HUMAN HEALTH AND DISEASES

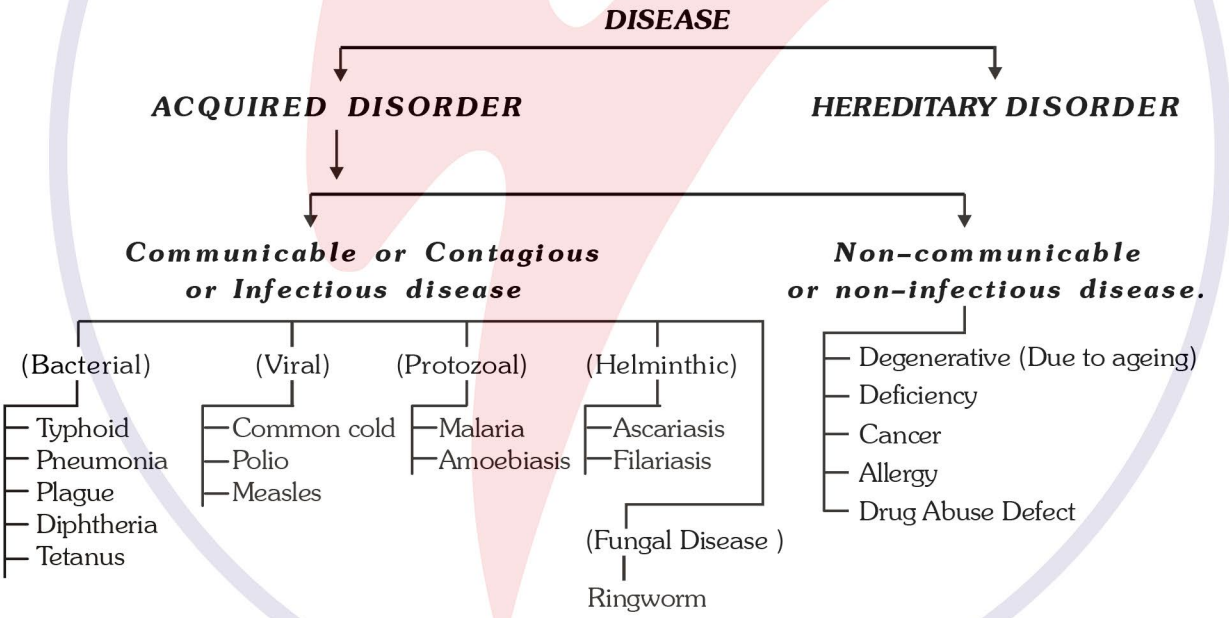
1.0 INTRODUCTION

- Health, for a longer time, was considered as a state of body and mind where there was a balance of certain 'humors'. This is what early Greeks like Hippocrates as well as Indian Ayurveda system of medicine asserted. It was thought that persons with **'blackbile'** belonged to hot personality and would have fevers. The discovery of blood circulation by **William Harvey** using experimental method and the demonstration of **normal body temperature in persons with blackbile using thermometer disproved the 'good humor' hypothesis of health.**
- In later years, biology stated that mind influences, through neural system and endocrine system, our immune system and that our immune system maintains our health. Hence, mind and mental state can affect our health.

  Of course, health is affected by – **Genetic disorders, Infections and Life style**
- The term **health** is very frequently used by everybody. *How do we define it?* Health does not simply mean 'absence of disease' or 'physical fitness'. It could be defined as a state of complete **physical, mental** and **social well-being.** When people are healthy, they are more efficient at work. This increases productivity and brings economic prosperity. Health also increases longevity of people and reduces infant and maternal mortality.
- Balanced diet, personal hygiene, regular exercise, yoga, awareness about diseases, vaccination (immunisation), proper disposal of wastes, control of vectors and maintenance of hygienic food and water resources are necessary for achieving good health.

