

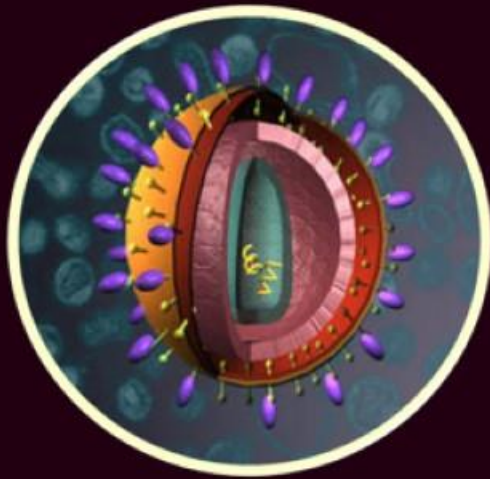
# Part 6



# AIDS

**(ACQUIRED IMMUNO DEFICIENCY SYNDROME)**

# AIDS



HIV

It is the deficiency of immune system.

Syndrome means a group of symptoms.

Caused by Human Immuno-deficiency Virus (HIV).

HIV is a Retrovirus with RNA genome.

AIDS was first reported in America (1981).

In last 25 years, it killed over 25 million persons.

1



**Sexual contact  
with infected  
person.**

2



**Transfusion of  
contaminated  
blood & blood  
products.**

3



**Sharing of infected  
needles**

4



**From infected  
mother to her  
child through  
placenta.**

## High risk people of getting HIV

1



Individuals with multiple sexual partners.

2



Individuals who require repeated blood transfusion.

3



Drug addicts who take drugs intravenously.

4



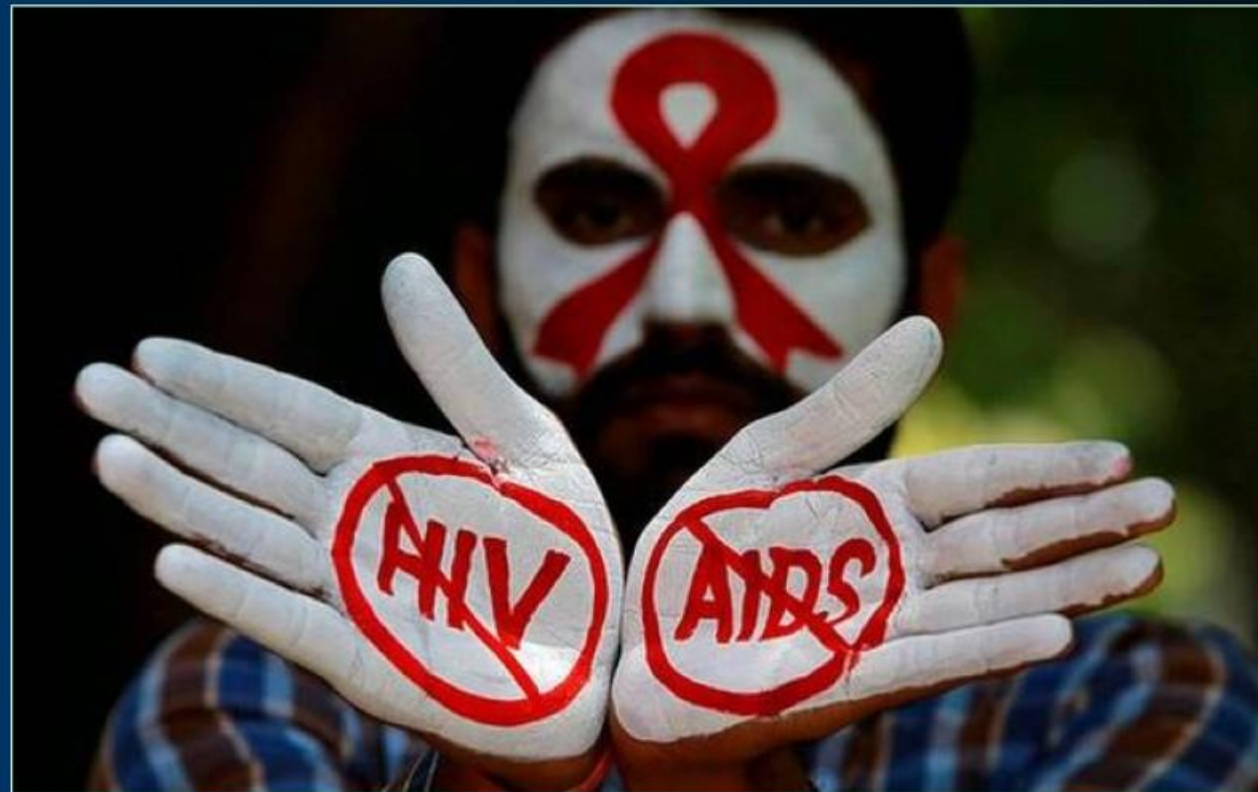
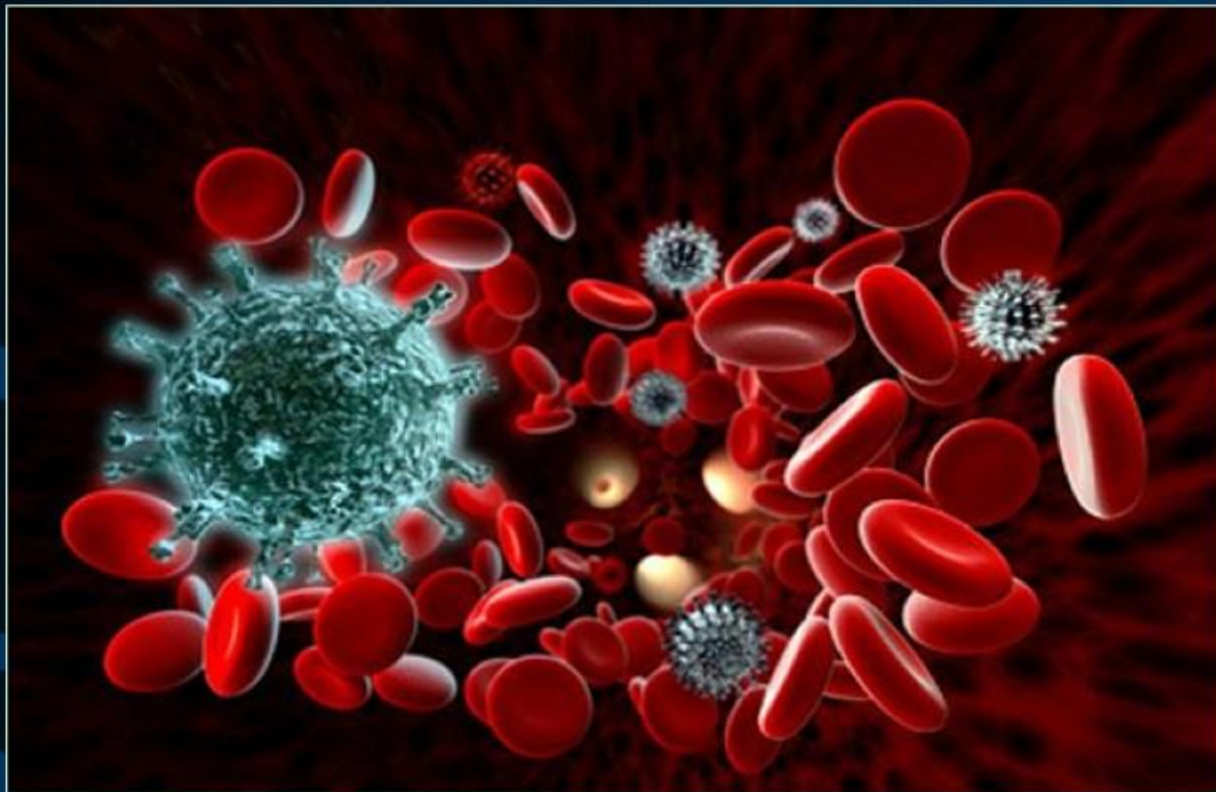
Children born to an HIV infected mother.

