

Human Health & Disease



Introduction- health

- The condition of being sound in body, mind or spirit, especially freedom from physical disease or pain- Health
- Ancient days- considered as a state of body & mind with balance of 'humors'- asserted by Greeks & Indian Ayurveda system
- It was believed- person with 'blackbile' belong to hot personality & would have fever
- Humors- four distinct bodily fluids; excess or deficiency of bodily fluids in individual person directly influences temperament & health
- Four humors- Black bile, yellow bile, phlegm & blood
- Later discovery of Blood circulation by William Harvey & demonstration of normal body temperature in person with blackbile- disproved 'good humor' hypothesis

- It was stated later- mind influenced by neural system, endocrine system & immune system- together they affect health
- **Factors influencing health:**
 1. Genetic disorders- deficiencies a child born with & deficiencies/ defect child inherit
 2. Infections
 3. Life style- food & water, rest & exercise, habits
- Health in generally means free from illness/ disease, injury or pain/ lack of physical fitness
- Health can be defined as a state of complete physical, mental and social well-being
- Healthy people are efficient at work which increases productivity & brings economic prosperity
- Health- increases longevity of people & reduce infant & maternal mortality

Factors to achieve good health





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HEART DISEASE AWARENESS



Characteristics of Good Health

- Important characteristics of person having good health:
 - i. Free from sickness and diseases
 - ii. Free from unnecessary anxiety
 - iii. Free from social and psychological tensions
 - iv. Self confidence
 - v. Feeling joy in living
 - vi. Ability to work efficiently and at its best



Disease & its types

- Any condition which interferes with normal functioning of the body and impairs the health- Disease

Types of Diseases:

- I. Congenital Disease- inborn disease & genetically inherited
- II. Acquired Disease- after birth & non- inheritable

Congenital Disease:

1. Disease due to gene mutation. Eg.- Haemophilia, Color blindness
2. Disease due to chromosomal mutation Eg.- Down's syndrome, Klinefelter's syndrome

Acquired Disease:

1. Communicable or infectious diseases- air, water, food, physical contact or vectors (Bacteria, Virus, Protozoa, Helminth, Fungus etc.)
2. Non- communicable or non- infectious diseases- Deficiency disease (Diabetes), Degenerative (Arthritis), Cancerous & Allergic diseases (Asthma)

COMMON DISEASES IN HUMANS

- Any substance which cause a disease by its excess or deficiency or absence- Disease agents
- Organism belonging to bacteria, viruses, fungi, protozoans, helminths etc., which cause disease- **Pathogens**
- Pathogen acts as parasite by living on/ in host & cause harm i.e. disease
- Mode of transmission/ epidemiology or entry into host- different means
- Once entered into host body- it multiply & interfere with normal vital activities which results morphological & functional damage
- Pathogens after it entry into the host- adapts itself based on the environment, Eg. Pathogen entering gut should survive at low pH to resist digestive enzymes

Typhoid

- Causative agent: *Salmonella typhi* (Bacterium)
- **Epidemiology:** Contaminated food & water, enters small intestine & migrate to other organs through blood
- **Symptoms:**

Typhoid fever- sustained high fever (39° to 40°C), Weakness, Stomach pain, Constipation, Headache, Loss of appetite, Severe cases- intestinal perforations & death
- Confirmation of disease: **Widal test**
- Mary Mallon nicknamed *Typhoid Mary*- typhoid carrier & was cook by profession, continued to spread typhoid for several years through food she prepared



Mode of transmission

Common Symptoms

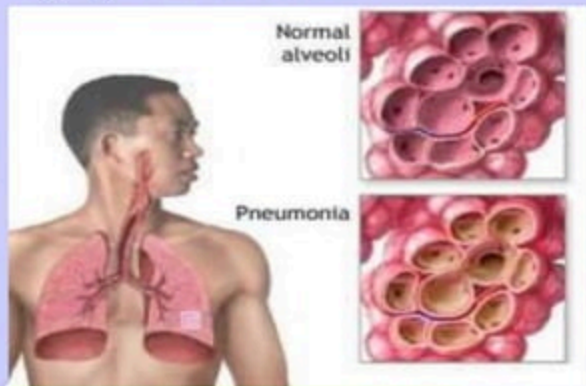


Pneumonia

- Causative agent: *Streptococcus pneumoniae* & *Haemophilus influenzae* (Bacteria)
- **Epidemiology:** inhalation of droplets/aerosols released by an infected person and by sharing glasses and utensils with an infected person
- **Symptoms:** Disease develop by causing infection in respiratory tract, Alveoli due to infection gets filled with fluid - severe problems in respiration, symptoms includes fever, chills, cough and headache, severe cases the lips and finger nails may turn gray to bluish in color



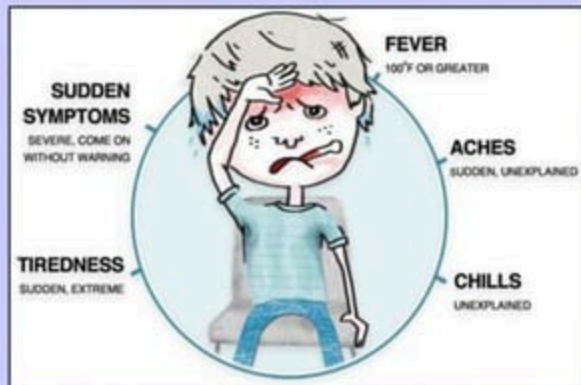
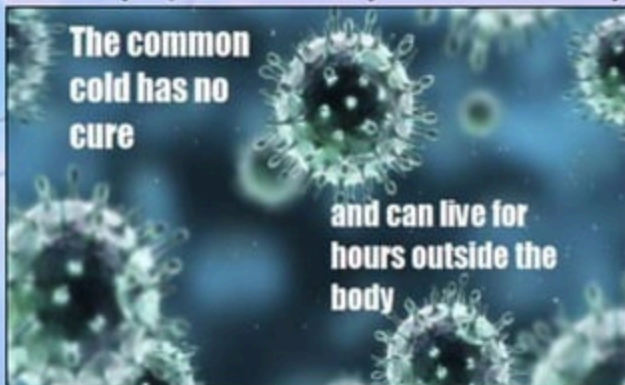
Streptococcus pneumoniae



Pneumonia

Common Cold

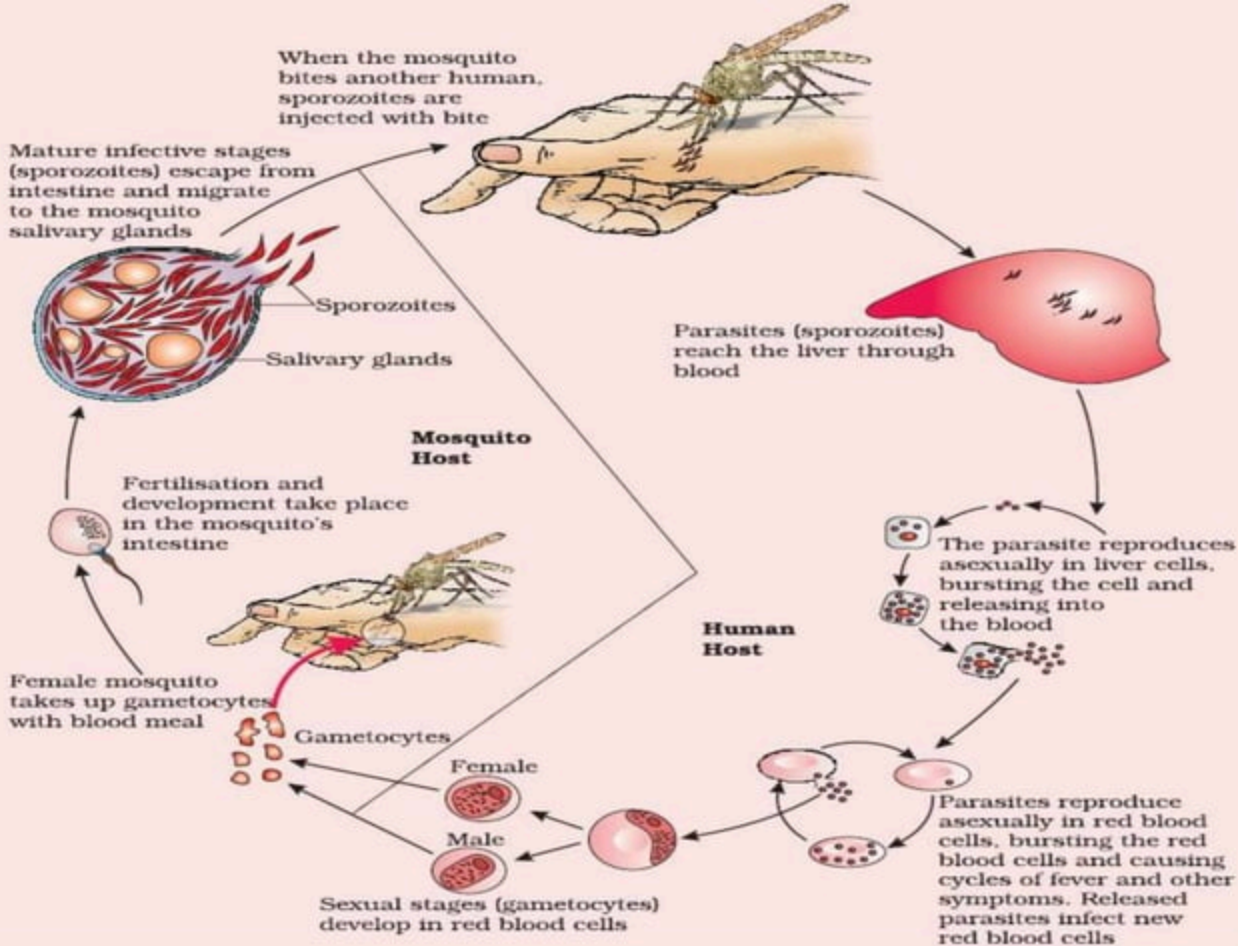
- Causative agent: Rhino virus
- **Epidemiology:**
 1. Inhalation of droplets of cough or sneeze of an infected person
 2. Transmission through contaminated objects
- **Symptoms:**
 - Infect the nose and respiratory passage but not the lungs
 - Common cold shows symptoms like nasal congestion and discharge, sore throat, hoarseness, cough, headache, tiredness, etc
 - Symptoms usually last for 3-7 days