2.0 COMMON DISEASES IN HUMANS

- Disease can be broadly grouped into following categrories

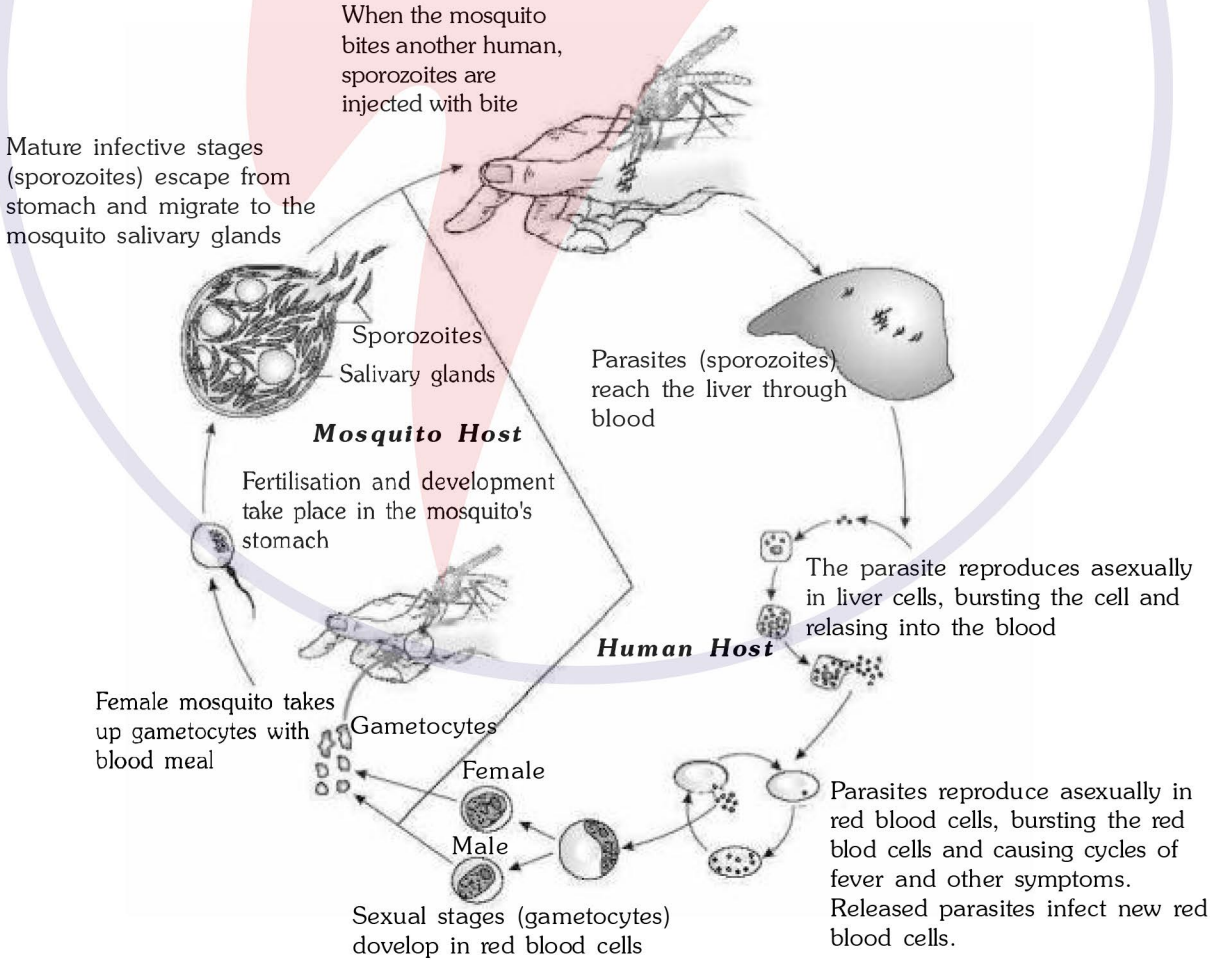


- **Salmonella typhi** is a pathogenic bacterium which causes **typhoid** fever in human beings. These pathogens generally enter the **small intestine** through **food and water contaminated** with them and migrate to other organs through blood. **Sustained high fever (39° to 40°C), weakness, stomach pain, constipation, headache and loss of appetite** are some of the common symptoms of this disease. Intestinal perforation and death may occur in severe cases. Typhoid fever could be confirmed by **Widal test**. A classic case in medicine, that of **Mary Mallon** nicknamed **Typhoid Mary**, is worth mentioning here. She was a cook by profession and was a typhoid carrier who continued to spread typhoid for several years through the food she prepared.
- Bacteria like **Streptococcus pneumoniae** and **Haemophilus influenzae** are responsible for the disease **pneumonia** in humans which infects the **alveoli (air filled sacs) of the lungs.** As a result of the infection, the alveoli get filled with fluid leading to severe problems in **respiration.** The symptoms of pneumonia include fever, **chills, cough and headache.** In severe cases, the **lips and finger nails** may turn **gray to bluish in colour.** A healthy person acquires the infection by inhaling the droplets/aerosols released by an infected person or even by sharing glasses and utensils with an infected person.

- **Dysentery, plague, diphtheria,** etc., are some of the other bacterial diseases in man.
- **Rhino viruses** cause one of the most infectious human ailments – the **common cold**. They **infect the nose** and **respiratory passage but not the lungs.** The common cold is characterised by **nasal congestion** and **discharge, sore throat, hoarseness, cough, headache, tiredness,** etc., which usually last for 3-7 days. Droplets resulting from cough or sneezes of an infected person are either inhaled directly or transmitted through **contaminated objects** such as pens, books, cups, doorknobs, computer keyboard or mouse, etc., and cause infection in a healthy person.

2.3 Protozoan Diseases

- **Plasmodium**, a tiny protozoan is responsible for Malaria. Different species of **Plasmodium (P. vivax, P. malaria and P. falciparum)** are responsible for different types of malaria. Of these, malignant malaria caused by **Plasmodium falciparum** is the most serious one and can even be fatal. Let us take a glance at the life cycle of **Plasmodium**. **Plasmodium** enters the human body as **sporozoites (infectious form)** through the bite of infected female **Anopheles mosquito**. The parasites initially multiply within the liver cells and then attack the red blood cells (RBCs) resulting in their rupture. The rupture of RBCs is associated with release of a toxic substance, **haemozoin**, which is **responsible for the chill and high fever** recurring every three to four days. When a female **Anopheles** mosquito bites an infected person, these parasites enter the mosquito's body and undergo further development. The parasites multiply within them to form sporozoites that are stored in their **salivary glands.** When these mosquitoes bite a human, the sporozoites are introduced into his/her body, thereby initiating the events mentioned above. It is interesting to note that the malarial parasite requires two hosts – human and mosquitoes – to complete its life cycle. The female **Anopheles** mosquito is the vector (transmitting agent) too.



Stages in the life cycle of Plasmodium

- **Entamoeba histolytica** is a protozoan parasite **in the large intestine** of human which causes **amoebiasis (amoebic dysentery)**. **Symptoms** of this disease include constipation, abdominal pain and cramps, stools with excess mucous and blood clots. **Houseflies** act as **mechanical carriers** and serve to transmit the parasite from faeces of infected person to food and food products, thereby **contaminating** them. Drinking water and food contaminated by the faecal matter are the main source of infection.

2.4 Helminth Diseases

- **Ascaris,** the "common round worm" and **Wuchereria**, the **"filarial worm",** are some of the helminths which are known to be pathogenic to man.

Diagram showing inflammation in one of the lower limbs due to elephantiasis

- *Ascaris*, an intestinal parasite causes **ascariasis**. Symptoms of these disease include **internal bleeding, muscular pain, fever, anemia** and **blockage of the intestinal passage.** The eggs of the parasite are excreted along with the faeces of infected persons which contaminate soil, water, plants, etc. A healthy person acquires this infection through **contaminated water, vegetables, fruits,** etc.

- **Wuchereria** *(W. bancrofti* and *W. malayi),* the filarial worms cause a slowly developing chronic inflammation of the organs in which they live for many years, usually the **lymphatic vessels of the lower limbs** and the disease is called **elephantiasis** or **filariasis**. The **genital organs** are also often affected, resulting in gross deformities. The pathogens are transmitted to a healthy person through the bite by the female mosquito vectors.

2.5 Fungal Disease (Dermatophytoses)

- Many **fungi** belonging to the genera **Microsporum, Trichophyton** and **Epidermophyton** are responsible for **ringworms** which is one of the **most common infectious diseases** in man. Appearance of **dry, scaly lesions on various parts** of the body such as **skin, nails and scalp** are the main symptoms of the disease. These lesions are accompanied by intense itching. Heat and moisture help these fungi to grow, which makes them thrive in skin folds such as those in the groin or between the toes. Ringworms are generally acquired from soil or by using towels, clothes or even the comb of infected individuals.

Diagram showing ringworm affected area of the skin

2.6 AIDS (Acquired Immuno Deficiency Syndrome)

The word AIDS stands for Acquired Immuno Deficiency Syndrome.

This means **deficiency of immune system, acquired during the lifetime of an individual indicating that it is not a congenital disease.** 'Syndrome' means a group of symptoms. AIDS was first reported in 1981 and in the last twenty-five years or so, it has spread all over the world killing more than 25 million persons. It is characerised by **decrease in number of helper T-cells.** Also called **slim disease.** It was first detected in homosexual males in USA (1981) at Disease control centre Atlanta. In India first AIDS case was reported in 1986 from chennai.