# AIDS

## Transmission



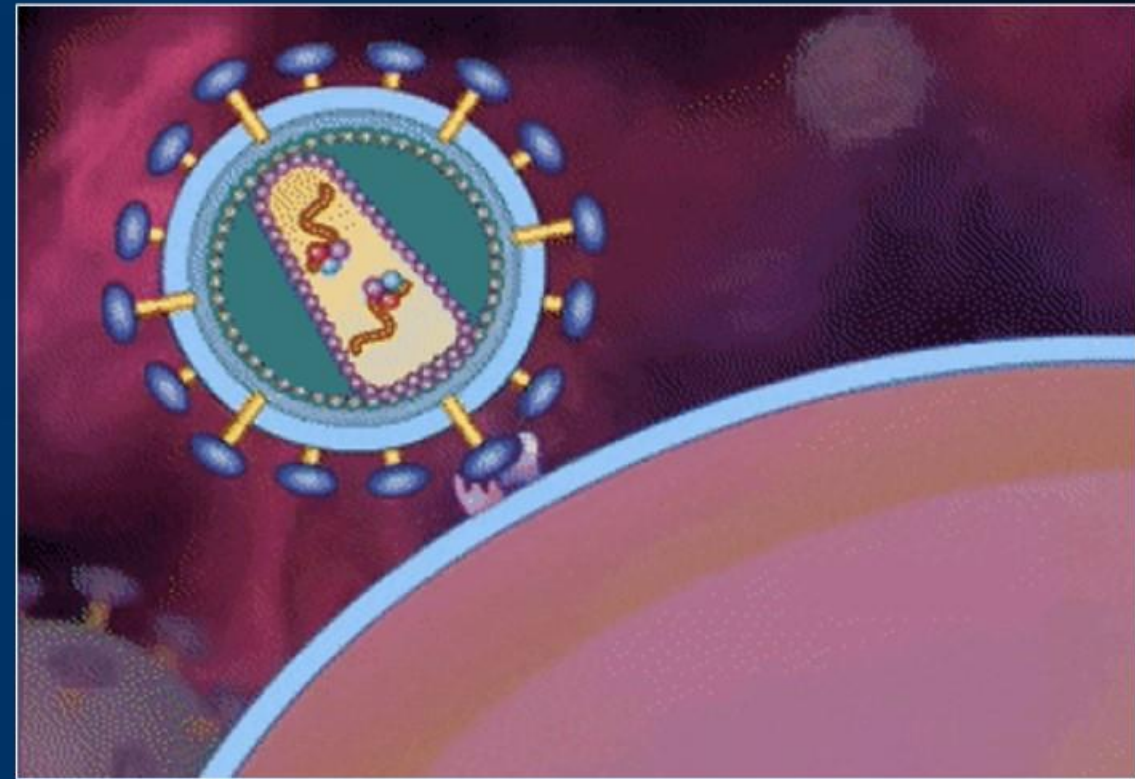
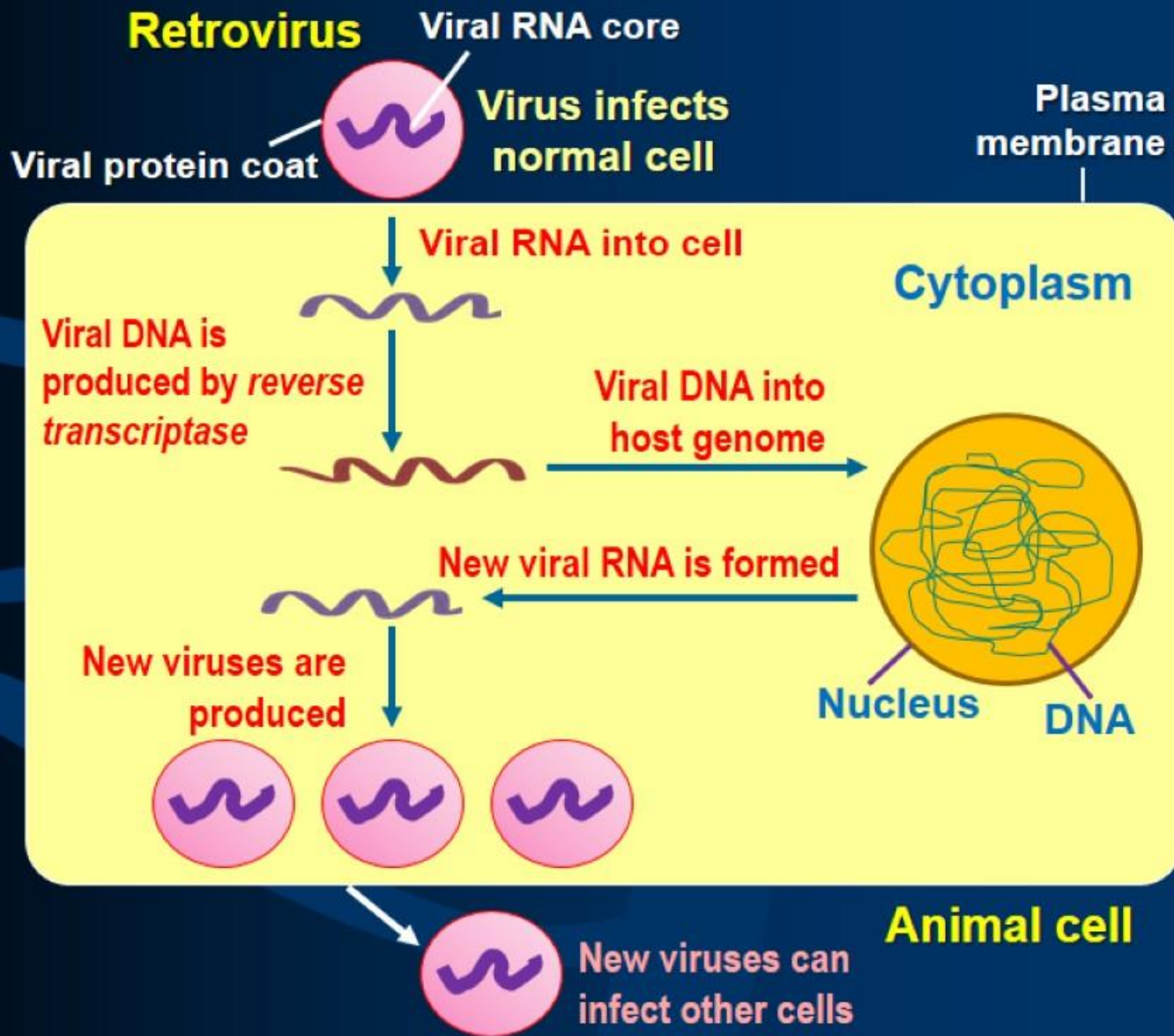
HIV does not spread by mere **touch or physical contact**.  
It spreads only through **body fluids**.



**There is a time-lag (from a few months to 5-10 years) between the infection and appearance of symptoms.**

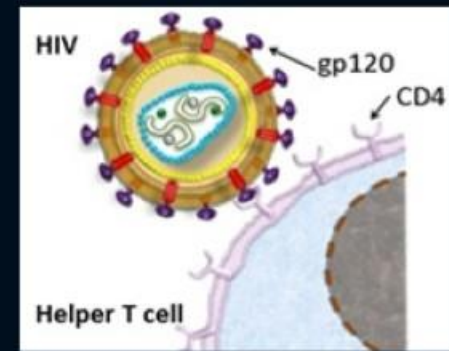
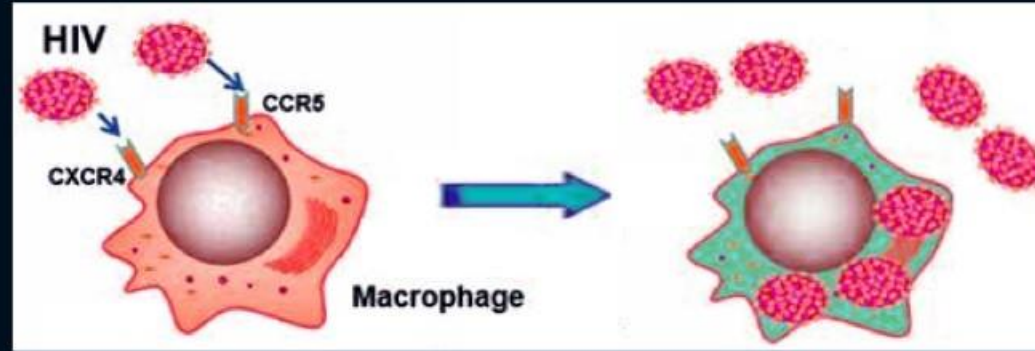
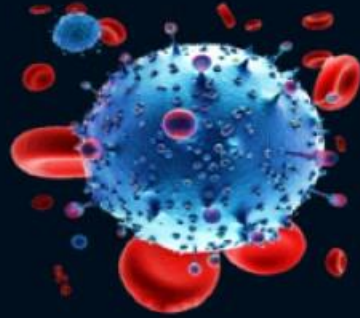
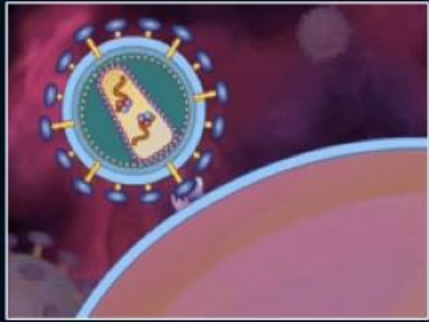
# AIDS

## Replication of Retrovirus



# AIDS

## Life cycle of HIV



HIV enters body

To macrophages  
(act as HIV  
factory)

RNA replicates  
in presence of  
reverse  
transcriptase to  
form viral DNA.

Viral DNA  
incorporates  
into host DNA

Infected cells  
produce viral  
particles

Weaken  
immunity

T-cells  
decrease

Attack other  $T_H$   
cells

Replicates &  
produce  
progeny  
viruses

HIV enters into  
helper T-cells  
( $T_H$   
lymphocytes)



## Effects



- During this period, the person suffers from **fever, diarrhoea and weight loss**.
- Due to deficiency of  $T_H$  cells, he may be infected with ***Mycobacterium*, viruses, fungi & parasites like *Toxoplasma***.

