- Hippocrates (father of medicine) & Indian Ayurveda System

"Good Humor Hypothesis"

- Health = Balance of certain humor.
- "Black bile" person belong to hot personality & would have fevers.

"William Harvey" disproved "Good humor hypothesis". He discovered Blood circul". Disproved hypothesis by using thermometer.

- Health affected by
  1) Genetic Disorders
  2) Infections
  3) Lifestyle Including food, H_2O, rest, exercise habits that we lack...
- Health = State of Complete physical, mental, & social Wellbeing.
- → Balance Diet
  → personal hygiene
  → Regular Exercise

Imp. to maintain Good health.

Disease:-

When the functioning of one/more organs or systems of body is adversely affected characterised by various signs & symptoms.

Human Health & Diseases:-

Disease

- Congenital → Genetic Disorders
- Acquired
  - Communicable (Infectious)
    - Contagious (through Direct contact) e.g. Ringworm
    - Non contagious (through carriers/ vectors)
  - Non Communicable (Non-Infectious)
    - Organ malfunction
    - Deficiency
    - Allergy
    - Addiction

** Some of the Infectious Diseases like "AIDS" are fatal.

** Among non Infectious diseases, "Cancer" is the major cause of Death.

pathogen:- A wide range of organism belonging to bacteria, Viruses, fungi, protozoa, Helminth etc. coined cause diseases in man, known as pathogens.

Common Diseases in Man:-

(1) Viral Diseases:-

(A) Common cold: (Rhinitis)

Rhino Virus (Group)

- Infect nose, Respiratory passage but not lungs.
- Nasal congestion & Discharge, Sore throat hoarseness, cough, headache, tiredness.
- Usually last for 3-7 days.
- Droplets resulting from cough or sneezes of an infected person are either inhaled directly or contaminate objects etc.

(b) Influenza: (flu)

Myxovirus Influenzae

- Cause fever, pain all over body & affect nose, throat, air passage like common cold
- Starts with fever, headache, sore throat, cold sneezing, pain all over body restlessness.

(c) Small pox:

Variola Virus (ds DNA)

- present in oral & nasal discharge out through coughing, sneezing etc.
- Rash appear 1st on face then rest body.
- small pox vaccine discovered by "Edward Jenner" - 1798
- Has been eradicated from world.

(d) chicken pox:

Varicella Zoster (ds DNA)

- Rash 1st appears on trunk & there are more lesions than face & limbs.
- Vaccine ✓

(e) measles:

Rubeola Virus (RNA Virus)

- Rash 1st appear in back of ear & face & spread downwards on body.

(f) Mumps :—
(Infectious parotitis)
"paramyxo virus"
(RNA virus)
- Cause fever, painful swelling of parotid gland → Testes swelling (orchitis) & pain in abdomen.

(g) Rabies :—
(Hydrophobia)
"Rhabdo Virus"
- Bite of Rabid (mad) dogs.
- Incubation period is from 10 days → 1 year.
- fear of water : symptom Excess saliv", headache & Destroy Brain, Spinal cord.
- Rabies = 100% fatal.

(h) Poliomyelitis :—
(Infantile paralysis)
"Polio Virus"
(ss RNA)
- spread through Intestinal discharge.
- Incub" period = 7-14 days.
- Inability to bend head - Symptom Stiffness of neck etc.
- no sure cure
- polio vaccine available.

(i) Dengue fever :—
"flavivibo Virus"
or
- Arbovirus of flavivirus group.
- Virus transmitted by bite of female Aedes aegypti (tiger mosquito)
- Incub" period = 3-8 days.

classical Dengue fever :-
→ High fever, headache, pain, Nausea, Vomiting

Dengue Haemorrhagic fever :-
Same symptom + Bleeding + stomach pain + Excessive thirst + Restlessness.

- Aspirin & Disprin Should be Avoided.
- Can be detected by "tourniquet test"

(j) Chikungunya :—
"chikungunya Virus"
- Virus was first Isolated from Human patients & "Aedes Aegypti" Mosquitoes from Tanzania in 1952.
- Onset of fever, lymph-adenopathy
- No vaccine is available.