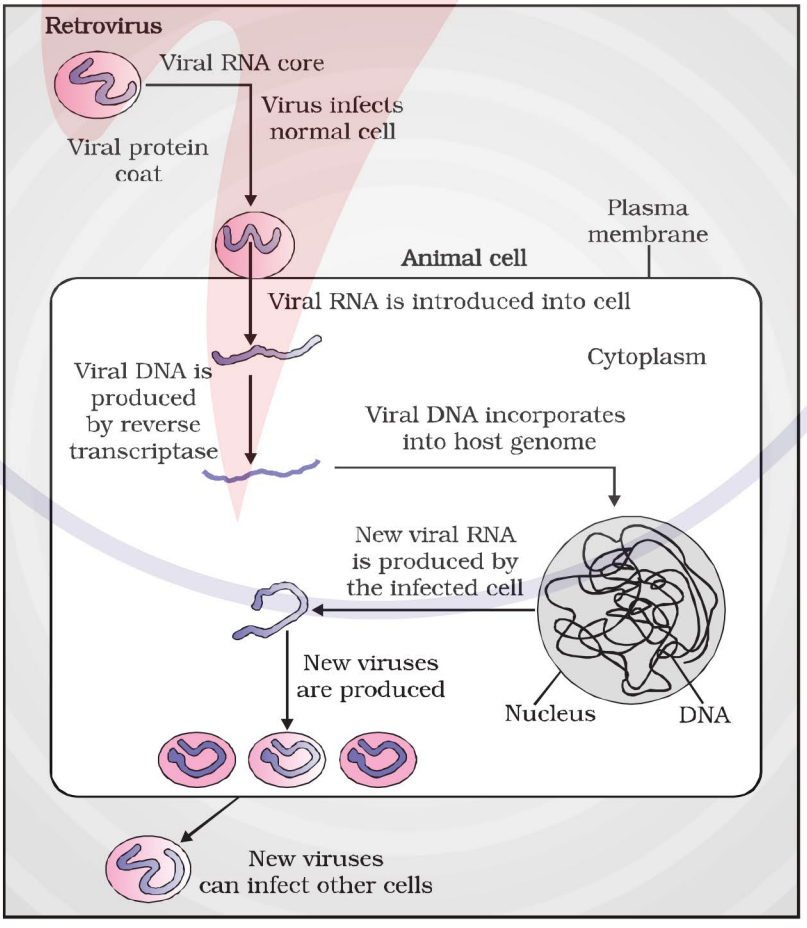
2.6.1 Misconceptions

AIDS do not spread through more touch, physical contact, hugging, kissing, sharing meals, shaking hands, mosquito bites, coughing, sneezing looking after AIDS patients.

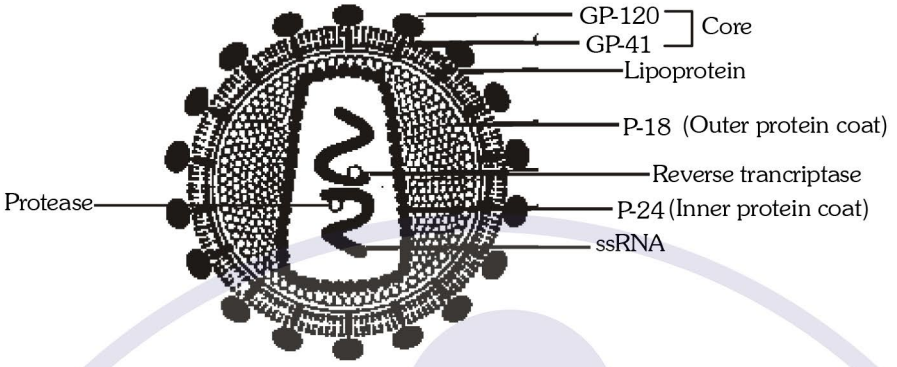
HIV spreads only through body fluids and transmission of HIV-infection generally occurs by (a) sexual contact with infected person, (b) by transfusion of contaminated blood and blood products, (c) by sharing infected needles as in the case of intravenous drug abusers and (d) from infected mother to her child through placenta.

2.6.2 Pathogenicity

- After getting into the body of the person, the virus enters into macrophages where RNA genome of the virus replicates to form viral DNA with the help of the enzyme **reverse transcriptase.** This viral DNA gets incorporated into host cell's DNA and directs the infected cells to produce virus particles. The macrophages continue to produce virus and in this way acts like a **HIV factory. Simultaneously,** HIV enters into helper T-lymphocytes (T_H), replicates and produce progeny viruses. The progeny viruses released in the blood attack other helper T-lymphocytes. This is repeated leading to a progressive decrease in the number of helper T-lymphocytes in the body of the infected person. During this period, the person suffers from bouts of fever, diarrhoea and weight loss. Due to **decrease in the number of helper T lymphocytes,** the person starts suffering from infections that could have been otherwise overcome such as those due to bacteria especially Mycobacterium, viruses, fungi and even parasites like Toxoplasma. The patient becomes so immuno-deficient that he/she is unable to protect himself/herself against these infections.



- **Structure :**
  - Retro virus (Lenti virus family)
  - Core has 2 identical molecules of SSRNAs, enzymes (reverse transcriptase, protease)



- **Symptoms :**

Asymptomatic phase : There is always a time lag between the infection and appearance of AIDS symptoms. This period may vary from a few month to many years usually 5 to 10 years. There is no antibody, protection in 1st **(2-12 weeks)** so infectivity of patients or activeness of virus is maximum is this period. This period is called Window Period (No specific symptom appear in this phase so ELISA test is negative in **window period**)

AIDS related complex (ARC) : mild form of HIV, swollen lymph nodes, bouts of fever, repeated episodes of diarrhoea, weight loss prolonged cough. Patient become fully immune deficient in this period. T-lymphocytes or CD_4 count < 200×10^6/litre (normal CD_4 count > 900×10^6 per/litre) and now this condition is called full blown AIDS.

Full blown AIDS = Tuberculosis by **Mycobacterium avium.**
= Candidiasis of mouth and oesophagus by **Candida albicans**
= Pneumonia by fungus **Pnemocystis carinii**
= Cancer of skin and lymphnodes (Kaposi' sarcoma), HIV acts as an oncovirus.
= Encephalitis by **Toxoplasma gondii**

Most of infections are due to oppertunistic infections, appear when immunity become weak.

- **Investigation :**

Screening test : (ELISA) Enzyme linked immuno sorbent assay.

Confirmatory tests : Western blot test which detects antibodies, in patient's serum.

- **Treatment :** Treatment of AIDS with anti retroviral drug is partially effective.
- **Prevention :**

As AIDS has no cure, prevention is the best option. Moreover, **HIV infection**, more often, **spreads due** to **"conscious behaviour patterns"** and is not something that happens inadvertently, like pneumonia or typhoid. Of course, infection in blood transfusion patients, new-borns (from mother) etc., may take place due to poor monitoring. The only excuse may be ignorance and it has been rightly said – **"don't die of ignorance".**

(i) Education : **NACO** (National AIDS Control Organistion) has been set up under health family welfare ministry. (**NGOs** / Non goverment organisation also playing their important role)
(ii) Screening of blood,
(iii) Ban on prostitution, Safer sex and awareness about to use of condoms.
(iv) Use of disposables
(v) Sterilization of Ragors, blades and dental equipments.
(vi) AIDS patients need help and sympathy instead of being shunned by society.
It is a malady that can only be tackled by society and medical fraternety acting together to prevent spread of the disease.

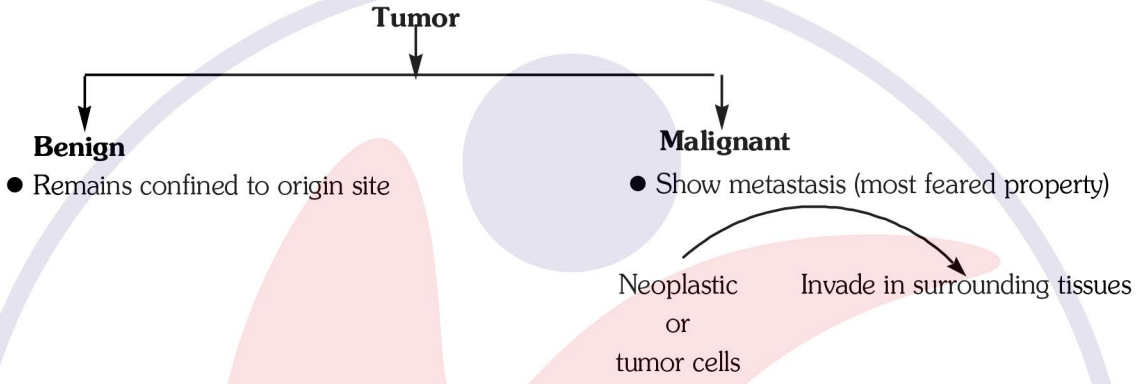
2.7 Cancer

- Cancer is one of the most dreaded diseases of human beings and is a major cause of death all over the globe. More than a million Indians suffer from cancer and a large number of them die from it annually. The mechanisms that underlie development of cancer or oncogenic transformation of cells, its treatment and control have been some of the most intense areas of research in biology and medicine.