## Diagnosis

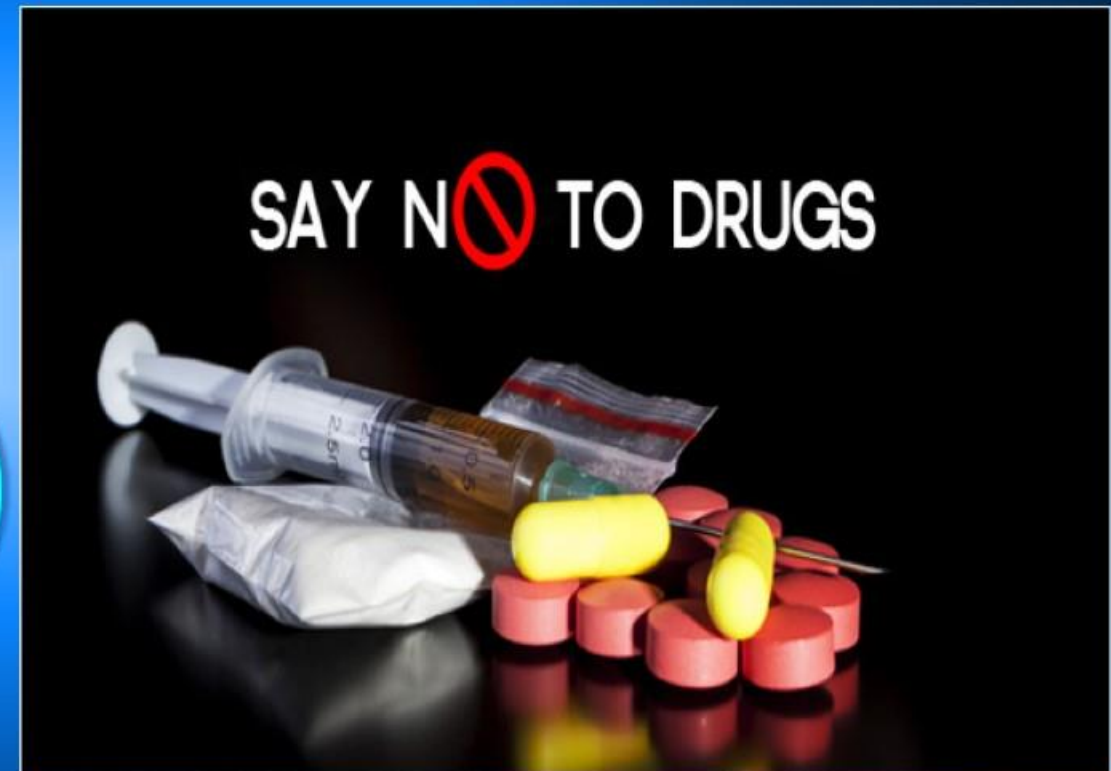


**ELISA test (Enzyme-linked immune-sorbent Assay).**

## Treatment



**Anti-viral drugs** are partially effective. They can only prolong the life of the patient.





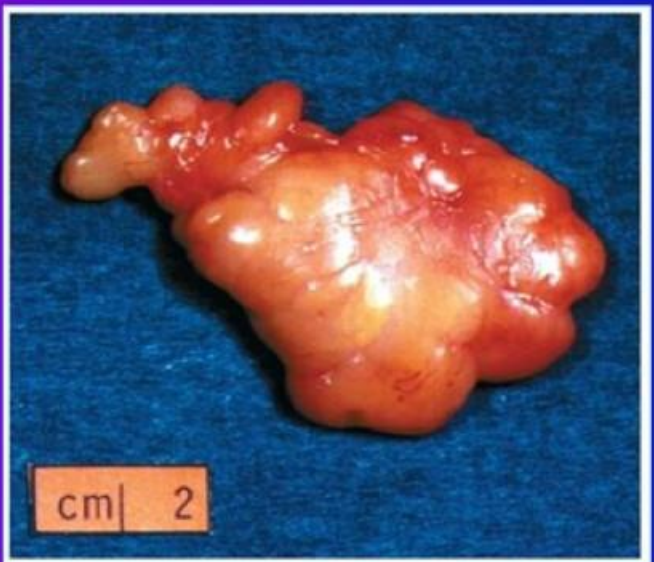
# CANCER

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# CANCER



- Cancer is an **abnormal and uncontrolled multiplication of cells** resulting in the formation of **tumor** (masses of cells).
- Normal cells show a **contact inhibition** (contact with the other cells inhibits their uncontrolled growth). Cancer cells do not have this property.



## TYPES OF TUMORS

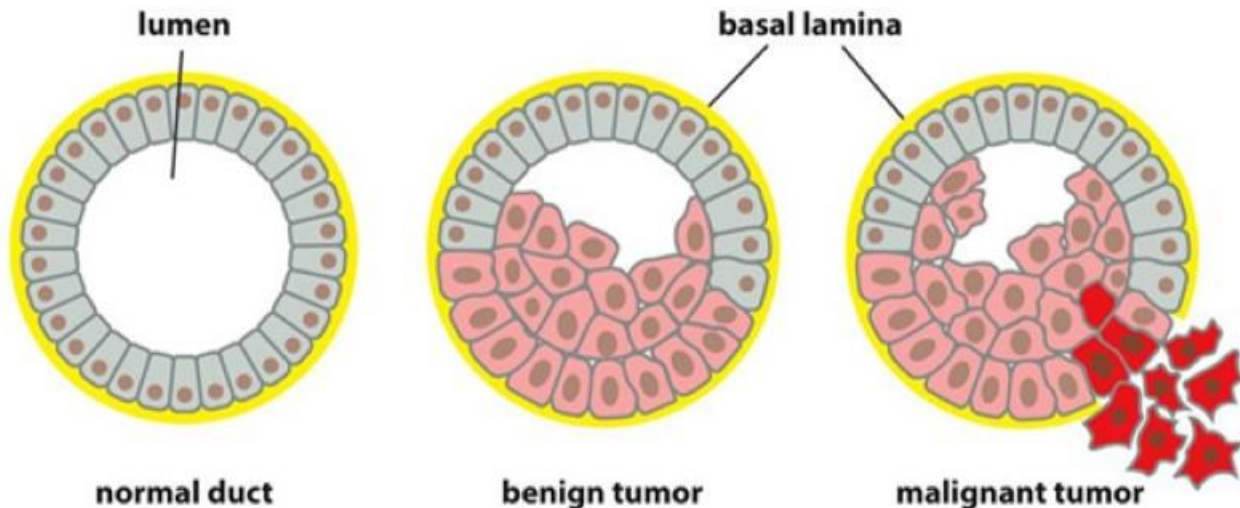
BENIGN

MALIGNANT

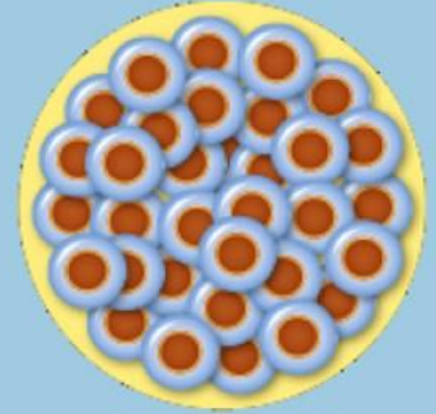
### 1. Benign tumours

- Confined to the place of its origin.
- They do not spread to other parts.
- Cause little damage.

### Benign v/s Malignant



Benign



Tongue

Gingiva

FIBROMA-  
BENIGN  
TUMORS



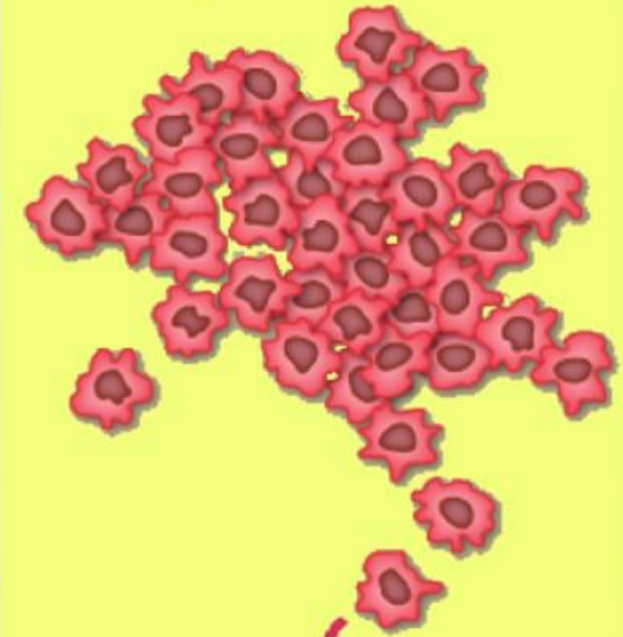
Palate

Buccal mucosa

### 2. Malignant tumours

- Mass of proliferating cells (**neoplastic or tumour cells**) that grow rapidly, invade and damage the surrounding normal tissues.
- Due to active division and growth, **they starve normal cells** by competing for nutrients.
- Cells sloughed from tumours reach other sites via blood where they form a new tumour. This is called **metastasis**.

