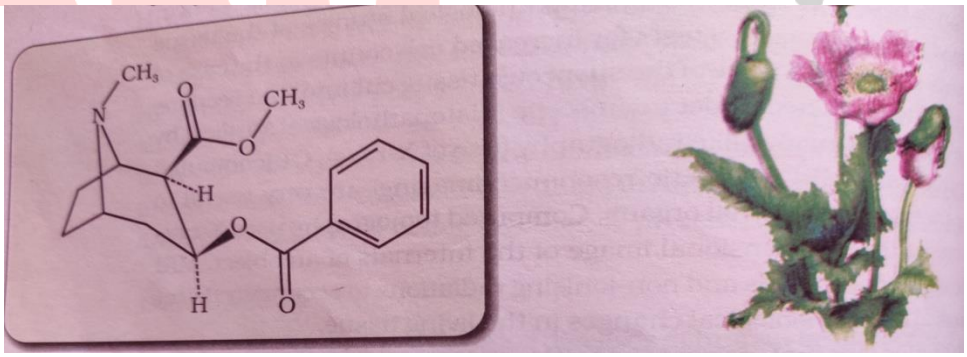
- To use disposable needles and syringes.
- To distribute free condoms.
- To prevent drug abuse.
- Advocating safe sex and promoting regular check ups.

DRUGS AND ALCOHOL ABUSE

The drugs which are commonly abused are opioids, cannabinoids and coca alkaloids.

Opoids:

- Opioids are the drugs which bind to specific opioid 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 and is obtained by acetylation of morphine extracted from the latex of poppy plant ***Papaver somniferum***
- Heroin is a depressant and slows down body functions.

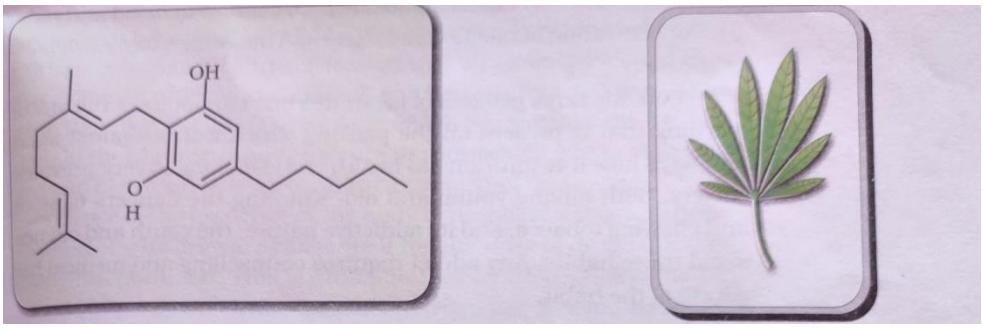


Chemical structure of Morphine

Opium poppy

Cannabinoids:

- Cannabinoids interact with cannabinoid receptors present principally in the brain.
- Natural cannabinoids are obtained from the inflorescences of the plant ***Cannabis sativa***.
- The flower tops, leaves and the resin of cannabis plant are used in various combinations to produce marijuana, hashish, charas and ganja.
- Effects on cardiovascular system of the body.
- They generally taken by inhalation and oral ingestion, these are known for their effects on cardiovascular system of the body.



Skeletal structure of cannabinoid molecule **Leaves of *Cannabis sativa***

Coca alkaloid:

- Coca alkaloid or **cocaine** is obtained from coca plant ***Erythroxylum coca*** native to South America.
- Coca alkaloid interferes with the transport of the neuro-transmitter dopamine.
- Cocaine, commonly called as **coke** or **crack**.
- It has a potent stimulating action on central nervous system, producing a sense of euphoria and increased energy.
- Excessive dosage of cocaine causes hallucinations.
- Some plants with hallucinogenic properties are *Atropa belladona* and *Datura.*

Flowering branch of Datura

Drugs like barbiturates, amphetamines, benzodiazepines, lysergic acid diethyl amides (LSD) are used as medicines to help patients cope with mental illnesses like depression and insomnia, are often abused.

Morphine is a very effective sedative and painkiller is often abused. It is very useful in patients who have undergone surgery.

Several plants, fruits and sees having hallucinogenic properties have been used for hundreds of years in folk medicine, religious ceremonies and rituals all over the globe.

Tobacco:

- Tobacco contains nicotine, an alkaloid.
- It is smoked, chewed or used as stuff.
- Nicotine stimulates adrenal gland to release adrenaline and nor-adrenaline into blood circulation, both of which raise blood pressure and increase heart rate.
- Smoking of tobacco is associated with increased incidence of cancers of lung, urinary bladder, throat, oral cavity, bronchitis, **emphysema**, coronary heart disease, gastric ulcer etc. Smoking increases carbon monoxide (CO) content in blood and reduces the concentration of haem-bound oxygen. This causes oxygen deficiency in the body.

ADOLESCENCE AND DRUG ABUSE

- Adolescence is both the 'period' and 'process' during which the child becomes matured in terms of his/her attitudes and beliefs.
- It is a link between childhood and adulthood.
- It is between 12 – 18 years of age.
- A very vulnerable phase of mental and physiological development of an individual.

Causes of drug abuse:

- Curiosity
- Need for adventure
- Excitement
- Experimentation
- Stress or pressure to excel in examination
- Television, movies, newspapers, internet also help to promote the perception among youth that it is cool or progressive to smoke or use drugs or alcohol.
- Unstable or unsupportive family structure and peer pressure.