  Uncontrolled, Abnormal and **excessive mitotic** division of cells is called **cancer** (Crab = cancer).

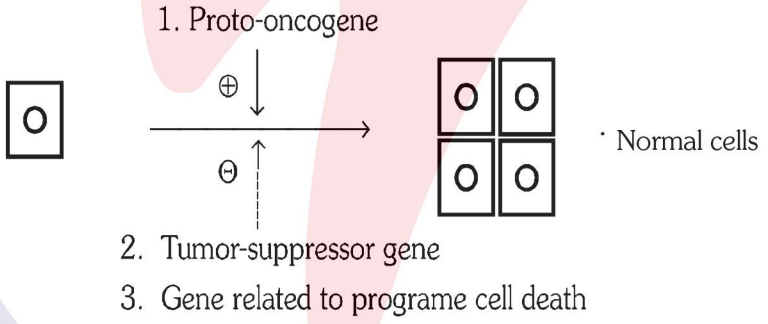
  Study of cancer is called **oncology**

  This abnormal and undifferentiated cells are called **cancerous cells**.

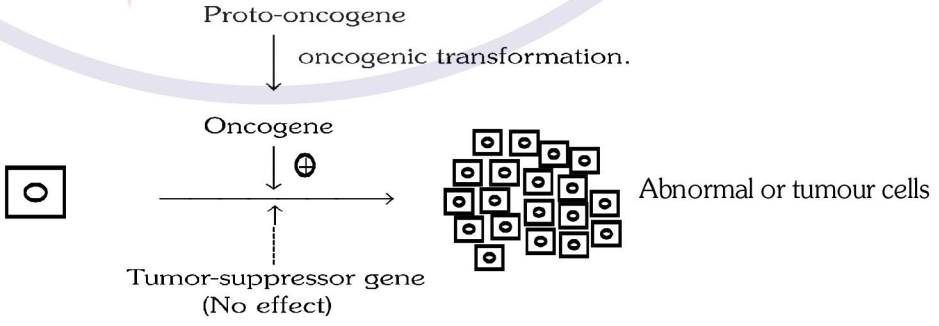


- **Normal mechanism of body growth –**

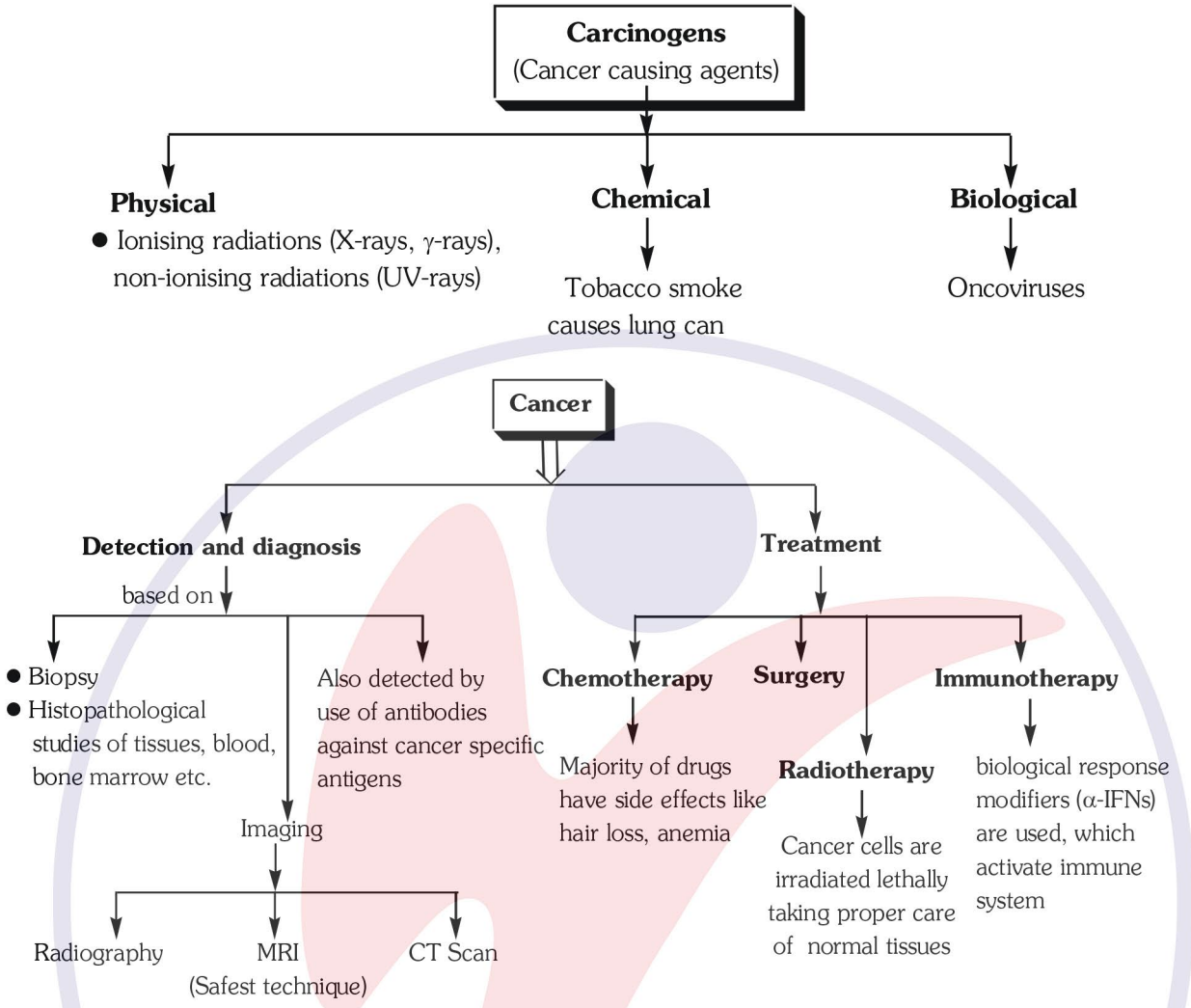
  Normal cell division regulation by proto-oncogenes and it is suppressed by tumour suppressor gene.



Transformation of a normal cell into cancer cell if the regulation is upset.