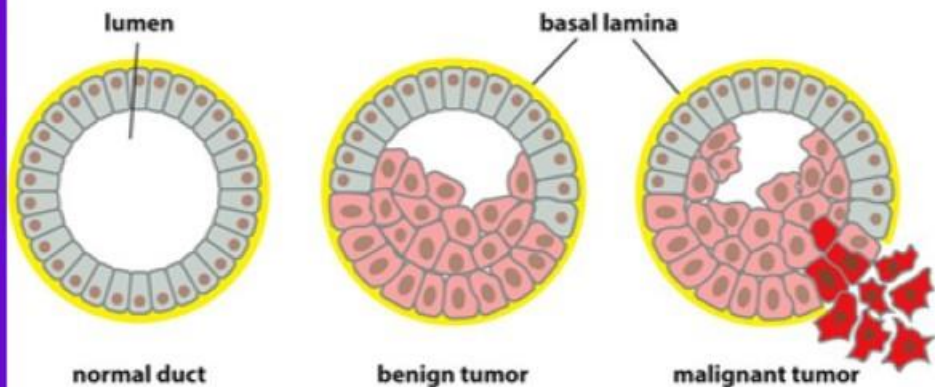
#### Malignant (Cancer)



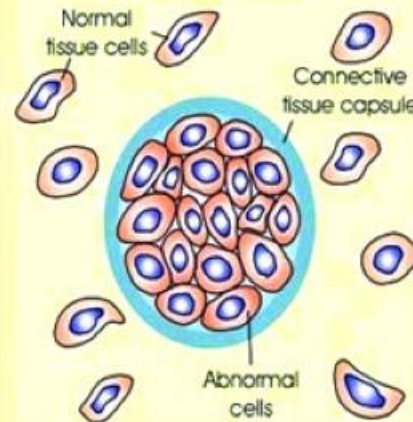
invade neighbouring tissues

enter bloodstream and metastasize to different sites

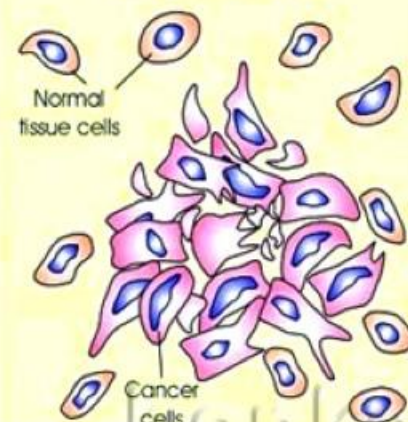
#### Benign v/s Malignant



#### Benign Growth



#### Malignant Tumor



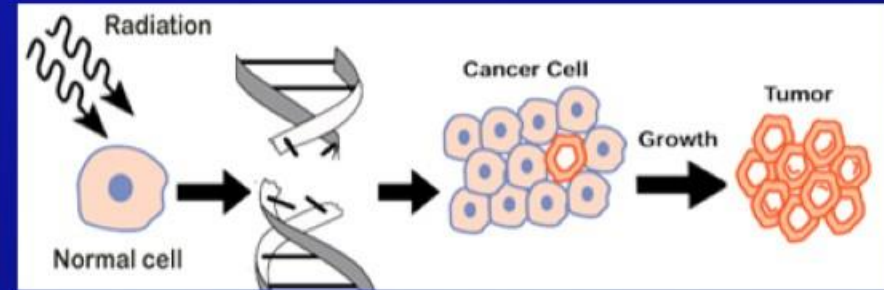
# CANCER

## Causes of cancer (Carcinogens)

### Carcinogens (cancer causing agents)

#### Physical agents

**Ionizing radiations like X-rays and gamma rays and non-ionizing radiations like UV.**



#### Chemical agents

**Tobacco smoke (major cause of lung cancer), vinyl chloride, caffeine, nicotine, mustard gas etc.**



#### Biological agents

**Oncogenic viruses, cellular oncogenes (c-onc) or proto oncogenes etc. When C-onc in normal cells is activated, the cells become oncogenic.**



# CANCER

## Cancer detection and diagnosis

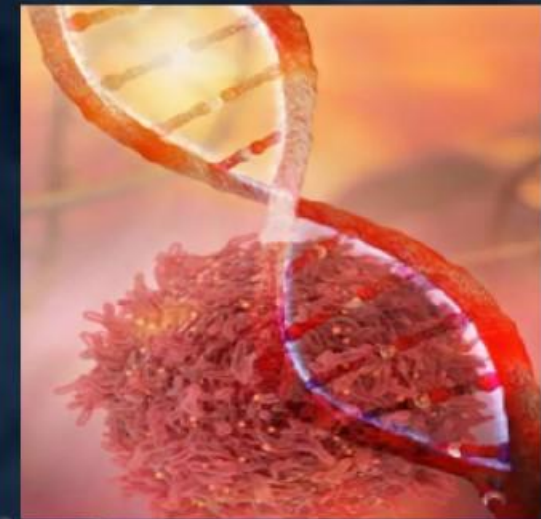
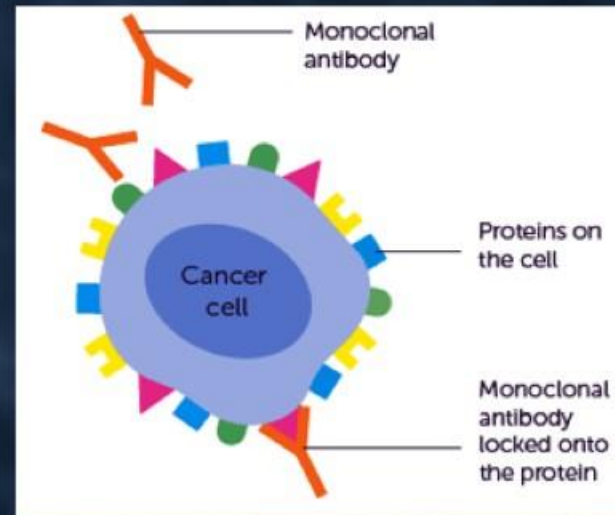
### Cancer detection & diagnosis

Biopsy

Imaging techniques

Use of antibodies

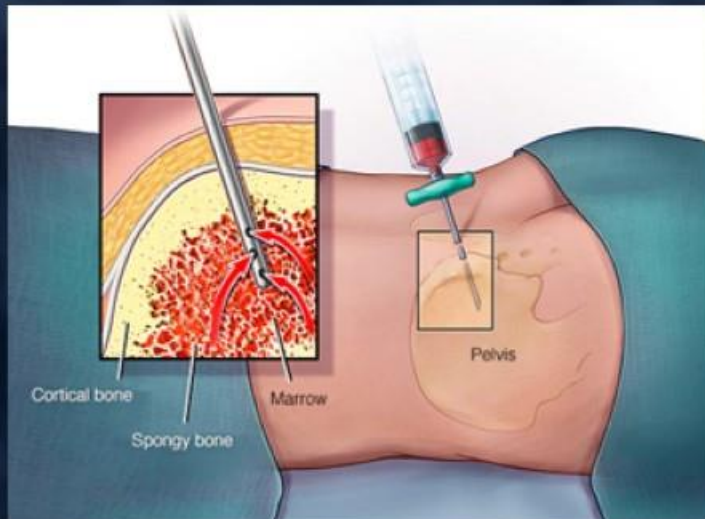
Molecular biology techniques



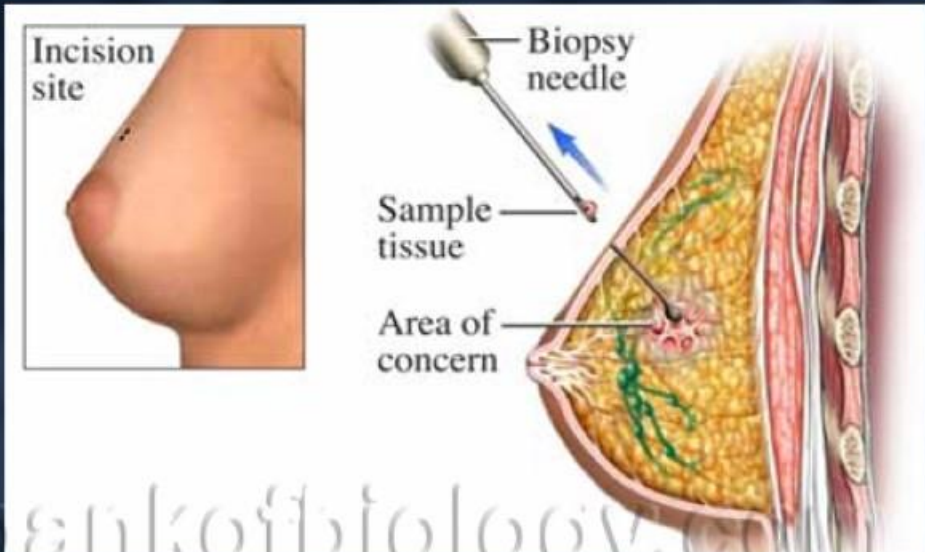
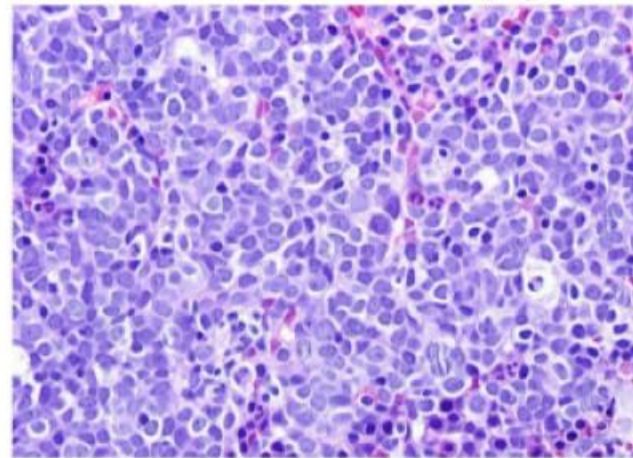


### 1. Biopsy

- A thin piece of the suspected tissue is stained and examined under microscope (histopathological studies).
- **In case of leukemia:** Biopsy and histopathological studies. Blood and bone marrow tests for increased cell counts.