Malaria

- Causative agent: *Plasmodium vivax*, *P. malaria*, *P. falciparum* (Protozoa)
- *P. falciparum*- Malignant malaria which may be fatal
- **Epidemiology:** Bite of female *Anopheles* mosquito
- **Target organ:** RBC & liver
- **Symptoms:** High fever and chill, fever occurs on every alternate day, vomiting



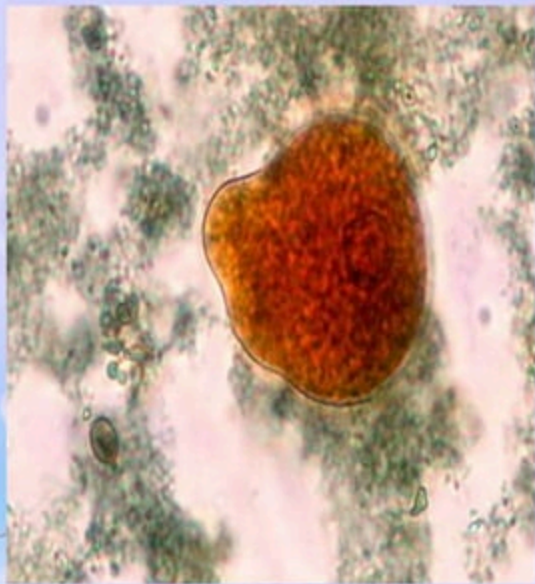


Life cycle of plasmodium

- Plasmodium requires two host- human & mosquito (female *Anopheles*)
- Life cycle of plasmodium starts with injecting **sporozoites** through the bite of infected female Anopheles mosquitoes.
- The parasite initially multiply within the liver cells and then attack the red blood cells (RBCs) resulting in their rupture.
- There is release of a toxic substance called hemozoin from the ruptured RBCs. It is responsible for the chill and high fever.
- From the infected human the parasite enters into the body of Anopheles mosquito during biting and sucking blood.
- Further development takes place in the body of Anopheles mosquitoes.

Amoebiasis/ Amoebic dysentery

- Causative agent: *Entamoeba histolytica* (protozoan)
- **Epidemiology:**
 1. Transmission of parasite from faeces of infected person to food or food products through Houseflies (mechanical carrier)
 2. Drinking water contaminated by the faecal matter are the main source of infection
- **Target Organ:** Large intestine
- **Symptoms:**
 - Symptoms includes constipation, abdominal pain and cramps, stools with excess mucous and blood clots.

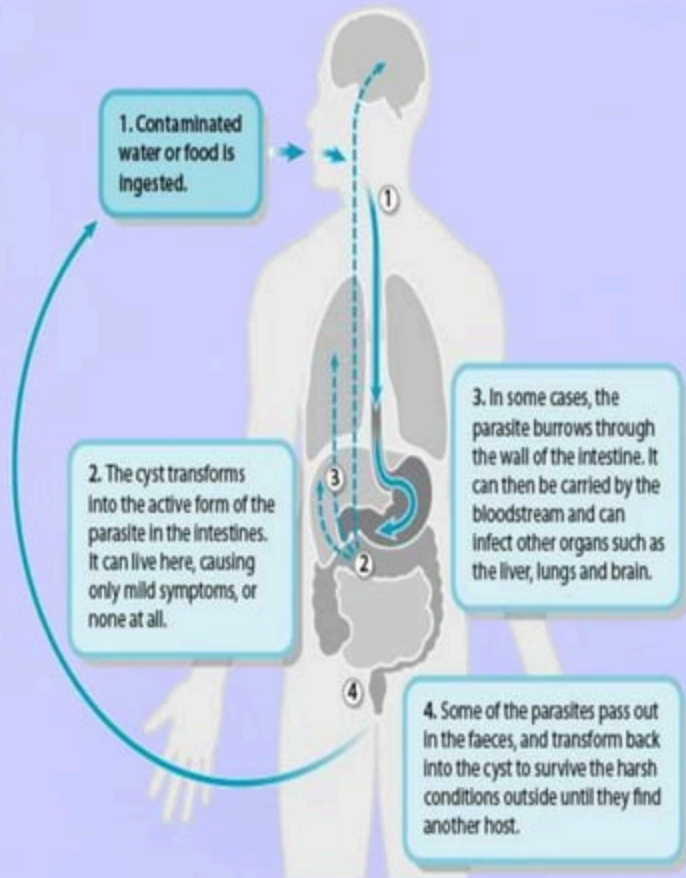


1. Contaminated water or food is ingested.


2. The cyst transforms into the active form of the parasite in the intestines. It can live here, causing only mild symptoms, or none at all.

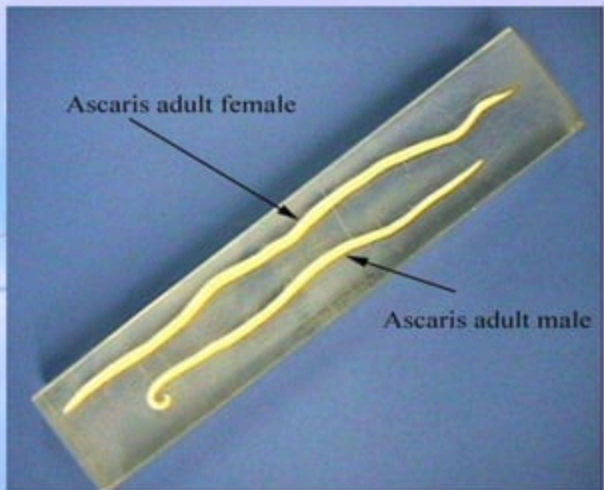
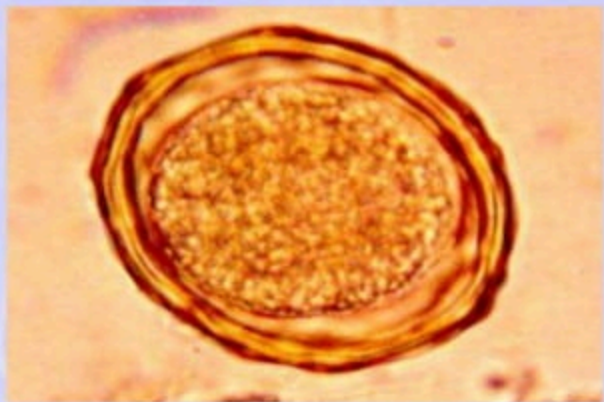
3. In some cases, the parasite burrows through the wall of the intestine. It can then be carried by the bloodstream and can infect other organs such as the liver, lungs and brain.

4. Some of the parasites pass out in the faeces, and transform back into the cyst to survive the harsh conditions outside until they find another host.



Ascariasis

- Causative agent: *Ascaris lumbricoides* (Round worm) - Helminths
 - **Epidemiology:** Consumption of contaminated water, vegetables, fruits etc., contamination takes place through faeces of infected person which have the egg of parasite
 - **Target organ:** Intestine
 - **Symptoms:** Internal bleeding of intestine, muscular pain, fever, anemia and blockage of the intestinal passage.
- 



Elephantiasis/ Filariasis

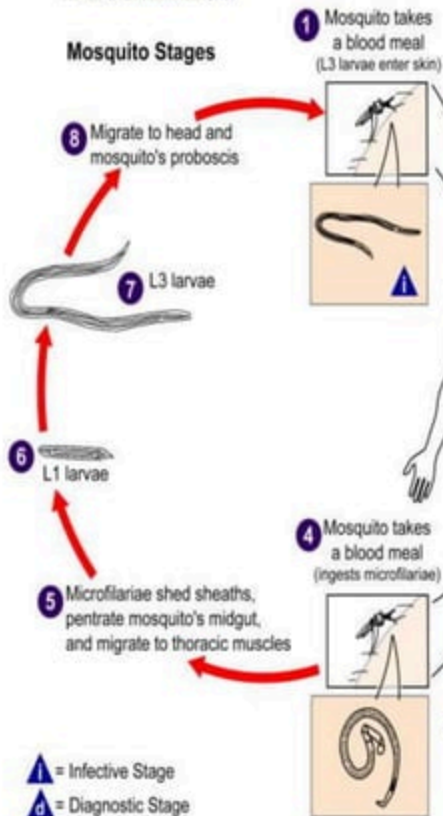
- **Causative organism:** *Wuchereria bancrofti* & *W. malayi* (Filarial worms)- Helminths
- **Epidemiology:** Bite of female mosquito vectors- *Culex*
- **Target organ:** Lymphatic vessels of lower limbs, genital organs
- **Symptoms:**
 1. Chronic inflammation of organs (many years)- lymphatic vessels which result in appearance of elephant like leg- **Elephantiasis**
 2. Deformation of genital organ