ADDICTION AND DEPENDENCE

The psychological attachment to certain effects such as euphoria and temporary feeling of well being, associated with drugs and alcohol is called **addiction**.

Reasons for alcohol abuse in adolescents:

- Social pressure.
- Curiosity and need for adventure, excitement and experiments.
- To escape from stress, depression and frustration.

- Unstable or unsupportive family structure.

The tendency of the body to manifest characteristics and unpleasant withdrawal syndrome on abrupt discontinuation of regular dose of drug/alcohol is called **dependence**.

Characteristics of withdrawal symptoms:

Anxiety, shakiness, nausea, sweating, vomiting, diarrhea, insomnia, muscular and abdominal cramps, restlessness.

Dependence leads the patient to ignore all social norms in order to get sufficient funds to satiate his/her needs. These results in many social adjustment problems.

EFFECTS OF DRUG/ALCOHOL ABUSE

The immediate adverse effects of drugs and alcohol abuse are manifested in the form of:

- Reckless behaviour
- Malicious mischief
- Violence
- Vandalism
- Drop in academic performance
- Depression, isolation, aggressiveness, etc.
- Excessive doses of drugs may lead to coma and death due to respiratory failure, heart failure or cerebral haemorrhage.

Warning signs of drug and alcohol abuse:

- Drop in academic performance.
- Unexplained absence from school/college.
- Lack of interest in personal hygiene.
- Aggressive and rebellious behavior.
- Deteriorating relationships with family and friends.
- Loss of interest in hobbies.
- Change in sleeping and eating habits.
- Fluctuations in **weight**, appetite, etc.

Other effects:

- The **far reaching implications of drug and alcohol abuse**, may also allow drug user to **steal** if the person is unable to get money t buy drugs.
- **Intravenous** user (direct injection into vein using a needle and syringe) of drugs may likely to acquire infections like AIDS and hepatitis B.
- The chronic use of drugs and alcohol damages nervous system and liver (**cirrhosis**).
- The use of drugs and alcohol during pregnancy is also known to adversely affect foetus.
- The misuse narcotic analgesics, anabolic steroids, diuretics and certain hormones in sports increase muscle strength and bulk and to promote aggressiveness and as a result increase athletic performance.

The side effects of use of **anabolic steroids in females** include:

- Masculinisation (features like males), increased aggressiveness, mood swings, depression, abnormal menstrual cycle, excessive hair growth on the face and body, enlargement of clitoris, deepening of voice.

The side effects of use of **anabolic steroids in males** include:

- Acne, increased aggressiveness, mood swings, depression, reduction of size of testicles, decreased sperm production, potential for kidney and liver dysfunction, breast enlargement, premature baldness, enlargement of prostate gland.

PREVENTION AND CONTROL

Some of the measures mentioned below would be particularly useful for prevention and control of alcohol and drugs abuse among adolescents:

- **Avoid undue peer pressure:**
- A child should not be pushed unduly to perform beyond his/her threshold limits, be studies, sports or other activities.

Educating and counseling:

- It would be worthwhile to channelize the child's energy into healthy pursuits like sports, reading, music, yoga and other extracurricular activities.

Seeking help from parents and peers:

Proper advises to sort out their problems; this would also help young to vent their feelings of anxiety and guilt**.**

Looking for danger signs:

- Alert parents, teachers, even friends should look for and identify danger signs and help to provide appropriate measures required to diagnose the malady and underlying causes which would help in initiating proper remedial steps or treatment.

Seeking professional and medical help:

- A lot of help is available in the form of highly qualified psychologists, psychiatrists, and de-addiction and rehabilitation programs to help individuals who have unfortunately got in the quagmire of drug/alcohol abuse.

IMPORTANT TERMS- HUMAN HEALTH AND DISEASE

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

Disease: Any condition that interferes with the normal functioning of the body and casue disorder of the mind is called **disease**.

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

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

Pathogen: The disease-causing microorganisms like bacteria, virus, fungus, protozoa, and helminthes are called pathogen.

Cancer: It is the uncontrolled cell division leading to the formation of a mass of cells called as a tumor. Cancer is one of the most dreaded diseases of human beings and is a major cause of death all over the world.

Immunity: The ability of host cells to fight the disease causing microorganism due to immune system is called immunity.

Innate immunity: These are non-specific types of defense, presents at the time of birth and provide different kinds of barriers to the entry of foreign agents into the body.

Vaccines: These are the dead or weakened pathogens introduced into the body. The dead or weakened pathogen leads to the production of antibodies which neutralizes the pathogenic agents during actual infection with the same pathogen.

Immunization is the process where performed antibodies against the toxin are introduced into the body.

Allergy: The exaggerated response of the immune system to certain antigens present in the environment is called **allergy**.

Auto immunity: The immune system of body can is able to identify and differentiate between self and non self.

Lymphoid organs: The organs where origin and/or maturation and proliferation of lymphocytes occur are called **lymphoid organs**.

Adolescence : is both the 'period' and 'process' during which the child becomes matured in terms of his/her attitudes and beliefs.

Addiction: The psychological attachment to certain effects such as euphoria and temporary feeling of well being, associated with drugs and alcohol is called **addiction**.

Dependence: The tendency of the body to manifest characteristics and unpleasant withdrawal syndrome on abrupt discontinuation of regular dose of drug/alcohol is called **dependence**.