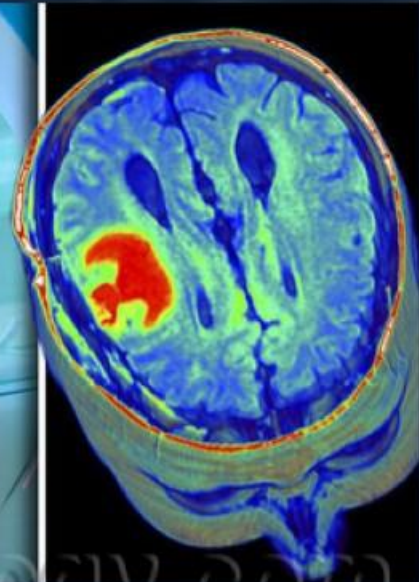
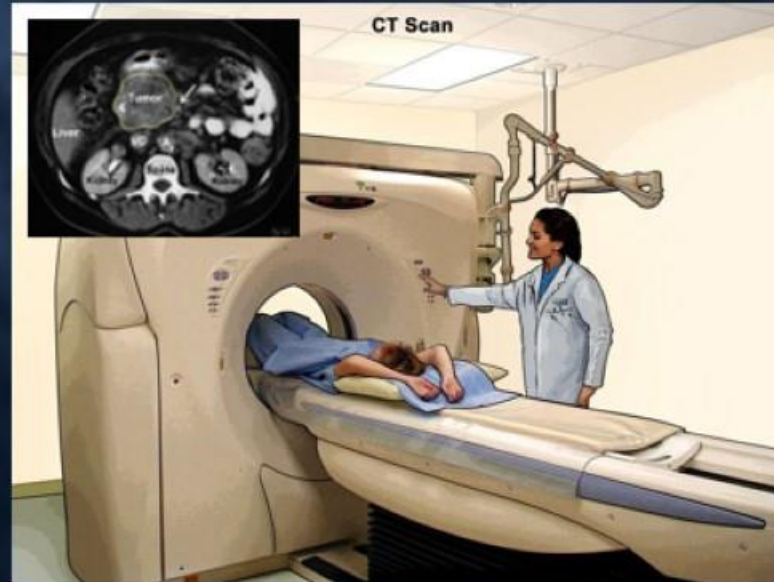
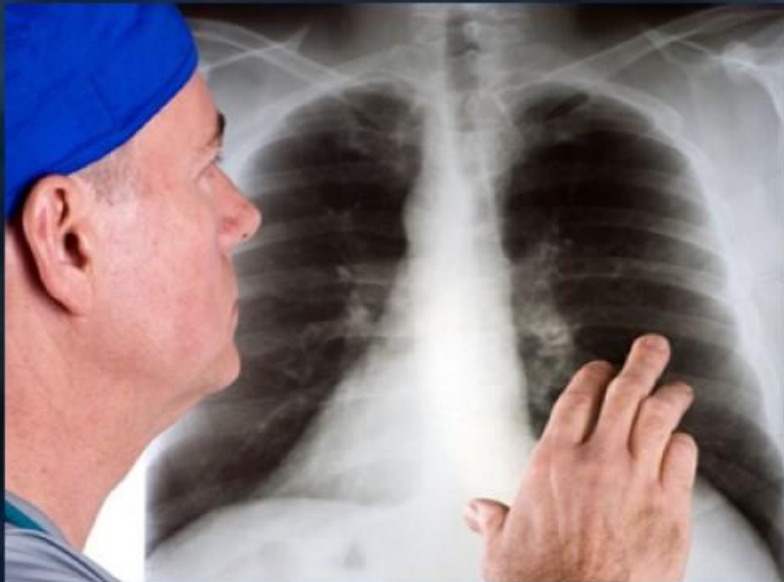


Bone Marrow Core Biopsy



### 2. Imaging techniques

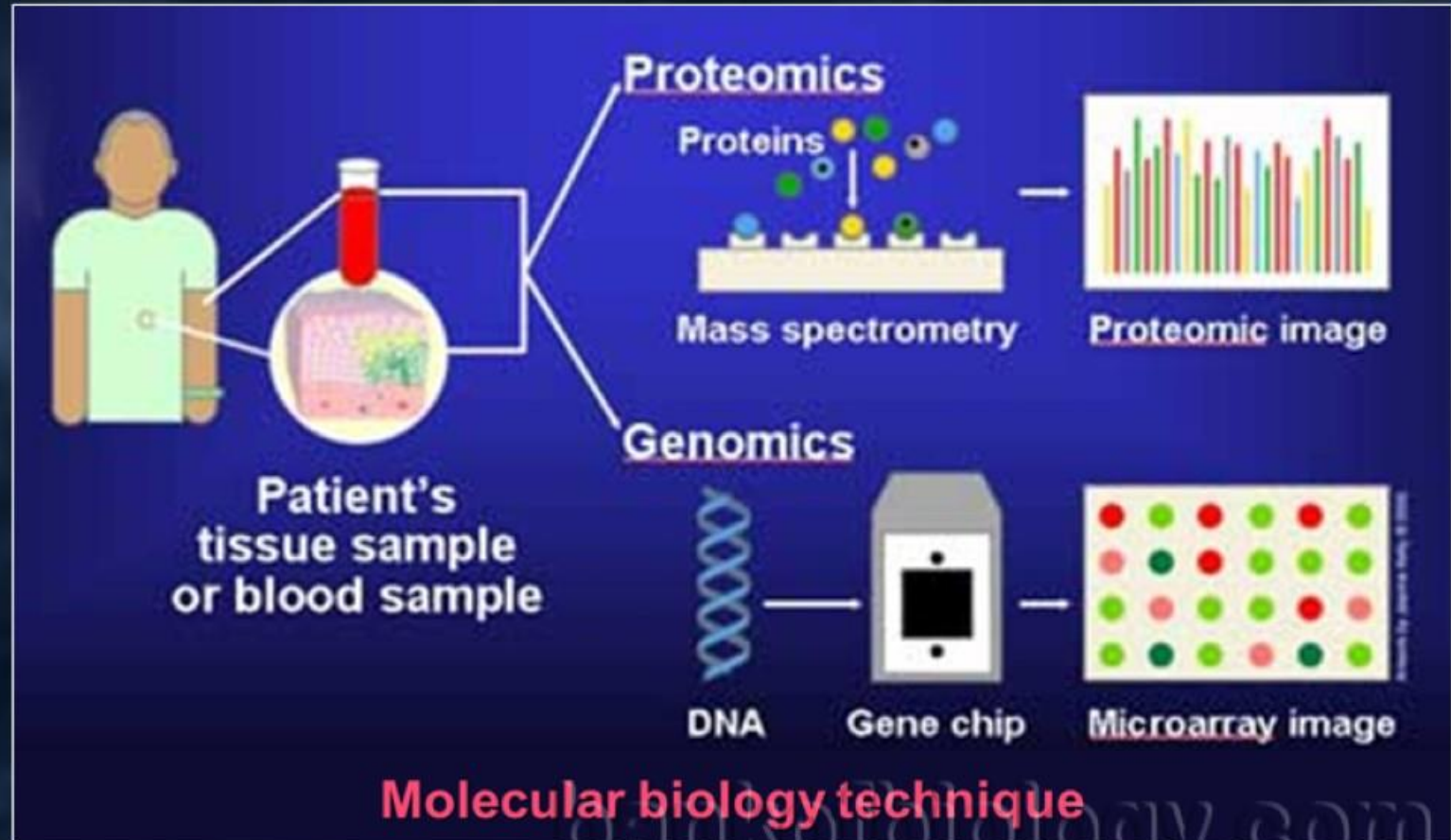
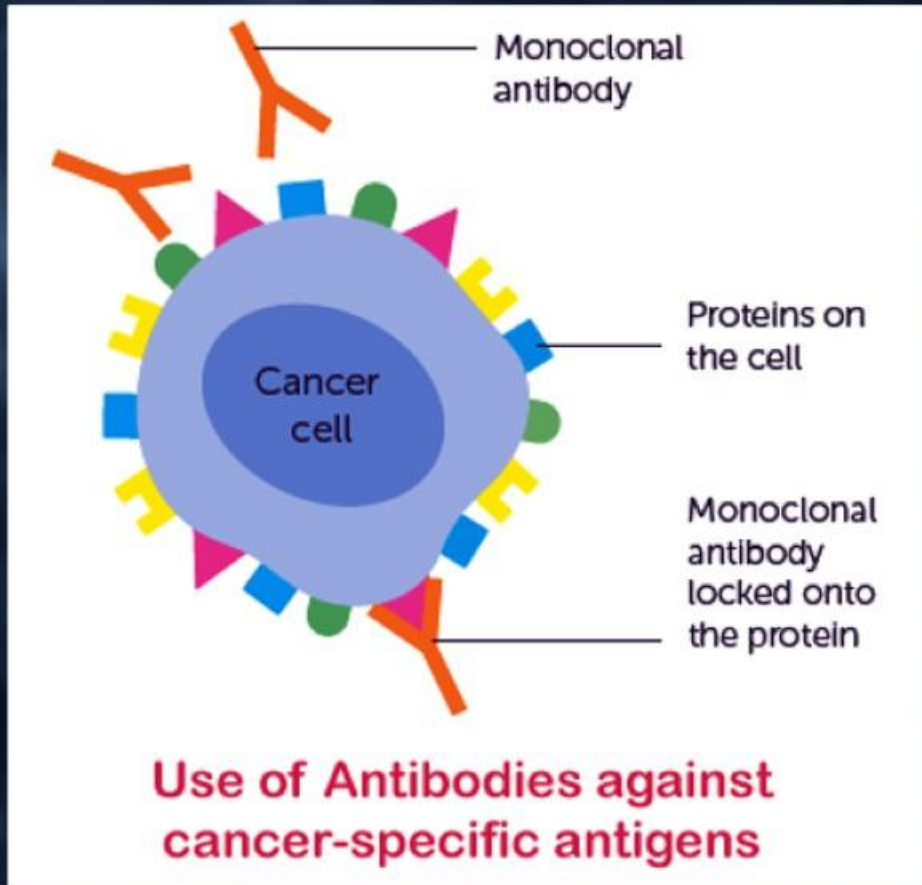
- **Radiography:** Use of X-rays.
- **CT (Computerized tomography) scan:** Uses X-rays to generate a 3D image of the internals of an object.
- **MRI (Magnetic Resonance Imaging):** Uses magnetic fields and non-ionising radiations to detect pathological and physiological changes in the living tissue.