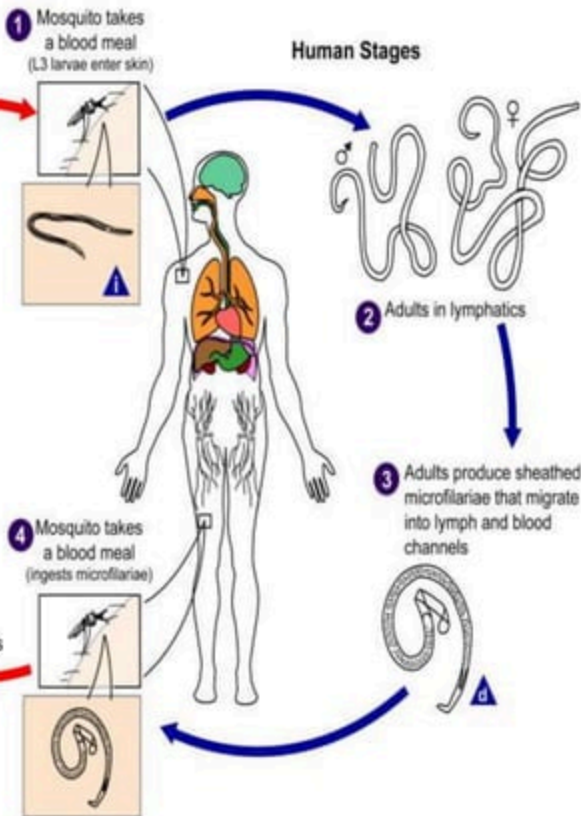
Filariasis

(*Wuchereria bancrofti*)

Mosquito Stages



Human Stages



Ring Worm

- **Causative agent:** *Microsporum*, *Trichophyton* & *Epidermophyton*-(fungi)
- **Epidemiology:**
 1. Acquired from the soil.
 2. Using towel, clothes or even comb of infected individuals.
 3. Heat & moisture enhances the growth of organism
- **Target organs:** Skin, nails, folds of skin in groin & toes
- **Symptoms:**
 1. Appearance of dry, scaly lesions in skin nails and scalp.
 2. Lesion accompanied with intense itching.



Microsporum

Prevention & control of diseases

- Infectious diseases can be prevented through maintenance of personal and public hygiene
- Diseases can be grouped as:
 1. Food & water borne diseases
 2. Air borne diseases
 3. Vector borne diseases

Food & water borne diseases:

- Proper personal hygiene include keeping the body clean; consumption of clean drinking water, food, vegetables, fruits, etc.
- Proper public hygiene which includes proper disposal of waste and excreta; periodic cleaning and disinfection of water reservoirs, pools, cesspools and tanks and observing standard practices of hygiene in public catering.
- Eg.- typhoid, amoebiasis and ascariasis

Air borne diseases:

- Close contact with infected person & their belongings should be avoided
- Personal hygiene is also very important to prevent diseases
- Eg.- Pneumonia and Common cold

Vector borne diseases:

- Controlling or eliminating the vectors and their breeding places.
- Avoiding stagnation of water in and around residential areas, regular cleaning of household coolers, use of mosquito nets
- Introducing fishes like *Gambusia* in ponds that feed on mosquito larvae, spraying of insecticides in ditches, drainage areas and swamps, etc.
- Doors and windows- wire mesh to prevent the entry of mosquitoes.
- *Aedes* & *Culex* mosquitoes, Houseflies
- Malaria, Filariasis, Dengue and Chikungunya

- Diseases can be now prevented- vaccines and immunisation
- Vaccines - eradicate smallpox, polio, diphtheria, pneumonia and tetanus
- Through Biotechnology we can make available newer and safer vaccines.
- Discovery of antibiotics and various other drugs has also enabled us to effectively treat infectious diseases



Immunity

- The overall ability of host to fight against disease causing organism-
Immunity
- The foreign agents could be pathogens or any foreign substance which in turn could cause disease in host

- **Types of Immunity**
 1. Innate Immunity
 2. Acquired Immunity

- Innate Immunity- which is present from the time of birth & is not pathogen specific
- Acquired Immunity- not from time of birth & is pathogen specific; Immunity is conferred based on memory that immune system have for that pathogen

The Immune System

Innate

physical barriers
natural killer cells
macrophages

Acquired

Cell-mediated

T & B cells

Humoral

antibody-mediated

Innate Immunity

- Is non-specific type of defence which is present at the time of birth
- Immunity is provided by different barriers which prevent entry of foreign agents in body
- Innate immunity consist of four types of barriers:
 1. Physical barrier
 2. Physiological barrier
 3. Cellular barrier
 4. Cytokine barrier

1. Physical Barrier:

- Barrier which prevents entry of microbes into the body which comes in contact with body
- Skin- main barrier which prevents entry of the micro-organisms.
- Mucus coating- present at epithelium lining of the respiratory, gastrointestinal and urogenital tracts- trap microbes

2. Physiological Barrier:

- Body secretions of body acts as physiological barrier & prevents microbial growth
- Stomach- acid (HCl), Mouth- saliva, Eyes- tears; physiological barrier

3. Cellular Barrier:

- Certain cells of body- eradicate microbes & provide immunity
- Act by engulfing pathogen & destroys them by secreting certain chemicals against them
- Tissues which mainly act as cellular barrier- **leukocytes** also called WBC
- Leukocytes (WBC)- **polymorpho-nuclear leukocytes** (PMNL- neutrophils) and **monocytes** and **natural killer** (type of lymphocytes) & macrophages in tissues can phagocytose and destroy microbes.

4. Cytokine barriers :

- Proteins (interferons)- protects healthy cells from invasion of pathogens
- Usually secreted from virus infected cells
- **Interferons**- protect non-infected cells from further viral infection.

Acquired Immunity

- Is pathogen specific & characterized by memory.
- When pathogen encounters body for first time body responds by producing initial response- **primary immune response** - low intensity.
- When same pathogen encounter again body elicits a highly intensified **secondary** or **anamnestic response**.
- Secondary response produced in body is due to **memory** of first encounter of pathogen

- **Types of Acquired Immunity:**
 1. Antibody mediated immunity or Humoral immunity
 2. Cell mediated immunity (CMI)

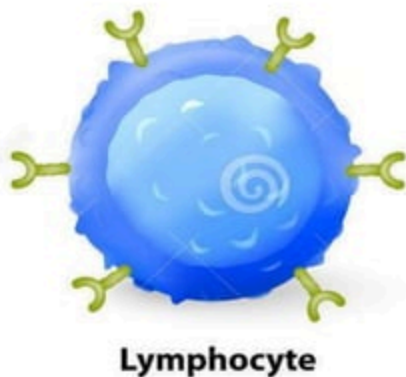
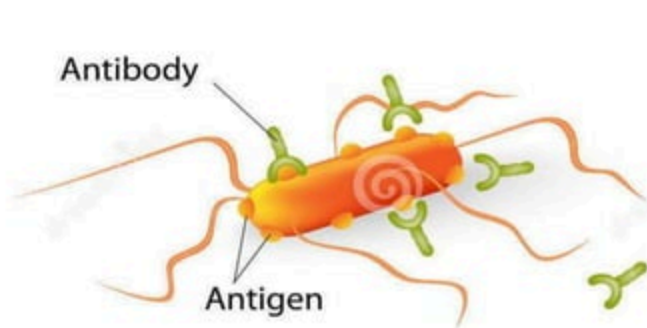
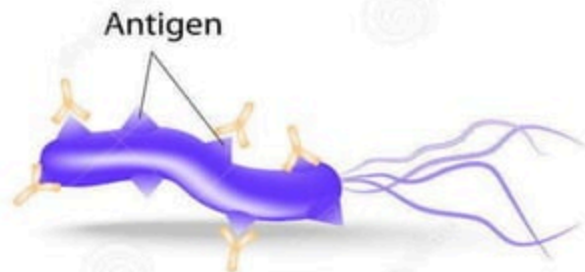
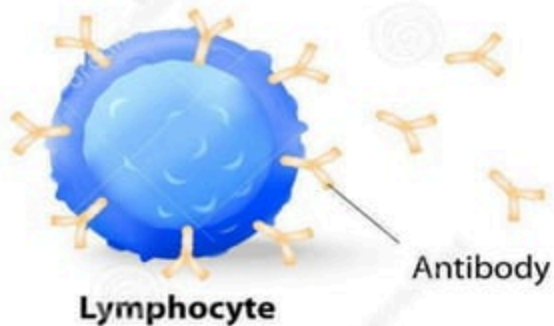
Tissues involved in Acquired Immunity

- Tissues involved in Acquired Immunity are:
 1. B- lymphocytes- produce antibodies
 2. T- lymphocytes- helps B cells to produce antibodies

I Antibody Mediated Acquired Immunity:

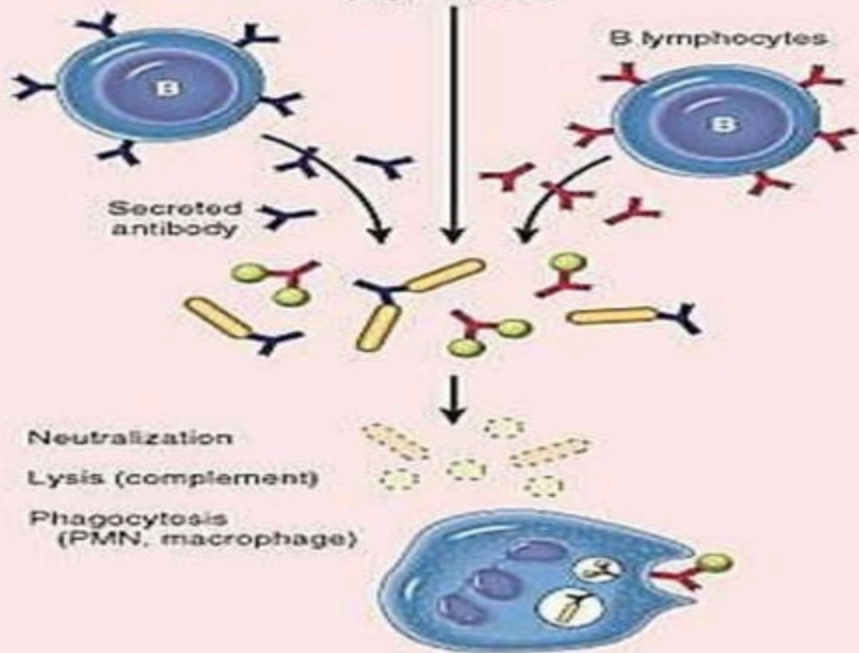
- Lymphocytes (WBC) B & T cells- mediate process of primary & secondary immune response
- When a pathogen invades body- B lymphocytes identifies that as *foreign* substance & responds by producing an army of proteins called **Antibodies**
- Antibodies are protein which fight against pathogen to eradicate them from body
- T lymphocyte/ T cell- helps B cell to produce antibodies
- Since antibodies are found in blood this immunity response is also called **Humoral immunity response.**

HUMORAL IMMUNITY



HUMORAL IMMUNITY

Extracellular microbes
(e.g. bacteria)



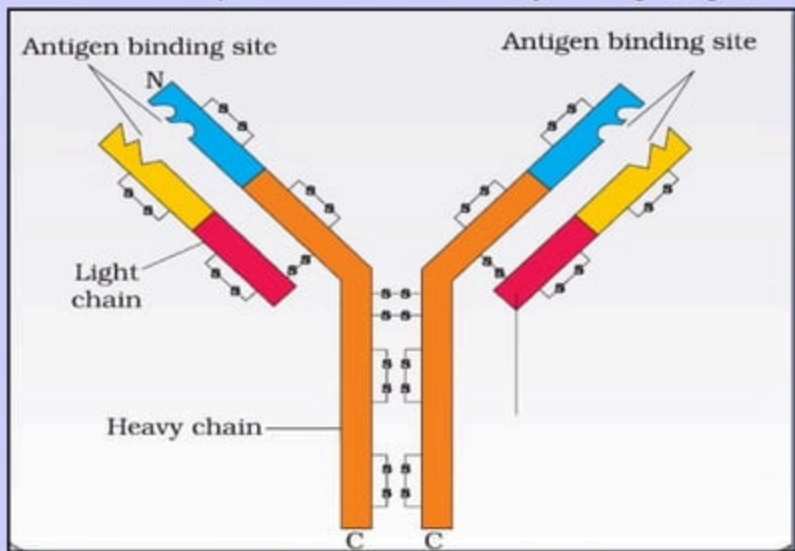
Neutralization

Lysis (complement)

Phagocytosis
(PMN, macrophage)

Structure & types of Antibodies:

- Antibodies- proteins produced by lymphocytes
- A molecule of antibody- four **peptide chains**
- Of 4 peptide chain- 2 are small & called **light chains** and 2 are long & called **heavy chains**
- Represented as **H₂L₂**
- Different types of antibodies are produced in our body are IgA, IgM, IgE, IgG & IgD

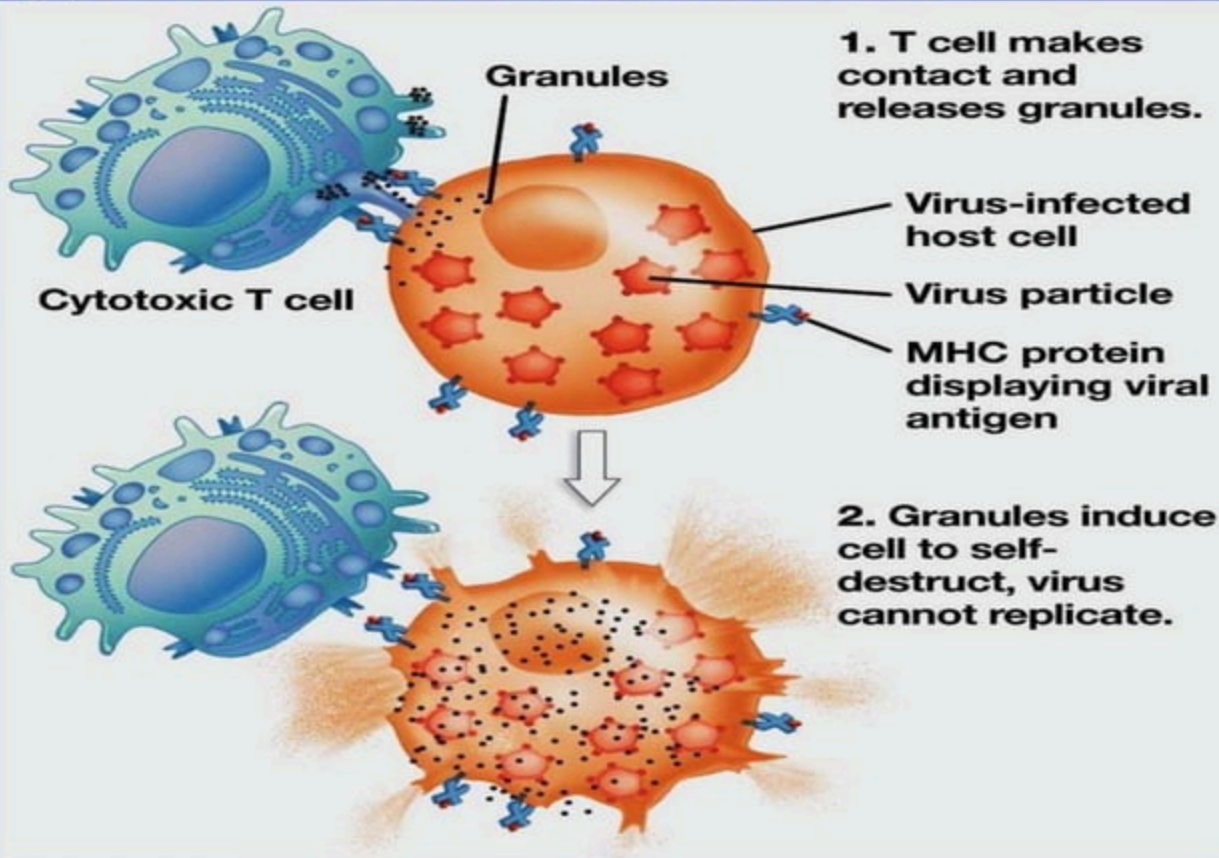


II Cell Mediated Immunity (CMI):

- Mediated by T- lymphocytes- Macrophages, Neutrophils etc.
- T cells identifies the infected cell which express antigen on its surface & releases certain protein called **Cytokine** which disrupts the infected cell

- For transplantation of human organs like heart, eye, liver, kidney its very important to find suitable donor
- Grafts for transplantation cannot be obtained from any animal or primate or any human being- rejected by the acceptor/ patient sooner or later
- To avoid complications- tissue matching, blood group matching- suitable donor
- After transplantation patient has to take **immune – suppressants** all his/her life.
- Else body will differentiate between 'self ' and 'non- self' and graft rejection will take place- cell-mediated immune response

(a) PROCESS: CELL-MEDIATED RESPONSE



Active & Passive Immunity

- Immunity conferred in body is basically of two types:
 1. Active Immunity
 2. Passive Immunity

Active Immunity:

- Slow process & takes time to give its full effective response

Reasons of Active Immunity:

- Generated in body due to injection of mild natured microbes during immunization or when infectious organism enters body during natural infection- induce active immunity

Mechanism of Active Immunity:

- Microbe enters body & identified by B & T- lymphocytes as antigen & in response to that body produce antibodies specific to that antigen
- Antibodies then act against pathogen (antigen) & provides immune response- Active Immunity

Passive Immunity:

- Quick process & does not take time to show immune response

Reasons of Passive Immunity:

- Generated in body when ready-made antibodies of pathogens are directly injected into body

Mechanism of Passive Immunity:

- When antibodies against specific antigen (pathogen) is directly injected into blood stream, body develops immune response against pathogen in the absence of pathogen due to **antibodies**
- Thus, when pathogen invades body the immune response is quickly shown (presence of antibody in body)
- Since antibodies are directly injected, the cells (B & T) responsible to produce antibodies does not involve- quick immune response
- Eg.- **Colostrum**- yellowish fluid secreted by mother during initial period of lactation- IgA antibodies which provides immunity to infant & foetus also gets some antibodies through placenta

Vaccination & Immunisation

- **Principle-** “property of ‘memory’ of the immune system”

Vaccination

- **Antigenic proteins** of pathogen or **activated/weakened pathogen** (vaccine) are introduced into the body.
- The antibodies produced in the body against these antigens would neutralise the pathogenic agents during actual infection.
- The vaccines also generate memory – B and T-cells that recognize the pathogen quickly on subsequent exposure and overwhelm the invaders with a massive production of antibodies.
- Recombinant DNA technology- antigenic polypeptides of pathogen are produced in bacteria or yeast.
- Vaccines produced using this approach allow large scale production and hence greater availability for immunisation, e.g., hepatitis B vaccine produced from yeast