(k) Hepatitis :-
- Inflammation of liver by virus, drug, chemical

(i) Hepatitis A : HAV
(Infectious)
- Feco-oral transmission
- Anorexia (appetite loss), nausea, diarrhoea, fever
- Eventually jaundice appears.

(ii) Hepatitis B : HBV
- Blood sexual contact
- Can lead to cancer.
- vaccines through RDT (Recombivax HB) - 2nd Gen"

(iii) Hepatitis C : (non-A non-B)
- Blood, Sexual contact.
- Possibly liver Cancer.

(iv) Hepatitis D (HDV)
(delta hepatitis) :-
- Blood, sexual contact

(v) Hepatitis E (HEV)
(Infectious NANB hepatitis) :-
- Feaco-oral
- Very high mortality rate in pregnant Women.

Virus	Genome
HAV	SSRNA
HBV	ds DNA
HCV	SS RNA
HDV	Ss RNA
HEV	SS RNA

(2) Bacterial Diseases :-

(a) Typhoid :—
(enteric fever)
"Salmonella typhi"
- Generally enter Small Intestine through food & H_2O & migrate to Other Organs through blood.
- Sustained high fever (39°-40°C), weakness, stomach pain, constipation, headache, loss of appetite.
- Intestinal perforation & Death may occur.
- Typhoid confirmed by "Widal test"
- Mary Mallon nicknamed Typhoid Mary as she was typhoid carrier continued to spread typhoid for several years through food she prepared.

(b) pneumonia :-
"Streptococcus pneumoniae" or "Haemophilus Influenzae"
- Infects the alveoli of lungs, as a result the alveoli get filled with fluid leading to severe problems in respiration.
- symptoms: fever, chills, cough, headache.
- lip & finger nails may turn gray to bluish in colour in severe cases.
- A healthy person acquires Infection by inhaling droplets/ aerosols released by an Infected person.

(c) plague / Bubonic plague :-
(Black death)
"Yersinia pestis"
- 1° a disease of rodents but accidently affect man.
- from rat to rat through rat flea (Xenopsylla)
- high fever & bubo (lump) in the Groin / Armpit.
- Red patches → Black Death.
"Wayson stain" test helps to detect plague.

(d) Tuberculosis :-
"Koch's Disease"
"Mycobacterium tuberculosis"
- Bacteria damage tissues & release toxin "tuberculin"
- Affect lungs, bones, joints.
- Symptom: fever, cough, chest pain, loss of wt.
- BCG vaccine ✗
- TB detected using "Mantoux test"

(e) leprosy :-
(Hansen's Disease)
"Mycobacterium leprae"
- light coloured patch, nerve thickening, fever, pain, ulcer, skin eruption
- Treated by DDS (Diaminodiphenyl sulphone)

(f) cholera :-
"Vibrio cholerae"
- starts passing stools frequently which are White like rice water & Vomits.
- Oral rehydration therapy

(g) Diptheria :-
"Coryne bacterium diptheriae"
- May start with sore throat, chills with mild fever, sometimes Vomiting & headache.
- Throat / tonsils show a Grey membrane which spread down & cause hoarseness & Breathing difficultly.
- DPT Vaccine

(h) Tetanus (lock jaw) :-
"Clostridium tetani"
produces a neurotoxin tetanospasmin which acts at Neuromuscular junction.
- spasms of muscles of jaw & face occurs called "Lock jaw".
- Severe pain
- fatal disease.
- Toxin mainly affects "Voluntary muscles"
- "Anti Tetanus Serum" Injection.

3) protozoans

(i) Malaria :-
- By plasmodium
- Malignant malaria caused by P. falciparum is the most serious one & can be fatal.
- It shows alternation of Generation.

Lifecycle
- pre erythrocytic Schizogony :-
Sporozoites travel to the liver. Each sporozoite undergoes asexual reproduction (Multiple fission) ↓ merozoites (cryptozoites)
Eventually liver cell ruptures & Merozoites are released
↓
Merozoites Infect healthy liver cell & repeat same cycle thrice.
↙ few merozoite remain in liver & continue to multiply & start Exo-Erythrocytic schizogony
↘ finally Merozoites enter RBC ↓
Upon release merozoites Invade RBCs & undergo another

asexual cycle
Erythrocytic schizogony

↓

Trophozoite/
Signet ring stage

Merozoites develop to form Immature/ ring stage, trophozoite which then progress to mature trophozoites

↓

Amoeboid stage

Trophozoite transform into amoeboid stage At this time RBCs contain eosinophilic granules (Schuffner's dots).