# CANCER

## Cancer detection and diagnosis

3. **Use of Antibodies** against cancer-specific antigens.
4. **Molecular biology technique:** To detect cancer related genes. Such individuals should avoid carcinogens (e.g. tobacco smoke).



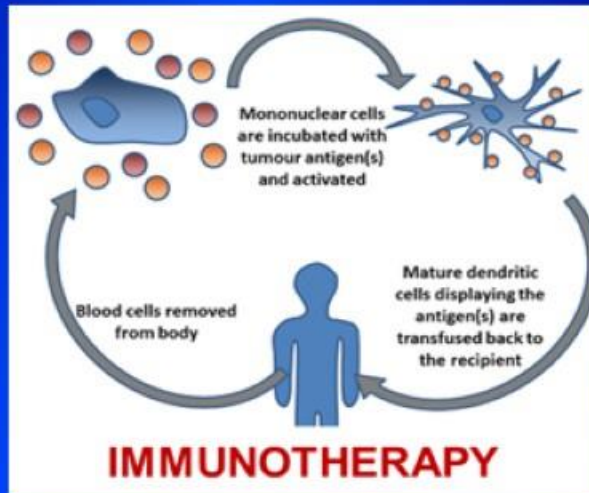
- **Radiotherapy:** Tumor cells are irradiated lethally, without damaging surrounding normal tissues.
- **Chemotherapy:** Use of chemotherapeutic drugs. Many drugs have side effects like hair loss, anaemia etc.
- **Immunotherapy:** The patients are given **biological response modifiers** (e.g.  $\alpha$ -interferon) which activates their immune system and helps in destroying the tumor.
- **Surgery.**



**RADIOTHERAPY**



**CHEMOTHERAPY**



**IMMUNOTHERAPY**



**SURGERY**

Most cancers are treated by combination of surgery, radiotherapy & chemotherapy.



# **DRUGS, SMOKING & ALCOHOL ABUSE**

# DRUGS

## Commonly abused drugs



Opioids



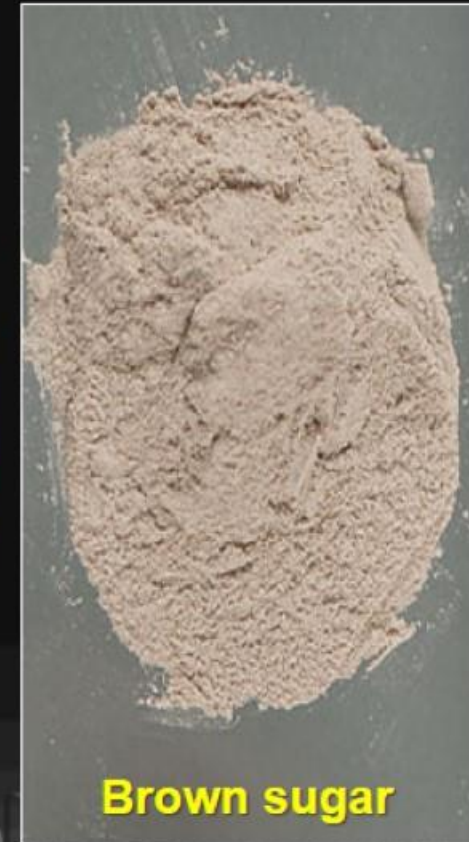
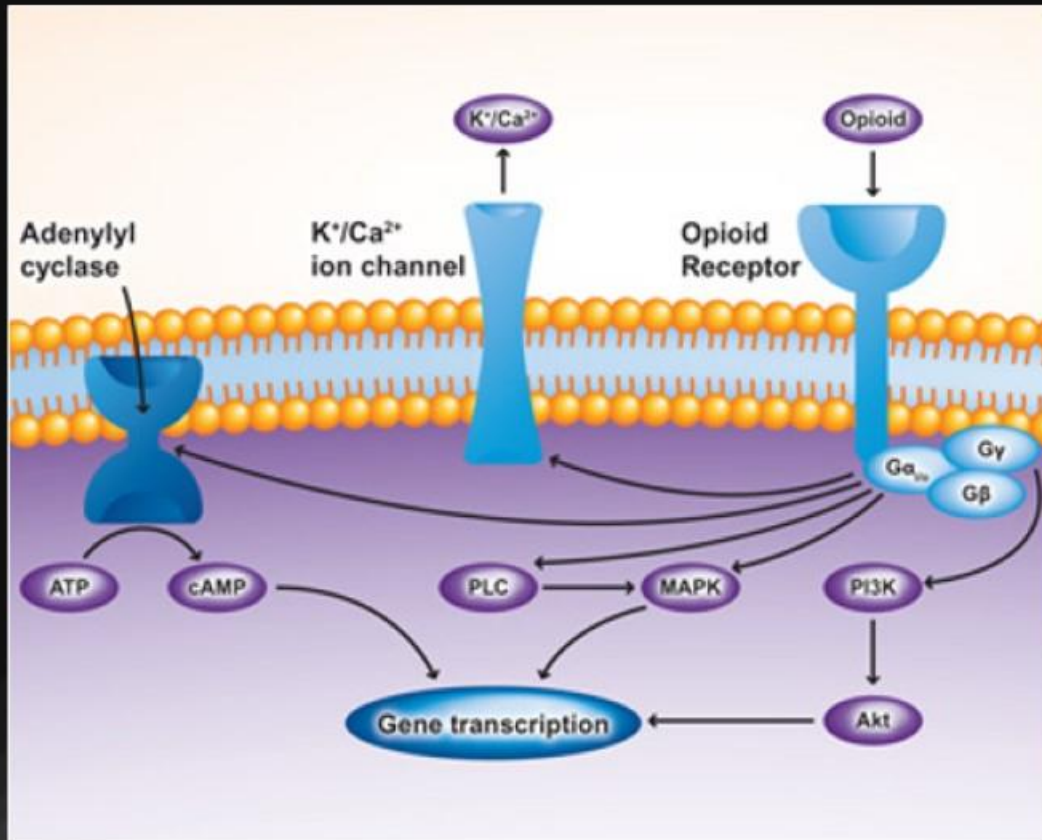
Cannabinoids



Coca alkaloids



- They bind to specific **opioid receptors** in CNS and gastrointestinal tract.
- E.g. morphine, heroin, brown sugar.



- **Morphine** is extracted from the latex of **poppy plant**, *Papaver somniferum*.
- It is a sedative and painkiller, and useful for surgery.



Poppy plant

Latex





- **Heroin (*smack* or *diacetylmorphine*)** is a white, odourless, bitter crystalline compound.
- It is obtained by acetylation of morphine.
- It is taken by snorting and injection.
- It is a depressant and slows down body functions.



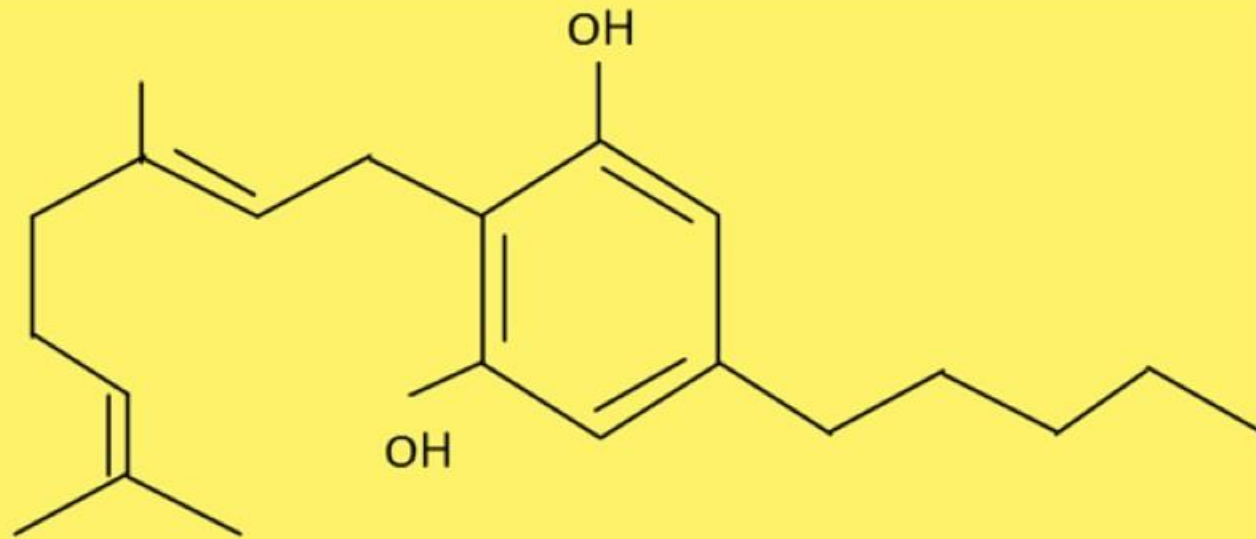
- They interact with **cannabinoid receptors** in the brain.
- Generally taken by inhalation and oral ingestion.



- Natural cannabinoids are obtained from the inflorescences of the plant *Cannabis sativa* (Hemp plant).
- Its flower tops, leaves & resin are used to produce *marijuana, hashish, charas & ganja*.



- Natural cannabinoids are obtained from the inflorescences of the plant *Cannabis sativa* (Hemp plant).
- Its flower tops, leaves & resin are used to produce *marijuana, hashish, charas & ganja*.
- They affect cardiovascular system.
- Cannabinoids are abused by some sportspersons.