Immunisation

- Immunization is the process whereby a person is made immune or resistant to an infectious disease, typically by the administration of a vaccine. Vaccines stimulate the body's own immune system to protect the person against subsequent infection or disease.
- Two Types:
 1. Active Immunisation- Slow immune response- infected from mild dosage of dead / pretreated live microbe. Eg.- Measles, mumps, rubella etc.
 2. Passive Immunisation- Quick immune response
 - Direct injection of **preformed antibodies** (Eg. Tetanus), or **antitoxin**- a preparation containing antibodies to the toxin (Eg. Snakebites)
 - Snakebites, the injection which is given to the patients, contain preformed antibodies against the snake venom- **Passive Immunisation**

Allergies



- **Allergy:** Is hypersensitivity disorder of immune system in which exaggerated response of the immune takes place to certain antigens present in the environment
- Substance which induce allergy- **Allergen** (mites in dust, pollens, animal dander)
- Antibodies produced- IgE type etc.
- Symptoms: Sneezing, watery eyes, running nose and difficulty in breathing.
- Reason: Release of chemicals like **histamine** and **serotonin** from the mast cells
- Diagnosis: Injecting small dosage of possible allergens & reactions are observed
- Drugs **anti-histamine, adrenalin and steroids**- quickly reduce the symptoms of allergy
- Protected environment- lowered immunity thus more & more people are now sensitive to allergens

Autoimmunity

- **Autoimmunity** is the failure of an organism in recognizing its own constituent parts as *self*, thus leading to an immune response against its own cells and tissues.
- Higher vertebrates- evolved & developed its ability to differentiate foreign organisms (e.g., Pathogens) or molecule from self cells
- But some times due to genetic or other unknown reasons- body attacks self cells- **auto-immune** disease.
- Eg.- Rheumatoid arthritis (an auto-immune disease.)



Immune System in Body

- Is a system of biological structures & processes within an organism which protects organism against any diseases & also helps to identify self from non- self and remembers them
- Structures associated with immune system:
 1. lymphoid organs
 2. Tissues & cells
 3. Antibodies (Soluble molecule)
- Unique as it recognises foreign antigens, responds to these and remembers them.
- Functions: Important role in allergic reactions, auto-immune diseases and organ transplantation.

Lymphoid Organs

- Organs- origin and/or maturation and proliferation of lymphocytes occur
- Lymphoid organs are of 2 types:
 1. Primary lymphoid organ
 2. Secondary lymphoid organ

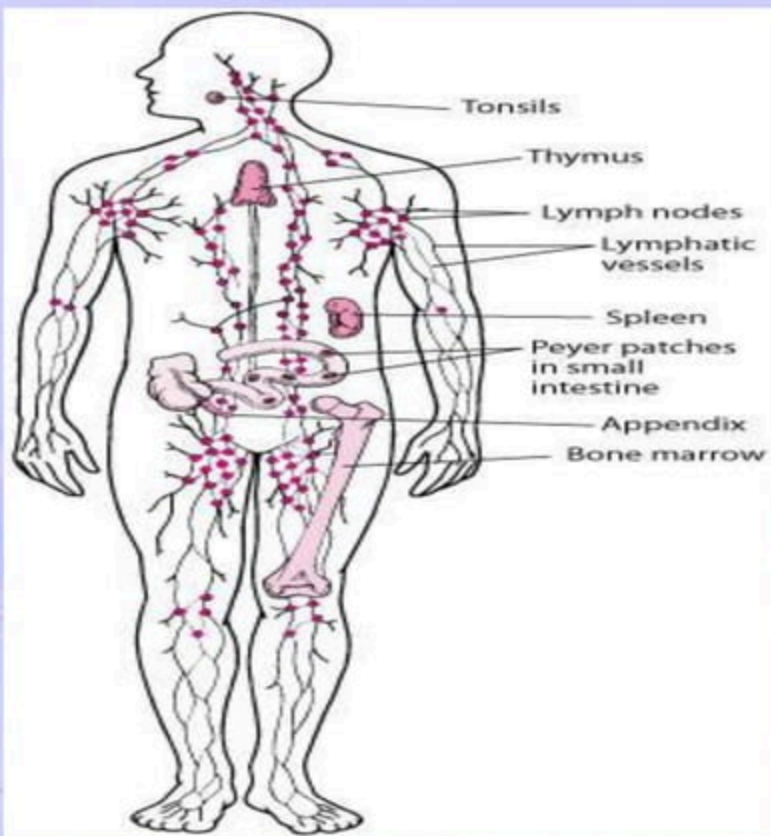
Primary lymphoid organ:

- Origin, maturation & proliferation of immune cells- **Bone marrow** and **thymus**
- During proliferation & maturation - immature lymphocytes differentiate into antigen-sensitive lymphocytes and after maturation the lymphocytes migrate to secondary lymphoid organs

Secondary Lymphoid organ:

- provide the sites for interaction of lymphocytes with the antigen & then lymphocytes proliferate to become effector cells
- Spleen, lymph nodes, tonsils, Peyer's patches of small intestine and appendix

Lymphatic organ



Function of Lymphoid Organs:

- Primary lymphoid organs **Bone marrow & Thymus**- provide micro-environments for development & maturation of T lymphocytes
- Bone marrow- main lymphoid organ where all blood cells including lymphocytes are produced.
- Thymus is a lobed organ located near the heart and beneath the breastbone. 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
- Spleen (secondary)- bean shaped & contains lymphocytes and phagocytes. Act as a filter of the blood by trapping blood-borne microorganisms. Spleen also has a large reservoir of erythrocytes

- Lymph nodes (secondary)- small solid structures located at different points along the lymphatic system- trap the micro-organisms/ antigens, which enters lymph and tissue fluid and activates lymphocytes causing immune response.
- Lymphoid tissues- lines at the major tracts (respiratory, digestive and urogenital tracts) called **mucosal associated lymphoid tissue (MALT)** & are 50 per cent of the lymphoid tissue in human body.

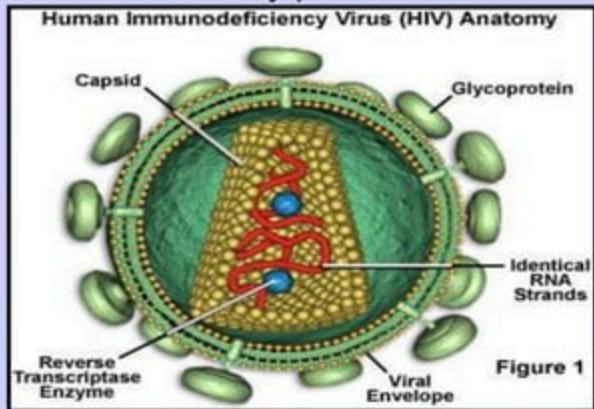


AIDS

- **Acquired Immuno Deficiency Syndrome-** disease caused due to deficiency of immune system
- Disease/ syndrome- acquired during the lifetime of an individual indicating that it is not a congenital disease
- First reported in 1981 & last twenty-five years- 25 million persons were killed

Causative organism:-

- Human Immuno deficiency Virus (HIV)- **retrovirus**, i.e RNA virus having RNA genome enclosed by protein coat

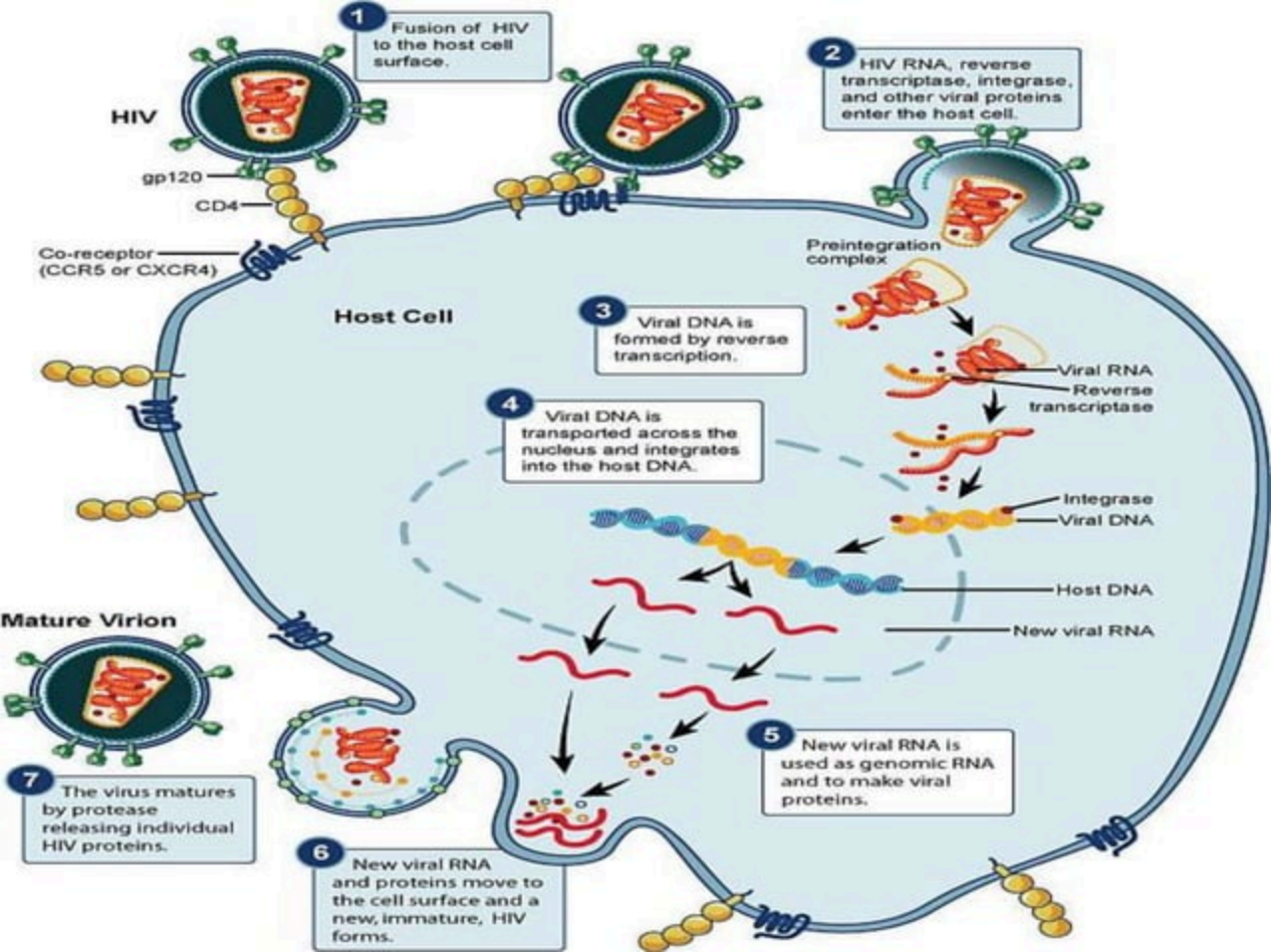


Modes of Transmission of HIV infection:

- (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
 - (d) from infected mother to her child through placenta
-
- Individuals with multiple sexual partners, drug addicts who take drugs intravenously, individuals who require repeated blood transfusions and children born to an HIV infected mother- high chance of AIDS
 - Cause of HIV infection: **Body fluids** only not by touch or physical contact
 - It takes few months to few years (5- 10 years)- between infection & appearance of AIDS symptoms

Mechanism of action/ replication of HIV:

- HIV is a RNA virus
- Its structure includes identical RNA strands, reverse transcriptase which are enclosed in protein coat
- Target cell of HIV- **Macrophage & Helper T- lymphocyte (T_H)**
- HIV first binds to the receptor on host macrophage where fusion of HIV takes place
- HIV RNA/ viral RNA- released in cytoplasm which undergoes **reverse transcription** with Reverse transcriptase enzyme- HIV DNA/ viral DNA
- Viral DNA enters host nucleus & integrates with host DNA- **transcription**- new viral RNA forms viral genome & some **translates** in cytoplasm to new viral proteins
- Viral proteins & RNA- moves to surface of cell & buds off as new HIV
- They targets helper T- lymphocyte- replicates & produce progeny virus- reduces helper T- lymphocytes



Symptoms:

- HIV attacks Helper T lymphocyte- reduction of Helper T lymphocyte which cause severe **Cellular immuno- deficiency**
- Bouts of fever, Diarrhea & Weight loss
- Highly susceptible to *Mycobacterium*, viruses, fungi, parasites like *Toxoplasma*
- Infected person becomes opportunistic to infections

Diagnosis & Treatment:

- Diagnostic test for AIDS- **enzyme linked immuno-sorbent assay (ELISA)**
- Treatment of AIDS with **anti-retroviral drugs**- partially effective
- Drugs can only prolong the life of the patient but cannot prevent death, which is inevitable.

What Have You Heard About AIDS?

What Does It Mean?

How Does It Harm Us?

Who Can Get It?

What Causes It?

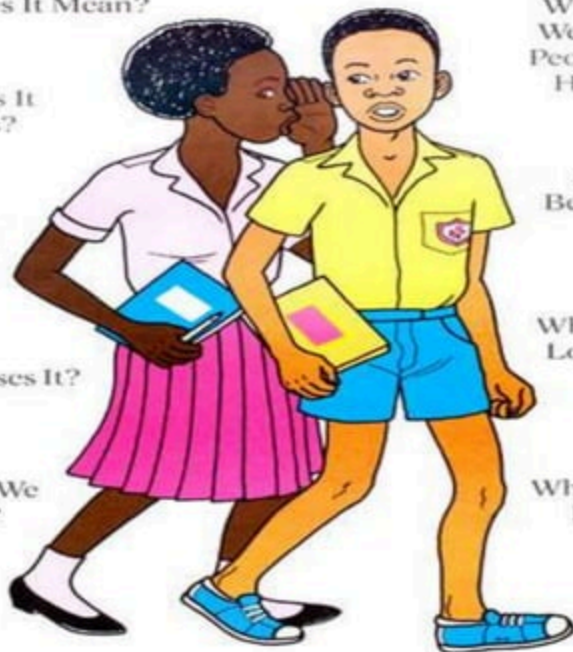
How Can We Stop It?

What Can We Do For People Who Have It?

Can It Be Cured?

What Does It Look Like?

Which Of Us Has It?



Don't GUESS the Answers!
LEARN THE TRUTH ABOUT AIDS!

Adapted from the Uganda School Health Kit on AIDS Control (Item 3)
Ministry of Education, Ministry of Health, AIDS Control Programme, UNICEF Kampala

Prevention of AIDS:

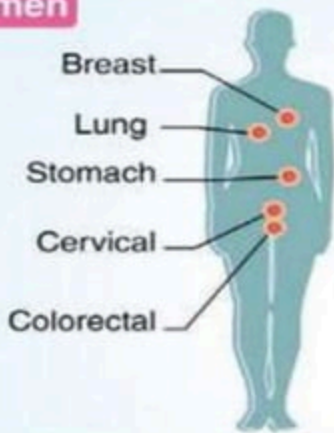
- Educating people to generate awareness among them - National AIDS Control Organization (NACO) and other non-governmental organization (NGOs)
- WHO has started a number of programs to prevent the spreading of HIV infection which includes- Making blood (from blood banks) safe from HIV, ensuring the use of only disposable needles and syringes in public and private hospitals and clinics, free distribution of condoms, controlling drug abuse, advocating safe sex and promoting regular check-ups for HIV in susceptible populations
- Infection with HIV or having AIDS is something that should not be hidden – since then, the infection may spread to many more people

Cancer

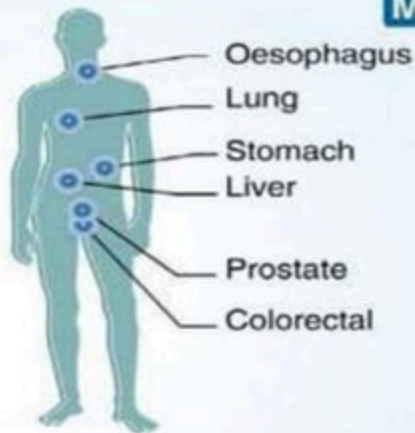
- Cancer also known as a malignant tumor, is a group of diseases involving abnormal **cell growth** with the potential to invade or spread to other parts of the body
- Considered as one major cause of death all over world
- Due to its severity process of Oncogenic transformation of cells, its treatment and control requires most intense areas of research in biology and medicine
- Cancer can be induced by external factors- **Carcinogens**

The most common cancers worldwide

Women

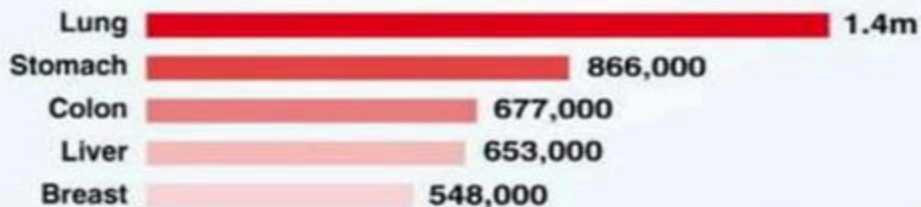


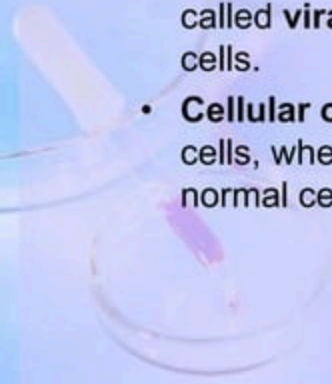
Men



Source: WHO

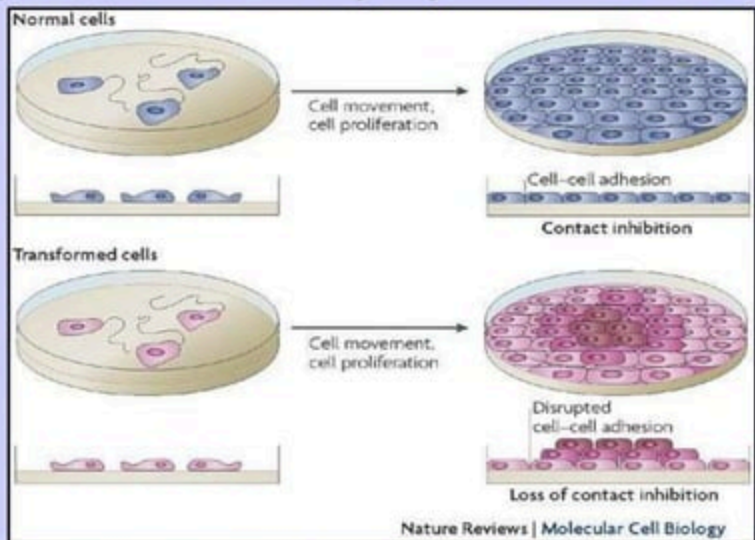
Cancers that caused the most deaths in 2007



- **Causes of Cancer:**
 - Normal cells transformed into cancerous neoplastic cells by physical, chemical and biological agents. These agents are called **carcinogen**.
 - **Physical agents:** ionizing radiation like X-rays, gamma rays non-ionizing radiations like UV-rays.
 - **Chemical agents:** Tobacco smoke, sodium azide, Methyl ethane sulphonate.
 - **Biological agents:**
 - Cancer causing viruses called **oncogenic viruses** have a gene called **viral oncogenes**, induce transformation of neoplastic cells.
 - **Cellular oncogenes** (c-onc) or **proto oncogenes** in normal cells, when activated lead to oncogenic transformation of the normal cells.
- 

Mechanism to transformation to cancerous cell:

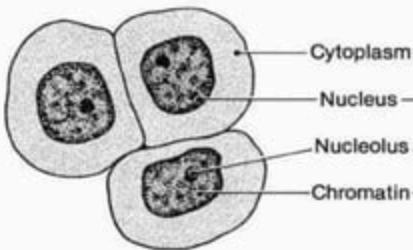
- Cell growth and differentiation is highly controlled and regulated which is lacked in cancerous cell
- Normal cell show a property- **Contact inhibition**- inhibits uncontrolled growth
- Cancer cells appears to have lost this property. As a result of this, cancerous cells just continue to divide giving rise to masses of cells called **tumors**.