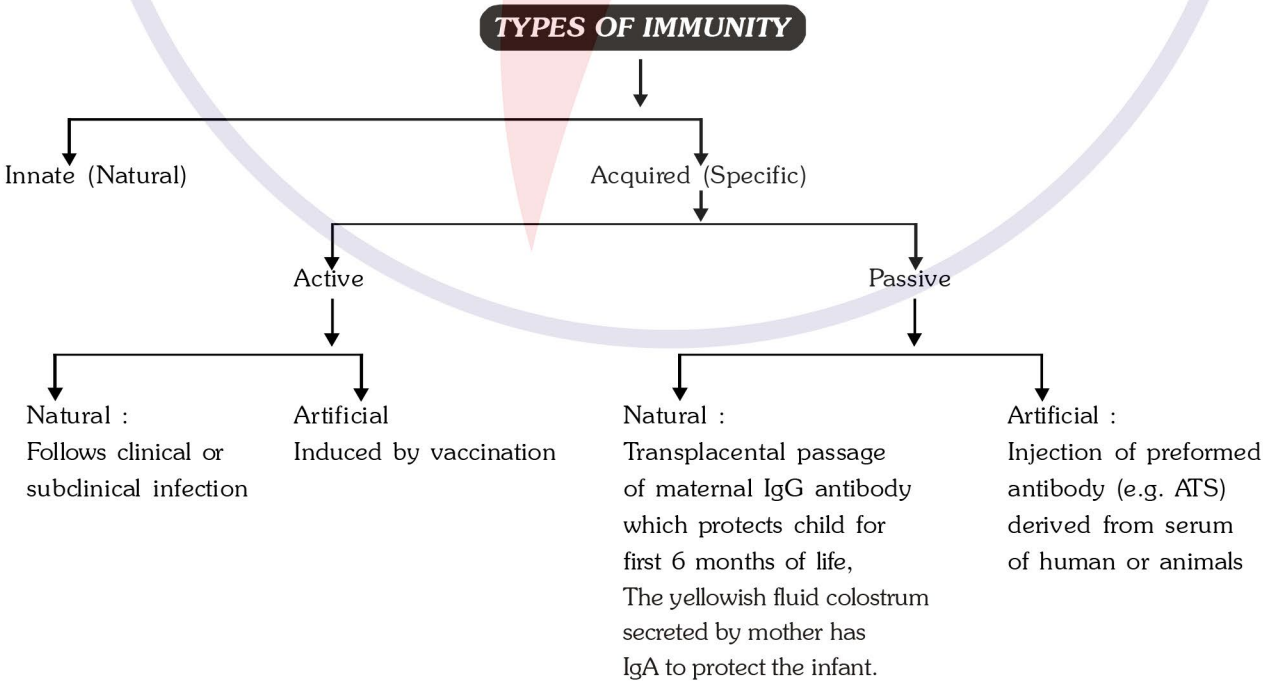
Cancer cells don't show **contact inhibition** phenomenon which is shown by normal cells (when normal cells contact with other cells they inhibit uncontrolled growth by activation of tumour suppressor gene of cells).



- **most of cancer are treated by combination therapy of surgery, radiation and anti cancerous drug.**

3.0 Immunity

- Body resistance against deseases is called immunity.



3.1 Innate/Congenital Immunity

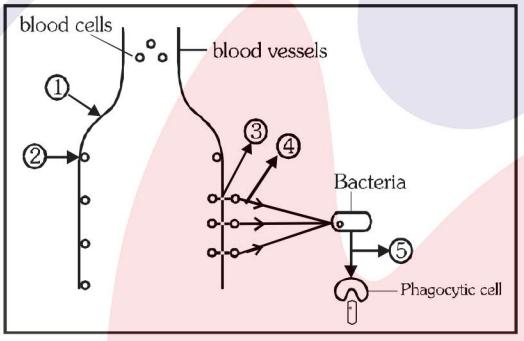
- It is **present by birth** and In most of animal, It is first line of defence of body. It is made up of following barriers.

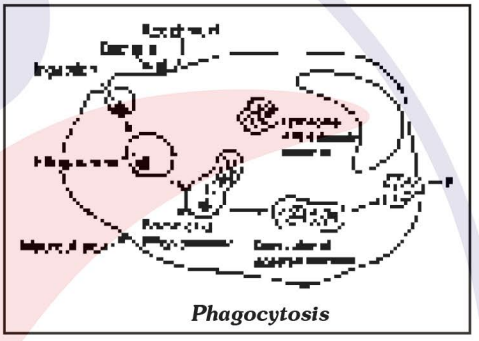
(A) **Anatomical / Physical Barrier** : It is made up of two parts : **Skin and Mucosal surface**

(B) **Physiological Barriers** : it is made up of **Fever, pH of body, Secretions** like **lysozyme enzyme** and **Interferon.** Interferon are Anti-viral protein made up to 270 amino acids secreted by virus infected cells and stimulates the adjacent cells to produce the Translation Inhibiting Protein (T.I.P.)

(C) **Phagocytic / Cellular Barrier** :- Phagocytosis is exhibited by some types of WBC's which are called phagocytes. Most important phagocytes are **macrophages** and **Neutrophils**. Monocytes are liberated at the site of infection these later converted into macrophages. **Macrophages** are large irregular shaped cells that engulf microbes, virus, cellular debris etc in response to an infection.

Steps of Phagocytosis – (1) Vasodilation (Blood stasis), (2) Adhesion, (3) Migration or diapedesis, (4) Chemotaxis (Neutrophils or Monocytes), (5) Phagocytosis




Phagocytosis

(D) **Inflammatory Barrier :**

Inflammation : Local response of living mammalian tissue to injury due to any agent. It is the body defence reaction in order to eliminate or limit the spread of infectious agent.

Inflammation is characterised by **Redness (Rubor/Erythema), Heat (Calor), Swelling (Tumor/ Oedema) and Pain (Dolor)**

(E) **NK-Cell / Cellular barrier :**

It is a large granular lymphocyte cell.

During this process apart from the phagocytes, another type of cells called **Natural killer cells** kill virus infected cells and tumour cells of body by creating perforin linked pores in the plasma membrane of target cells (i.e. infected cells). Water enters through these pores causing swelling and bursting of the diseased cells.

3.2 Acquired Immunity

It is the resistance that an individual acquires during life. This is generated in response to an exposure to the microoganism in question. This type of immunity is founds only in vertebrates. It is also called Adaptive or specific immunity. This immunity is **acquired after birth** by experience. This immunity recognise and selectively eleminate the pathogen.

- **The Features of Acquired immunity** are **Specificity, Diversity, Discrimination between self and non-self** and **Memory.**

When a pathogen enter inside the body, body takes longer times to recognise and respond to it this is called **primary immune response** but the memory of this encounter remain in immune system. When this pathogen enters second time inside the body, body immune system rapidly recognise this pathogen and respond quickly to it. This is called **secondary immune response (Anamnestic)**. This is based on memory of immune system.

Difference between active and passive immunity

	Active immunity		***Passive immunity***
1.	Produced actively by the immune system of host	***1.***	Received passively by the host and the host's immune system does not participate.
2.	Induced by infection or by contacts with immunogen, e.g. vaccines.	***2.***	Conferred by introduction of ready-made antibodies.
3.	Immune response-durable and effective	***3.***	Immune response-short lived and less effective.
4.	Immunity develops only after a lag period	***4.***	Immunity effective immediately.
5.	Immunological memory present. Subsequent challenge with booster dose more effective.	***5.***	No immunological memory. Subsequent administration of antibody less effective due to "immune elimination"
6.	Serves no purpose in immunodeficient host.	***6.***	Applicable in immunodeficient host
7.	Used for prophylaxis to increase body resistance.	***7.***	Used for treatment of acute infection.

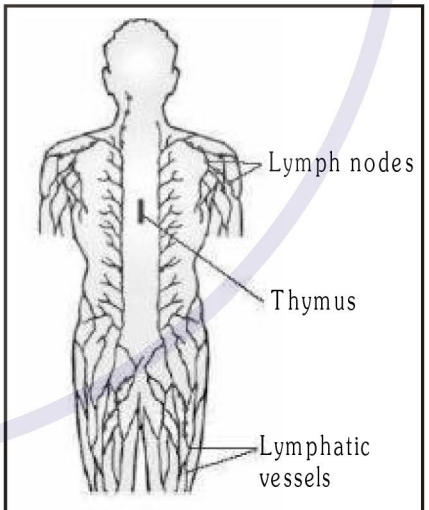
- **Active Immunity** :

This immunity develops **after infection or vaccination**.