↓

multiple fission

Trophozoite Divides by multiple fission forming Merozoites.

↓

RBCs rupture
Merozoites released.
Haemozoin - a toxic break down product of RBCs is also released - cause high fever chills +

Released merozoites

Enter RBC & cycle continue

Re-enter liver & continue Asexual division

enter RBC & begin Gamogony.

Asexual division is Post-Erythrocytic Schizogony :-

↓

Occur in Liver.

Gamogony :-
(or) Sexual cycle.

- Merozoites develop into Gametocytes in RBC.

↓

Marks beginning of sexual cycle which begin in human but it is complete in Mosquito.

↓

When a ♀ anopheles mosquito takes blood meal from an infected person, both male (microgametocytes) & female (macrogametocytes) maybe Ingested.

↓

RBCs are digested in the midgut of mosquito & Gametocyte set free.

↓

Each of Gametocyte forms upto 8 male Gamete by Exflagellation.

↓

In midgut of mosquito zygote formed, becomes elongated & motile & called ookinete.

ookinete Invade midgut wall of mosquito where develop into oocyst.

↓ Sporogony

Growth & division of each oocyst produce 1000s of active haploid forms sporozoites.

↓

After sporogonic phase (8-15) days oocyst bursts & release sporozoites into body cavity of Mosquito & travel to salivary glands.

	P. Vivax	P. falciparum	P. ovale	P. malariae
Pre patent period	8 days	6 days	9 days	13 days
Erythrocytic phase Incubation period	48hrs	48hrs	48hrs	72 hours
	14 days	12 days	14 days	30 days
Type of malaria	Benign tertian	Malignant Tertian Tertian / Cerebral	Tertian	Quartan

- Quinine - alkaloid cinchona bark
- Currently WHO recommended Artemisenen based Combination therapy (ACT)
- Controlling Vector by introducing larvivorous fish: Gambusia

(i) Amoebiasis / Amoebic Dysentry

"Entamoeba histolytica" in large intestine of human.

- Housefly act as Mechanical carrier & serve to transmit the parasite from faeces of infected person to food & food products thereby contaminating them.

- Drinking water & food contaminated by faecal matter: Main source of infection.

- Symptom :- Constipation, Abdominal pain, Cramps, stools with excess mucous & blood clots.

- Adult Entamoeba is called Trophozoite (pathogenic) & is monopodial.

- It has 2 forms :-

Magna / pathogenic form found in mucosa & submucosa of intestine forming ulcer & minuta

Non-pathogenic found in lumen of intestine.

- Entamoeba has no contractile vacuole.

- Trophozoite of Entamoeba reproduces by binary fission.

- Minuta form Encyst.

- mature cyst is called Quadrinucleate cyst. It has 4 nuclei & 2 chromatoid bodies. → Infective stage

4) Helminthes

(i) Ascariasis :-

"Ascaris lumbricoides" An intestinal parasite of small intestine of human beings. common Round Worm.

- Mode of transmission :- Healthy person Acquires infection through contaminated Water, vegetables, fruits etc.

- symptoms :-
- Internal Bleeding
- Muscular pain
- fever
- Anaemia
- Blockage of Intestinal passage.

- Eggs of parasite come out along with faeces of infected persons which contaminate soil, water, plants etc.

(ii) filariasis / Elephantiasis :-

"W. Bancrofti" "W. Malayi" filarial worm.

Mode of transmission :- Infected ♀ culex Mosquito

Symptoms :-
- Causes a slowly developing Chronic Inflammation of organs in which they live for many years, usually lymphatic vessels of lower limbs.
- Genital organs are also often affected resulting in Gross Deformities.

5) fungal Diseases.

Ring worm

Genera "Microsporum" "Trichophyton" "Epidermophyton"

- Symptoms :- Appearance of dry, scaly lesions on various parts of body such as skin, nail, scalp.
- These lesions are accompanied by intense itchings.
- Heat & Moisture help these fungi to grow, which makes them thrive in skin folds such as those in the groin / b/w the toes.