Normal and Cancer Cells

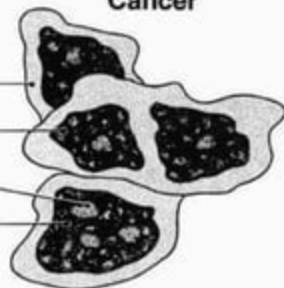
Structure

Normal



- Large cytoplasm
- Single nucleus
- Single nucleolus
- Fine chromatin

Cancer



- Small cytoplasm
- Multiple nuclei
- Multiple and large nucleoli
- Coarse chromatin

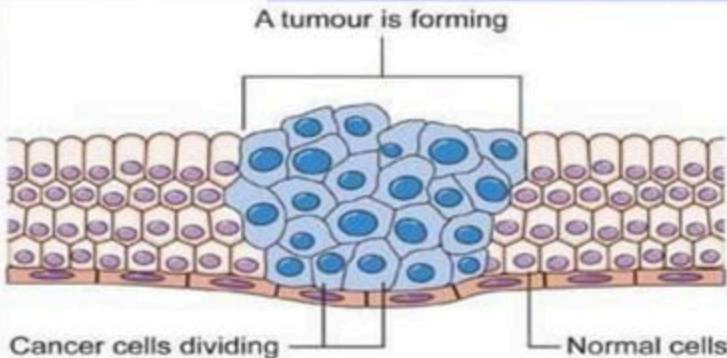


Diagram showing how cancer cells keep on reproducing to form a tumour
Copyright © CancerHelp UK

Types of Tumors:

- **Benign tumors:**
 - Normally remain confined to their original location
 - Do not spread to other location.
 - Cause little damage

- **Malignant tumors:**
 - Mass of proliferating cells called **neoplastic** or tumor cells.
 - These cells grow very rapidly.
 - Invade and damage surrounding tissues.
 - These cells actively divide and grow; they also starve the normal cells.
 - Cancerous cells escape from the site of origin and moves to distant place by blood, wherever they get lodged make the normal cell cancerous. This property is called **metastasis**.

Detection of Cancer:

- **Biopsy and histopathological study-**

- a) tissue and blood and bone marrow tests for increased cell counts (leukemias);
- b) Biopsy of a piece of the suspected tissue cut into thin sections is stained and examined under microscope (histopathological studies) by a pathologist

- **Radiography like X-rays, CT (computerized tomography)**

- a) used to detect cancers of the internal organs
- b) Computed tomography uses X-rays to generate a three-dimensional image of the internals of an object

- **MRI (magnetic resonance Imaging):**

- a) uses strong magnetic fields and non-ionising radiations to accurately detect pathological and physiological changes in the living tissue

- **Antibodies against cancer-specific antigen:**

- a. Antibodies against cancer-specific antigens are used for detection of certain cancers genes- person is advised to prevent exposure

Treatment of Cancer

Surgery

Removal of cancer cells using surgery

Radiotherapy

Destruction of cancer cells using radiation

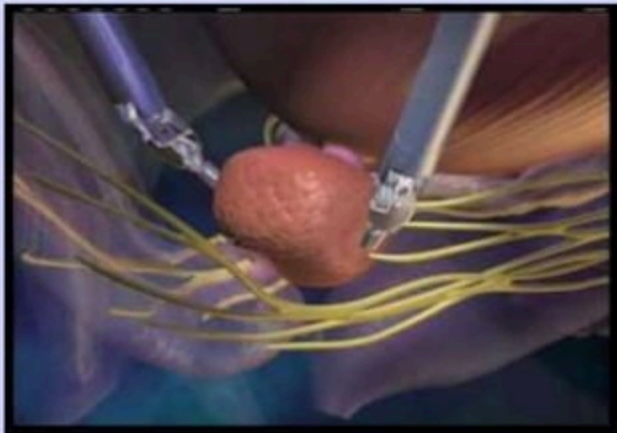
Chemotherapy

Destruction of cancer cells using drugs (anti-cancer agents)

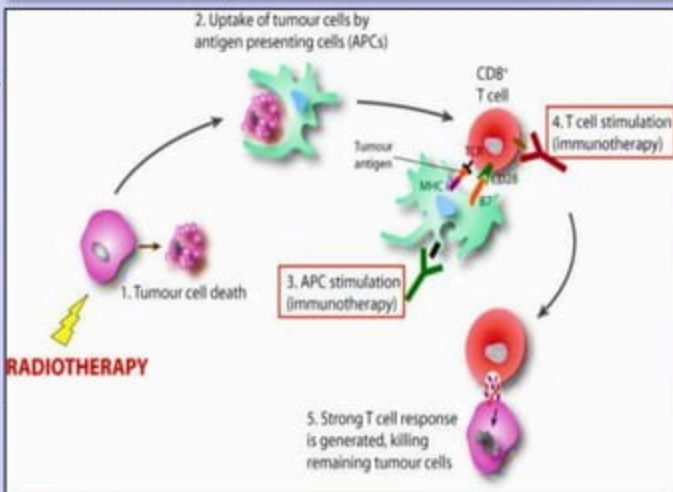
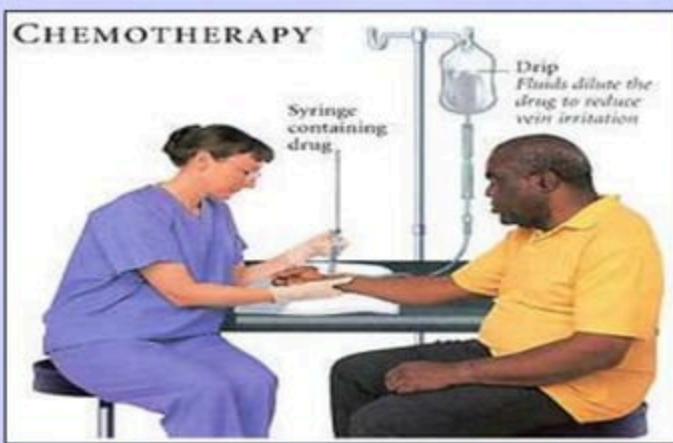
Treatment:

- **Surgery-** Tumor cells are surgically removed

- **Radiation therapy/
Radiotherapy-** Tumor cells are irradiated lethally, taking proper care of the normal tissues



- **Chemotherapy**- Kill cancer cells, specific for particular tumors. Majority of drugs have side effects like hair loss, anemia, etc.
- **Immunotherapy**- involves use of biological response modifier like **α -interferon** which activates immune system to detect the cancer cells & destroys them
- Most cancers are treated by combination of surgery, radiotherapy and chemotherapy.