Active immunity is formed by **lymphocytes**, lymphocytes are produce in **bone marrow (Haematopoiesis)**. After production some of lymphocytes migrates from bone marrow to thymus cells and mature as **T-cells (Thymus cell)**.

Lymphoid organs are the organs where origin and/or maturation and proliferation of lymphocytes occur. The primary lymphoid organs are **bone marrow** and **thymus** where immature lymphocytes differentiate into antigen-sensitive lymphocytes. After maturation the lymphocytes migrate to secondary lymphoid organs like **spleen, lymph nodes, tonsils, Peyer's patches of small intestine and appendix.** The secondary lymphoid organs provide the sites for interaction of lymphocytes with the antigen, which then proliferate to become effector cells.

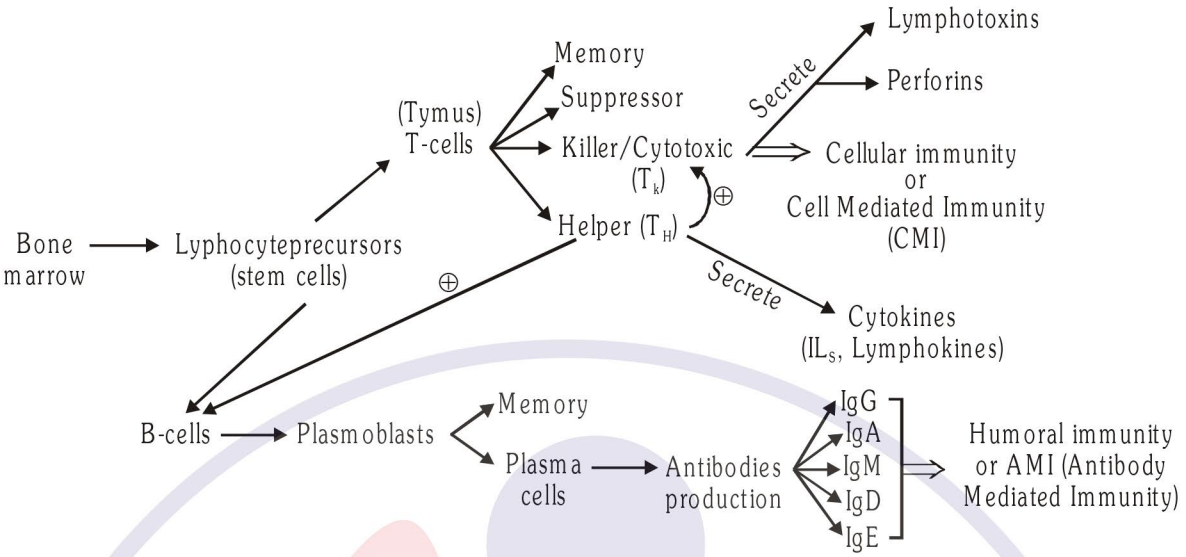
The bone marrow is the main lymphoid organ where all blood cells including lymphocytes are produced. The thymus is a lobed organ located near the heart and beneath the breastbone. The thymus is quite large at the time of birth but keeps reducing in size with age and by the time puberty is attained it reduces to a very small size. Both bone-marrow and thymus provide micro-environments for the development and maturation of T-lymphocytes. The spleen is a large beanshaped organ. It mainly contains lymphocytes and phagocytes.



Diagrammatic representation of Lymph nodes

It acts as a filter of the blood by trapping blood-borne microorganisms. Spleen also 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 micro-organisms or other antigens, which happen to get into the lymph and tissue fluid. Antigens trapped in the lymph nodes are responsible for the activation of lymphocytes present there and cause the immune response.

There is lymphoid tissue also located within the lining of the major tracts (respiratory, digestive and urogenital tracts) called **mucosal associated lymphoid tissue** (MALT). It constitutes about 50 per cent of the lymphoid tissue in human body.



Based on these two type of lymphocytes there are **two types** of active immune system.

(1) **C.M.I.S.** → Cell mediated immune system or Cellular immunity

This immune system is based on T-cells. (60-70%)

There are 5 type of cell :

When pathogens enter inside the body first macrophage interact with them and activates T_H-cell by releasing cytokines or ILs or monokines.

(i) **Helper T-cell** → This activated helper cell stimulates the killer T-cell and B-cell and these killer & B-cell start dividing and produce clone (group of similar cells) this phenomenon is called **clonal selection**.

They produce *lymphokines* (messenger molecules) which cause accumulating of WBCs to the affected site. T_H-cells also stimulate B–cells to produce antibodies and facillitate the action of other T–cells.

(ii) **Killer T-cell** : These cell or clone of these cell **destroy the infected cells or target cell** and kill the pathogen and also the **cancerous cells** by secreting Lymphotoxic substances and secrete lymphokines which attracts phagocytes.

These are responsible for cell–mediated immunity. They also destroy transplanted, tumour cells and other foreign cells.

(iii) **Suppressor Cells (TS) :-** These suppress the functions of T_C and T_H cells. B–cells and plasma cells are also affected by T_S cells by synthesysing suppressor factors and suppress the entire immune system for attacking the own body

(iv) **Memory T-cell** : They don't kill the pathogen or don't form the antibodies but these cell **retain the memory** of every encounter.

They converts into effector cells (T_C) on later encounter with specific antigen even after several years.

(2) **A.M.I.S.** (Antibody mediated immune system or humoral immunity)

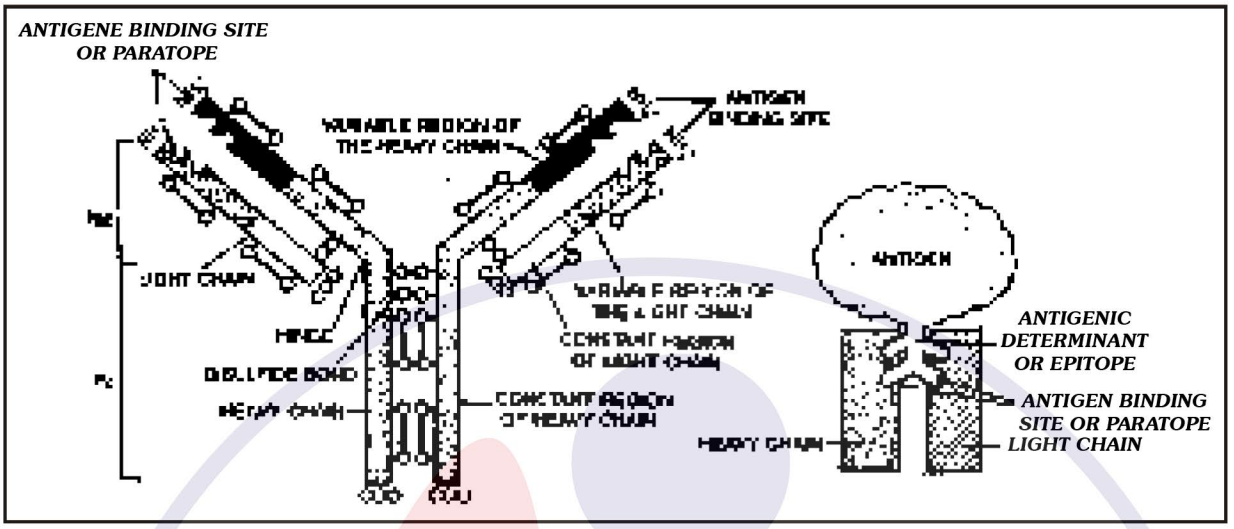
This immune system is **based on B-lymphocyte** (10-20%) and these B-lymphocyte secrete the antibody.