Skeletal structure of Cannabinoid molecule



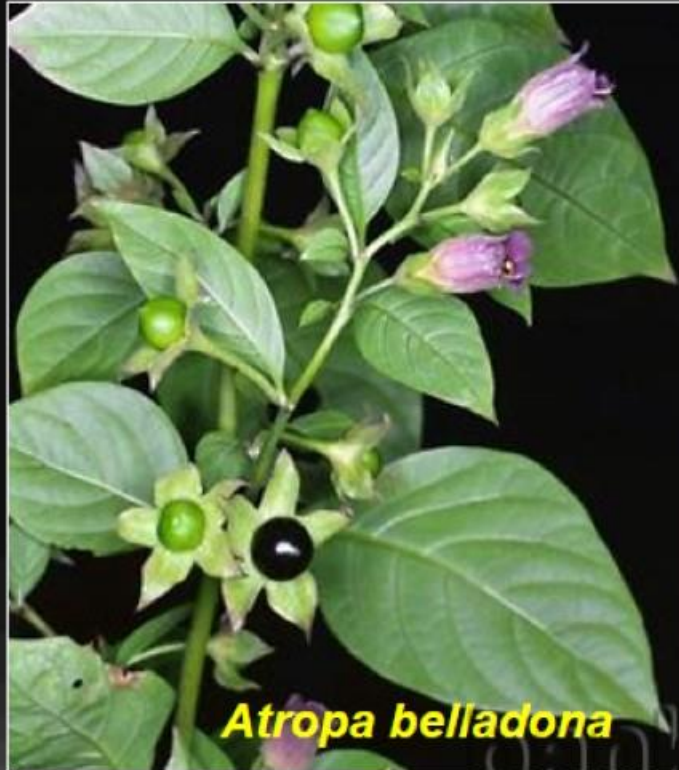
# DRUGS

## 3. COCA ALKALOID OR COCAINE (COKE / CRACK)

- It is obtained from coca plant *Erythroxylum coca*.
- It interferes with transport of neurotransmitter **dopamine**.



- Cocaine is usually snorted.
- It stimulates CNS producing euphoria & increased energy.
- Excessive dosage of cocaine causes **hallucinations**.
- ***Atropa belladonna* & *Datura*** are also hallucinogenic plants.



# DRUGS

- Drugs like **barbiturates, amphetamines, benzodiazepines** etc. are used as medicines to treat mental illnesses like depression and insomnia.
- But they are abused resulting in impairment of physical, physiological or psychological functions.





SMOKING



# SMOKING

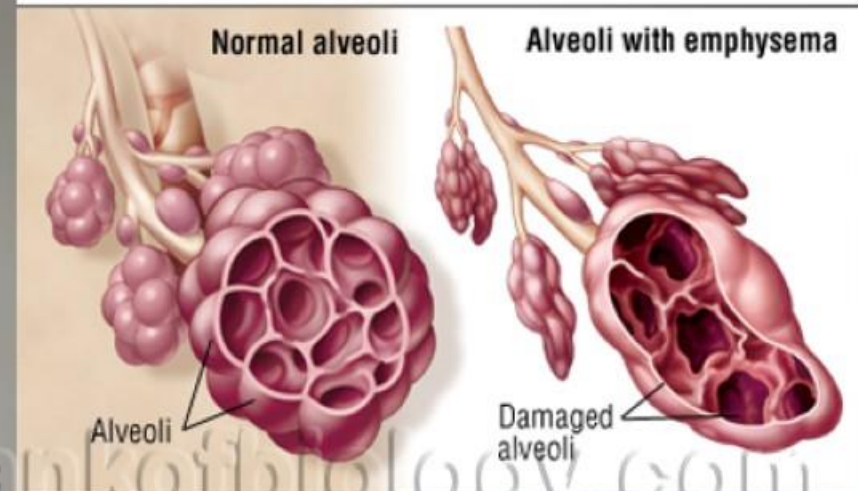
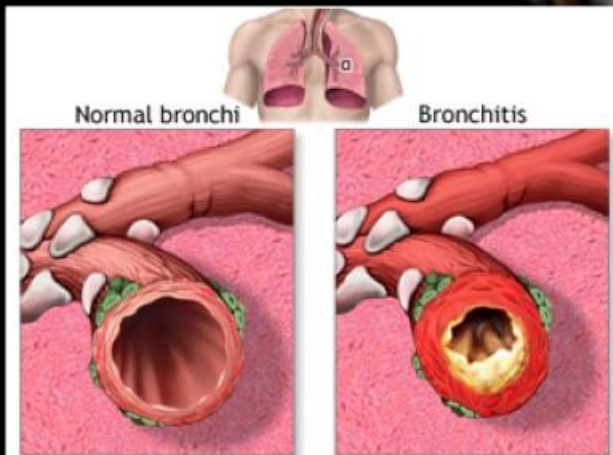
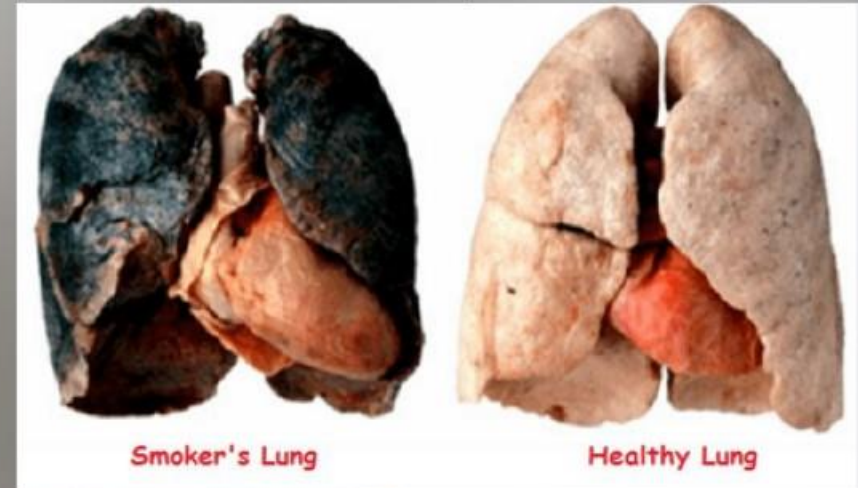


- **Tobacco** has been used by human beings for over 400 years.
- It is smoked, chewed or used as a snuff.
- It contains many chemical substances like **nicotine (an alkaloid)** which stimulates adrenal gland to release **adrenaline and nor-adrenaline**, causing **high BP and heart rate**.



# SMOKING

- Smoking causes **cancers of lung, urinary bladder & throat, emphysema, bronchitis, coronary heart disease, gastric ulcer etc.**
- Tobacco chewing causes **oral cancer.**
- Smoking increases CO content in blood and **reduces oxyhaemoglobin.** This causes O<sub>2</sub> deficiency in body.





# ADOLESCENCE AND DRUG/ALCOHOL ABUSE

# ADOLESCENCE AND DRUG/ALCOHOL ABUSE

- **Adolescence** is a **period & a process** during which a child becomes mature in terms of his/her attitudes & beliefs for effective participation in society.
- It is a **bridge linking childhood & adulthood** (period of **12-18 years** of age).
- It is very vulnerable phase of **mental & psychological** development.



# ADOLESCENCE AND DRUG/ALCOHOL ABUSE

## Causes of drug/alcohol use in Adolescence

Curiosity and experimentation

Need for adventure and excitement

To escape facing problems

Stress from pressure to excel in academics or examination.

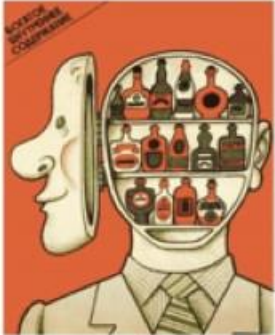
Television, movies, news papers, internet etc.

Unstable or unsupportive family structures and peer pressure.