Exercise



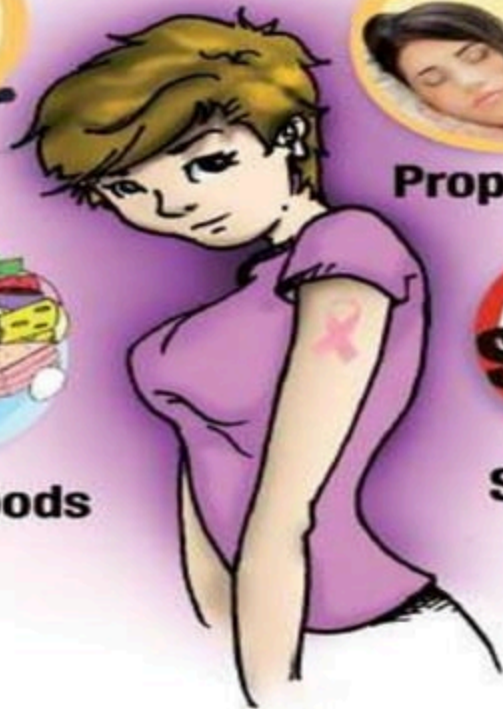
Proper Sleep



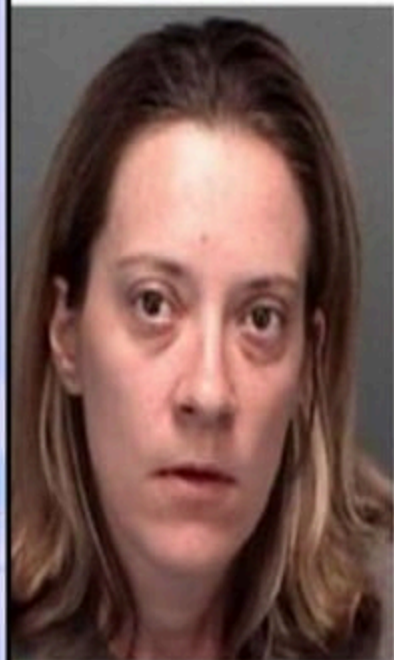
Healthy Foods



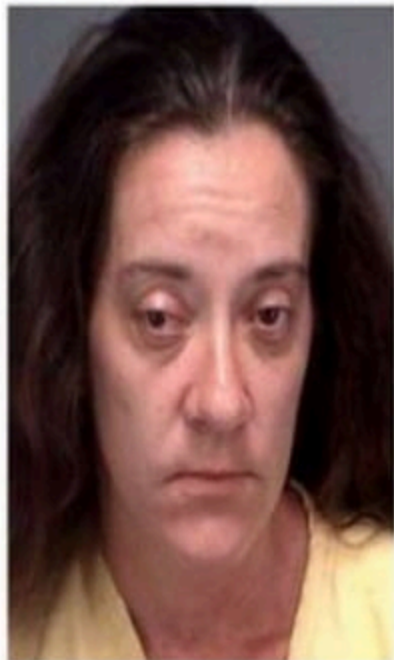
**Stress Free
Life**



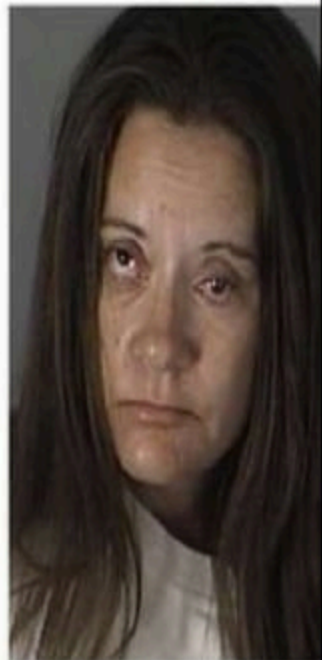
Victim of Drug abuse..



1 AGE: 33



2 AGE: 37



3 AGE: 39

Effect of Smoking...





Drugs & Alcohol abuse

- Drugs- chemical substance which has biological effects on human & animals
- Drugs commonly abused includes Opioids, cannabinoids & coca-alkaloids
- Proper education and guidance would enable youth to safeguard themselves against these dangerous behavior patterns and follow healthy lifestyles.

1. Opioids:

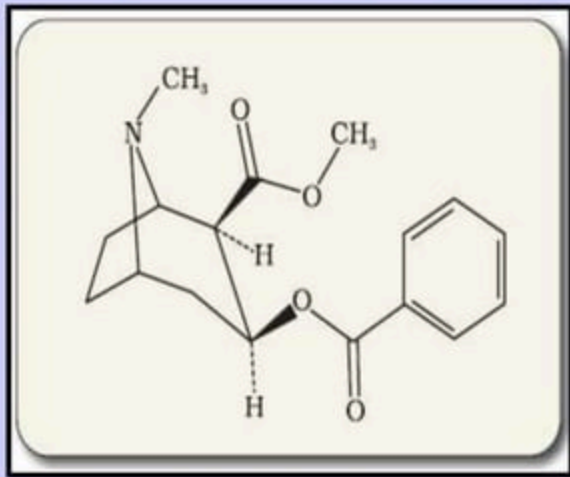
- Drugs binds to opioid receptors in the CNS & gastrointestinal tract
- Eg.- Morphine (*smack*) & heroin

Morphine –

- obtained from latex of poppy plant (*Papaver somniferum*)
- Sedative & pain- killer & used to reduce pain after surgery

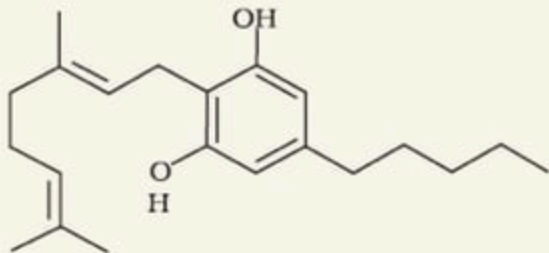
Heroin (smack):

- Chemically diacetyl morphine
- Bitter, white , odourless, crystalline compound
- Obtained by acetylation of morphine
- Taken by snorting & injection
- Acts as depressant & slows down body function



2. Cannabinoids

- Chemicals which interact with cannabinoid receptors present in brain
- Natural cannabinoids- obtained from inflorescence of *Cannabis sativa*
- Marijuana, hashish, ganja and charas- produced by various combination of flower tops, leaves & resins of *Cannabis* plant
- Taken by inhalation & oral ingestion
- Affects cardiovascular system of body
- Sports person- caught abusing in recent



3. Coca Alkaloids/ Cocaine:

- Cocaine also called coke or crack-
Erythroxylon coca
- Interferes with the transport of neurotransmitter, dopamine
- Taken by smoking
- Stimulates CNS & induce euphoria & increased energy
- Higher dosage- hallucinations



4. Hallucinogens:

- Products from plants like *Atropa belladonna* & *Datura* spp. are hallucinogenic
- LSD (Lysergic acid Diethylamide)- obtained from fungus, barbiturates, amphetamines, benzodiazepines- treat mental illnesses like depression and insomnia- abused



*Tobacco companies
kill their
best customers.*



Buzzle.com

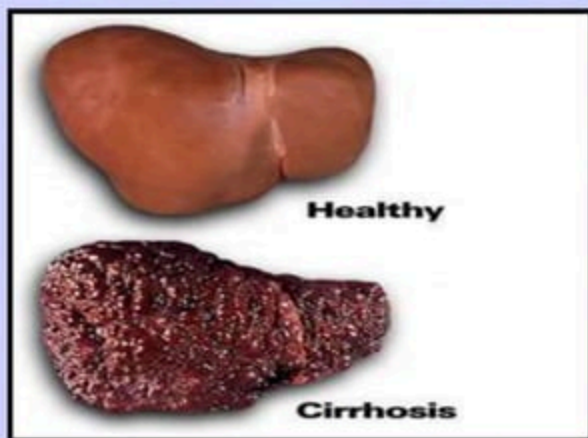
ked or used as snuff
nulant and toxin
to release adrenaline & nor-
pressure & heart rate
nces of lung cancer, bronchitis,
es, cancer of throat, gastric ulcer,
carbon monoxide content of
aem- bound oxygen which cause

ncer



6. Alcohol:

- Alcohol is a depressant
- Affects CNS







ot/1185243

MediaFocus



Adolescence

- Adolescence describes the teenage years between 12 and 19 and can be considered the transitional stage from childhood to adulthood.
- Adolescence is a time of both disorientation and discovery. The transitional period can bring up issues of independence and self-identity; many adolescents and their peers face tough choices regarding schoolwork, drugs, alcohol, and their social life.
- Thus it is a very vulnerable phase of mental and psychological development of an individual.

Causes of drug abuse

- Curiosity, need for adventure and excitement, and experimentation- motivates children to experiment.
- The first use of drugs or alcohol may be out of curiosity and experimentation.
- Stress and Pressures to Excel in Academics- significant role in persuading the youngsters to try alcohol and drugs to escape facing problems
- The perception among the youth that it is 'cool' to smoke, use drugs or alcohol, is also in a way a major cause for youth to start these habits.
- TV, movies, newspaper, internet also help to promote this perception.
- Unstable or unsupportive family structures and peer pressure.

Addiction & Dependence

- Following are the causes of drug/ alcohol abuse:
 1. Curiosity
 2. Need of adventure
 3. Excitement
 4. Experimentation
 5. To escape from stress
 6. Unsupportive family structure
- With repeated use of drug/ alcohol, the tolerance level of receptors in our body increases & consequently they respond only to higher doses of drug / alcohol- **Addiction**
- If the regular dose of drugs/ alcohol is abruptly discontinued, the body manifests characteristic & unpleasant withdrawal symptoms, which can be anxiety, nausea, sweating etc.- **Dependence**

Drugs EFFECTS



- The immediate effects of drugs/alcohol abuse are manifested as reckless behavior, vandalism and violence
- Excess does can lead to comma and death due to cerebral hemorrhage, respiratory and heart failures.
- A combination of drugs or their intake with alcohols leads to death
- The most common warning signals of drugs/alcohols abuse includes:
 - i. Drop in academic performance
 - ii. Lack of interest in personal hygiene
 - iii. Withdrawal and isolation from family and friends
 - iv. Aggressive and rebellious behavior
 - v. Lack of interest in hobbies
 - vi. Change in sleeping and eating habits
 - vii. Fluctuations in weight



- When the drug is taken intravenously, it can lead to infections like AIDS and hepatitis.
- Use of alcohol during adolescence can lead to heavy drinking in adulthood.
- Chronic use of drugs and alcohols damages to the central nervous system and liver.

- Misuse of anabolic steroids cause the following in **females**:
 - i. Masculinisations
 - ii. Increased aggressiveness
 - iii. Mood swings
 - iv. Abnormal menstrual cycles
 - v. Excess hair growth on the face and body
 - vi. Enlargement in clitoris
 - vii. Deepening of voice

• Misuse of anabolic steroids causes the following **in males**:

i. Acne

ii. Increased aggressiveness

iii. Depression

iv. Reduction in size of testicles

v. Decreased sperm production

vi. Potential for kidney and liver dysfunction

vii. Premature baldness

viii. Enlargement of prostate glands

ix. Enlargement of chest.



Prevention and Control

- Avoid undue peer pressure
- Educating and counseling to face problems, stress, to accept failure
- Help from parents and peers
- Professional and medical help





Say No To Drugs

FINGODAP

Federation of Indian NGOs for Drug Abuse Prevention