Antibody or Immunoglobulin : These are complex glycoprotein molecule made up of 4 polypeptide chains two light and two heavy chains.

These two chain held together by **disulphide bond** in shape of Y molecule, represented as **H2L2.**

Two **top tips** of this molecule bind with antigen [large and complex foreign molecules mainly proteins that activate the specific immunity] like **lock and key fashion** and make antigen-antibody complex.

STRUCTURE AND Type of Antibodies –



Type of antibodies – I_gA, I_gG, I_gM, I_gE and I_gD

4.0 Vaccine

- Vaccine is suspension of **inactivated pathogens** or **antigenic protein of pathogen** which is taken orally or injected to provide immunity for that pathogen.
- **History** :

(i) **Edward jenner (1796)** noticed that milkmaid did not suffer from small pox but they had scabs of cow pox. He transport the material from sore of milkmaid who was suffering from cow pox to the young body of 8 year old. After sometime he injected live small pox material into that boy, but symptoms of disease did not appear. He tried this procedure on other person and got success. He gave the term vaccination for this process.

- **Principle of vaccination :**

– The principle of vaccination and immunisation is based on the property called 'memory' of the immune system.

– The vaccine generates antibodies that neutralise the toxin/pathogen and also produces memory **B-cells** and **T-cells** , which recognise the pathogen in subsequent encounters and produce antibodies.

– If a quick immune response is needed as in tetanus infection, preformed antibodies or antitoxin is injected into the patient; this type of immunisation is called passive immunisation.

When a antigenic material is injected in a healthy person, it **generate antibodies and memory cell** as a **primary immune respone.** When this active pathogen enter second time inside this body of vaccinated person memory cells **rapidly recognise** and respond with massive production of lymphocytes and antibodies. So it destroys pathogen rapidly and disease does not appear. Person become **resistant** for that disease after vaccination.

6.0 Immune system disorder

- **Hyper Sensitive Disorder or Allergy**

When a person show hyper response or hyper sensitiveness for a common antigen or agent then it is called allergy.

The agents which cause allergy are called allergen. Common allergens can be pollen grains, food (egg, fish), medicines (penicilline), cold, heat, sunlight, fibres etc.

The exaggerated response of the immune system to certain antigens present in the environment is called allergy. The substances to which such an immune response is produced are called allergens. The antibodies produced to these are of IgE type. Common examples of allergens are mites in dust, pollens, animal dander, etc. Symptoms of allergic rections include sneezing, watery eyes, running nose and difficulty in breathing. Allergy is due to the release of chemicals like histamine and serotonin, from the mast cells. For determining the cause of allergy, the patient is exposed to or injected with very small doses of possible allergens, and the reactions studied. The use of drugs like anti-histamine, adrenalin and steroids quickly reduce the symptoms of allergy. Somehow, modern-day life style has resulted in lowering of immunity and more sensitivity to allergens-more and more children in metro cities of India suffer from allergies and asthma due to sensitivity to the environment. This could be because of the protected environment provided early in life.

Examples :

(i) **Bronchial Asthma** : It is common manifestation of allergy. It is allergy of lungs when an allergen enters inside the body by inhalation. It comes in contact with respiratory tube. This is characterised by the spasm of the smooth muscles present in the walls of the bronchiole. It is generally caused due to the hypersensitivity of the bronchiole to the foreign substances present in the air passing through it. The mucous memebranes on the wall of the air passage start secreting excess amount of mucous, which may clog the bronchi, as well as bronchiole.

Symptoms : coughing and difficulty in breathing mainly during expiration.(Wheezing)

(ii) **Hay Fever** : Mucosa of eyes and upper respiratory passage become hyper secretory in response to **allergen (pollen grain)**.

- **Auto immune disorder**

When the immune system does not discriminates between self and non-self antigen, antibodies are formed against the self antigen these antibodies destroy the self antigen and also the self tissue of the body. So, the antibody formation against self antigen is called. Auto immunity

- **Memory-based acquired immunity evolved** in **higher vertebrates** based on the ability to differentiate foreign organisms (e.g., pathogens) from selfcells. While we still do not understand the basis of this, **two corollaries** of this ability have to be understood. **One,** higher vertebrates can distinguish foreign molecules as well as foreign organisms. Most of the experimental immunology deals with this aspect. **Two,** sometimes, due to genetic and other unknown reasons, the body attacks self-cells. This results in damage to the body and is called **auto-immune** disease. Rheumatoid arthritis which affects many people in our society is an auto-immune disease.

Example :

(i) **Myasthenia gravis** :

(ii) **Pernicious (Destructive) anemia** :

(iii) **Hashimoto disease** :

(iv) **Rheumatoid arthritis :**

(v) **I.D.D.M** :

(vi) **Multiple sclerosis** :

(vii) **Vitiligo (VIII) Psoriasis**

8.0 DRUGS ABUSE

Surveys and statistics show that use of drugs and alcohol has been on the rise especially among the youth. This is really a cause of concern as it could result in many harmful effects. Proper education and guidance would enable youth to safeguard themselves against these dangerous behaviour patterns and follow healthy lifestyles.

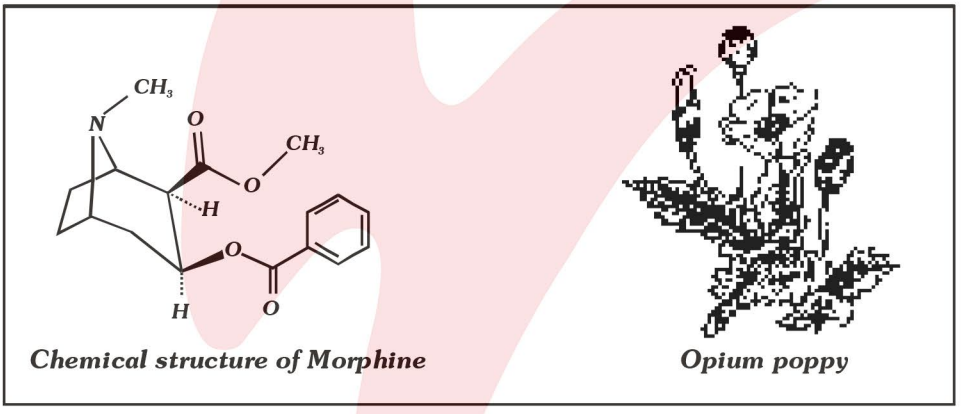
The drugs, which are commonly abused are opioids, cannabinoids and coca alkaloids. Majority of these are obtained from flowering plants. Some are obtained from fungi like LSD.

LSD (Lysergic acid diethyl amides) is a dangerous hallicinogen, obtained from fruiting body of a fungus *(Claviceps purpurea).*

(a) Opiods : (Eg ; Morphine, Heroin, etc.)

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. This is obtained by acetylation of morphine which is extracted from the latex of poppy plant **Papaver somniferum.** Generally taken by snorting and injection, heroin is a depressant and slows down body functions.