# ADOLESCENCE AND DRUG/ALCOHOL ABUSE

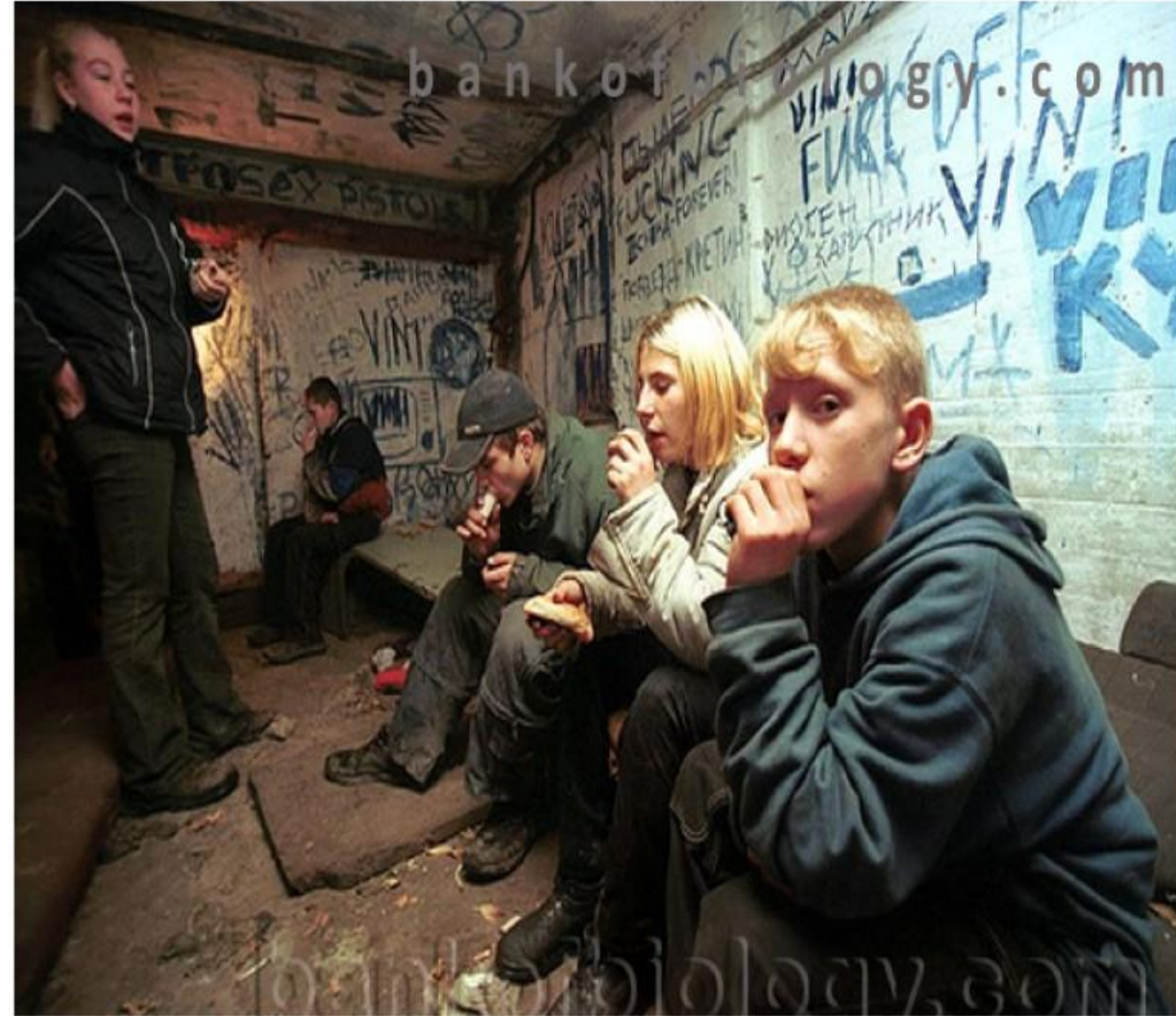
## ADDICTION AND DEPENDENCE



### Addiction



- A **psychological attachment** (euphoria & a temporary feeling of well being) to drugs and alcohol.
- With repeated use of drugs, the **tolerance level of the receptors increases**. Thus the receptors respond only to higher doses leading to greater intake and addiction.



# ADOLESCENCE AND DRUG/ALCOHOL ABUSE

## ADDICTION AND DEPENDENCE



### Dependence



- The tendency of the body to manifest a characteristic and unpleasant **withdrawal syndrome** if regular dose of drugs/alcohol is abruptly discontinued.
- This results in **anxiety, shakiness, nausea & sweating**.
- Dependence leads to social adjustment problems.



# ADOLESCENCE AND DRUG/ALCOHOL ABUSE

## Effects of Drug/alcohol abuse

Reckless behavior, vandalism & violence.

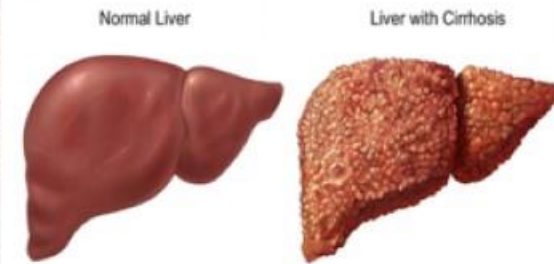
Coma & death due to respiratory failure, heart failure or cerebral hemorrhage.

Drugs mixed with alcohol may cause death.

Damage of nervous system & liver cirrhosis.

Mental and social distress to family & friends.

Social problems like stealing and spread of infectious diseases (e.g. AIDS, hepatitis B).





# ADOLESCENCE AND DRUG/ALCOHOL ABUSE

## Effects of Drug/alcohol abuse

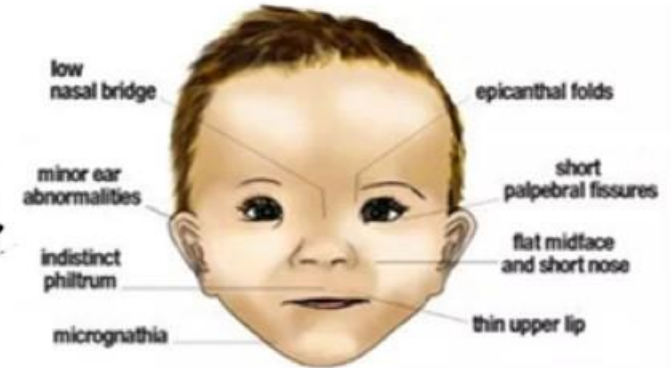
Use of drugs and alcohol by pregnant woman affect the foetus (Foetal alcohol syndrome or FAS).

Loss of sexual drive and necrospermia.

Misuse of drugs by athletes (e.g. narcotic analgesics, anabolic steroids, diuretics & certain hormones to increase muscle strength and bulk and to promote aggressiveness).



## FETAL ALCOHOL SYNDROME



# ADOLESCENCE AND DRUG/ALCOHOL ABUSE

## Warning signs of drug/alcohol abuse in Adolescence period

✓ Drop in academic performance and absence from school.

✓ Lack of interest in personal hygiene.

✓ Withdrawal and isolation.

✓ Depression, fatigue, aggressive & rebellious behavior.



# ADOLESCENCE AND DRUG/ALCOHOL ABUSE

## Warning signs of drug/alcohol abuse in Adolescence period

✓ Change in sleeping and eating habits.

✓ Fluctuations in weight, appetite etc.

✓ Loss of interest in hobbies.

✓ Deteriorating relationship between family & friends.



# ADOLESCENCE AND DRUG/ALCOHOL ABUSE

## Side effects of anabolic steroid abuse

In males

Acne

Increased  
aggressiveness

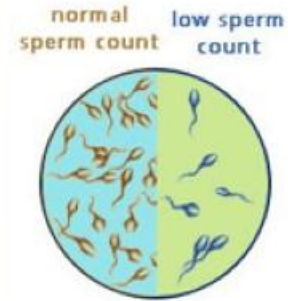
Mood swings  
& depression



Reduced  
testicles

Decreased  
sperm  
production

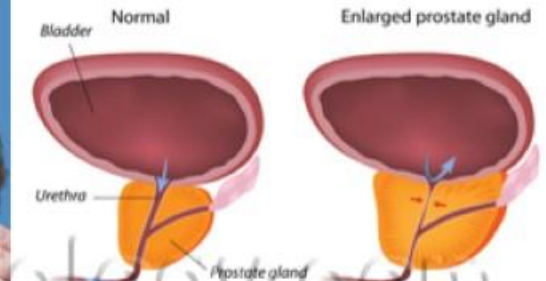
Kidney &  
liver  
dysfunction



Breast  
enlargement

Premature  
baldness

Enlargement  
of prostate  
gland



# ADOLESCENCE AND DRUG/ALCOHOL ABUSE

## Side effects of anabolic steroid abuse

## In females

Masculinisation

Increased aggressiveness

Mood swings & depression



Excessive hair on face and body

Abnormal menstrual cycle

Deepening of voice



Enlargement of clitoris



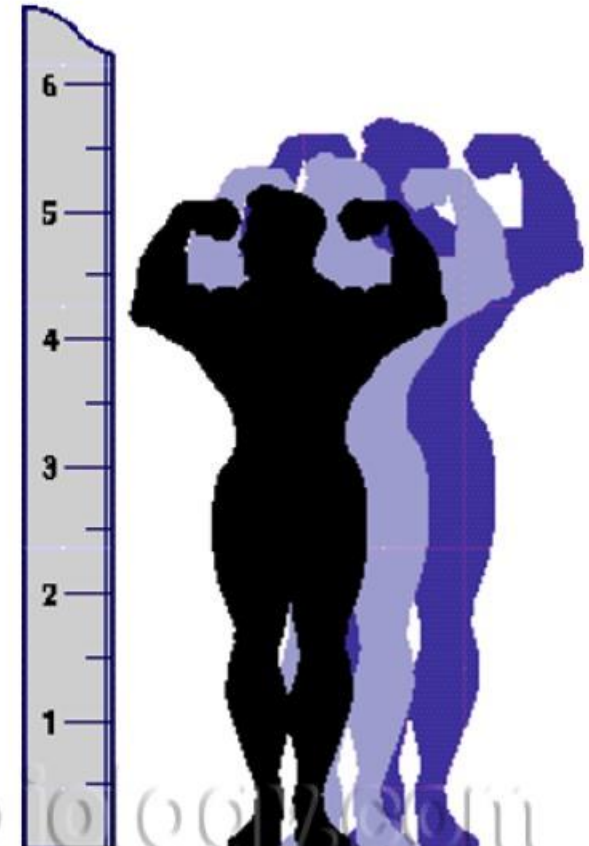
# ADOLESCENCE AND DRUG/ALCOHOL ABUSE

## Side effects of anabolic steroid abuse

In adolescent male & females

- Severe facial and body acne, premature closure of the growth centres of the long bones resulting in stunted growth.

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# ADOLESCENCE AND DRUG/ALCOHOL ABUSE

## Prevention and Control

- ✓ Avoid undue peer pressure.
- ✓ Education and counseling.
- ✓ Help from parents & peers.
- ✓ Looking for danger signs.
- ✓ Seeking professional & medical help such as
  - Psychologists & psychiatrists
  - De-addiction & rehabilitation programmes.