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

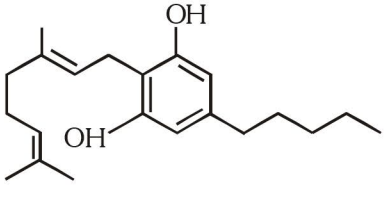


Chemical structure of Morphine

Opium poppy

(b) Cannabinoids

These are a group of chemicals, which 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. Generally taken by inhalation and oral ingestion, these are known for their effects on cardiovascular system of the body. These days cannabinoids are also being abused by some sportspersons



Skeletal structure of cannabinoid molecule

Leaves of Cannabis sativa

Flowering branch of Datura

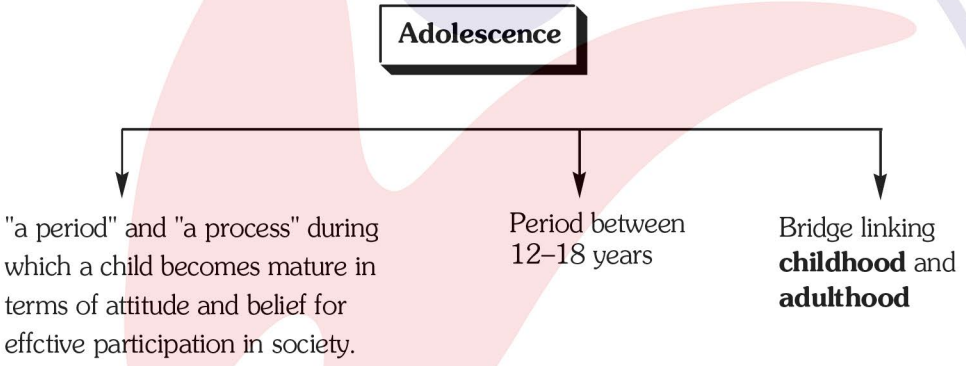
(c) Coca alkaloid or **cocaine**

These are 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. Excessive dosage of cocaine causes hallucinations.

Other well-known plants with hallucinogenic properties are Atropa belladona and Datura.

- Drugs like barbiturates, amphetamines, benzodiazepines and other similar drugs, that are normally used as medicines to help patients cope with mental illnesses like depression and insomnia, are often abused.
- Several plants, fruits and seeds having hallucinogenic properties have been used for hundreds of years in folk-medicine, religious ceremonies and rituals all over the globe. When these are taken for a purpose other than medicinal use or in amounts/frequency that impairs one's physical, physiological or psychological functions, it constitutes **drug abuse**.

9.0 ADOLESCENCE AND ALCOHOL ABUSE



- **Adolescence** means both **'a period'** and **'a process'** during which a child becomes mature in terms of his/her attitudes and beliefs for effective participation in society. The period between **12-18 years** of age may be thought of as adolescence period.
- In other words, adolescence is a **bridge linking childhood and adulthood**. Adolescence is accompanied by several biological and behavioural changes. Adolescence, thus is a very vulnerable phase of mental and psychological development of an individual.
- Curiosity, need for adventure and excitement, and experimentation, constitute common causes, which motivate youngsters towards drug and alcohol use.
- A child's natural curiosity motivates him/her to experiment. This is complicated further by effects that might be perceived as benefits, of alcohol or drug use. Thus, the first use of drugs or alcohol may be out of curiosity or experimentation, but later the child starts using these to escape facing problems.
- Of late, stress, from pressures to excel in academics or examinations, has played a significant role in persuading the youngsters to try alcohol and drugs.
- The perception among youth that it is 'cool' or progressive to smoke, use drugs or alcohol, is also in a way a major cause for youth to start these habits.
- Television, movies, newpapers, internet also help to promote this perception. Other factors that have been seen to be associated with drug and alcohol abuse among adolescents are unstable or unsupportive family structures and peer pressure.

- **Alcohol and Alcoholism**

  It affects the central nervous system alcohol is a depressant.

  (1) Ethyl alcohol is consumed as fermented beverages with low content of alcohol(beer, wine) and as distilled beverages with a relatively high alcohol percentage (Brandy, Rum, Whisky, Gin).

  (2) This alcohol is rapidly absorbed from the wall of stomach and enters the blood stream within minutes of ingestion.

  In the liver alcohol is converted into a more toxic substance **acetaldehyde**.

- **Effects of Alcohol Drinking**

  (1) Alcohol psychosis

Effects of Drug/Alcohol Abuse

- The **immediate adverse effects** of drugs and alcohol abuse are manifested in the form of reckless behaviour, vandalism and violence. **Excessive doses of drugs** may lead to coma and death due to respiratory failure, heart failure or cerebral hemorrhage.
- A **combination of drugs** or their intake along with alcohol generally results in overdosing and even deaths.
- The most common warning signs of drug and alcohol abuse among youth include drop in academic performance, unexplained absence from school/college, lack of interest in personal hygiene, withdrawal, isolation, depression, fatigue, aggressive and rebellious behaviour, deteriorating relationships with family and friends, loss of interest in hobbies, change in sleeping and eating habits, fluctuations in weight, appetite, etc.
- There may even be some **far-reaching implications** of drug/alcohol abuse. If abuser is unable to get money to buy drugs/alcohol he/she may turn to stealing. The adverse effects are just not restricted to the person who is using drugs or alcohol. At times, a drug/alcohol addict becomes the cause of mental and financial distress to his/her entire family and friends.
- Those who take drugs **intravenously** (direct injection into the vein using a needle and syringe), are much more likely to acquire serious infections like AIDS and hepatitis B. The viruses, which are responsible for these diseases, are transferred from one person to another by sharing of infected needles and syringes. Both AIDS and Hepatitis B infections are chronic infections and ultimately fatal. **AIDS and Hepatitis B are transmitted through infected blood and both are STDs.**
- The use of alcohol during adolescence may also have **long-term effects**. It could lead to heavy drinking in adulthood. 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 the foetus.
- Another **misuse of drugs** is what certain sportspersons do to enhance their performance. They (mis)use **narcotic analgesics**, anabolic steroids, diuretics and certain hormones in sports to increase muscle strength and bulk and to promote aggressiveness and as a result increase athletic performance.
- The **side-effects** of the use of anabolic steroids **in females** include masculinisation (features like males), increased aggressiveness, mood swings, depression, abnormal menstrual cycles, excessive hair growth on the face and body, enlargement of clitoris, deepening of voice.

In males it includes acne, increased aggressiveness, mood swings, depression, reduction of size of the testicles, decreased sperm production, potential for kidney and liver dysfunction, breast enlargement, premature baldness, enlargement of the prostate gland. These effects may be permanent with prolonged use.

- In the adolescent male or female, **severe facial and body acne**, and **premature closure of the growth centres** of **the long** bones may result in stunted growth.

Prevention and Control

- The age-old adage of **'prevention is better than cure'** holds true here also.
- It is also true that habits such as smoking, taking drug or alcohol are more likely to be taken up at a young age, more during adolescence.

  Hence, it is best to identify the situations that may push an adolescent towards use of drugs or alcohol, and to take remedial measures well in time. In this regard, the parents and the teachers have a special responsibility. Parenting that combines with high levels of nurturance and consistent discipline, has been associated with lowered risk of substance (alcohol/drugs/tobacco) abuse. Some of the measures mentioned here would be particularly useful for prevention and control of alcohol and drugs abuse among adolescents

(i) **Avoid undue peer pressure**

(ii) **Educating and counselling**

(iii) **Seeking help from parents and peers**

(iv) **Looking for danger signs**

(v) **Seeking professional and medical help**