Immunity

Overall ability of the host to fight the disease-causing Organisms.

1. Innate Immunity :-

"Inborn Immunity"
Nonspecific

- physical Barriers
- Skin on our body is the main barrier prevents Entry of Micro-Organism.
- Mucus coating of the epithelium lining Respiratory
- Gastro-Intestinal
- Urogenital tract

help in trapping Microbes entering our body.

- physiological Barriers
- Acid in stomach
- Saliva in mouth
- tears from eyes -

all prevent Microbial Growth.

- cellular Barriers
- Certain types of leukocytes (WBC) of our Body like

(i) PMNL (poly morpho nuclear leukocytes) → neutrophils

(ii) Monocytes

(iii) Natural Killer (Type of lymphocyte) in the Blood as well as Macrophages in tissues Can phagocytose & destroy microbes.

- Cytokine Barriers

- Virus Infected cells secrete proteins called Interferon which protect noninfected cells from further Viral Infection.

2. Acquired Immunity

"pathogen specific"

Vertebrates have three only 2 types

Humoral Immune Response	Cell mediated Immune Response
Produce Antibodies	Destroys Infected cells

(Acquired Immunity)

- Adaptive Immunity relies on:-
- T-cell & B-cell are type of WBCs called lymphocyte
- Antigen presenting cells (APCs)
- like all blood cells lymphocyte Originate from stem cell in Bone marrow.

some migrate from bone marrow to Thymus mature into T-cells	some remain & mature in Bone marrow develop as B-cells
1° lymphoid organ	2° lymphoid organ
- site of origin & maturation of lymphocyte.	- site of lymphocyte activat°.
- Yolk sac, foetal liver, Bone marrow, Avian Bursa of fabricus,	- spleen, lymphnode, tonsils, Vermiform appendix, MALT,

Thymus peyer's patches (SoI)

① Spleen : RBC graveyard.
- large bean shaped organ.
- contain lymphocyte & phagocyte.
- Act as Blood filter by trapping blood borne microorganism

large Reservoir of RBC

② lymphnodes :
Small solid structure located at diff. point along lymphatic system.
- Trap microorganism/antigen & get into lymphor tissue fluid.
↓
lymphocyte activ°
↓
which proliferate to become effector cell.

③ Thymus :
- large at birth, reduce with age.
- lobed organ, near hot beneath breast bone.

④ Bone marrow :
- main lymphoid organ where all blood cell produce

BM + Thymus
↓
provide micro envt. for development & matur° of T-lymphocytes.

MALT → Respiratory, Digestive, Urogenital tract

constitute about 50% of lymphoid tissue in human body.

Initiation.

T cell receptor & B cell Antibodies produced

↓

Recognise & Bind to Specific Antigen & this Interact^{n} Initiate Adaptive Immune Response

↓

Specific site on Antigen that Immune System recognise are Antigenic determinants or epitopes

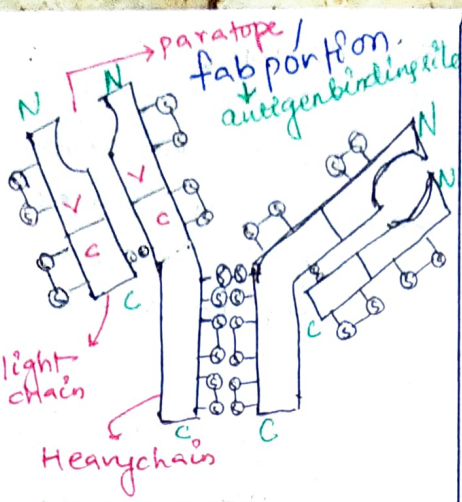
Haplēn :- Small molecule that are antigenic but themselve incapable of inducing Immune response.

Humoral Immunity

- B cell produce an army of protein in response to pathogens Into our blood to fight them.
- These proteins are Antibodies.
- Each Antibody has 4 peptide chain
  2 light chain — 2 Heavy chains
  Represented as H_2L_2

B cells → plasma cells (effector cell)
→ memory cell.

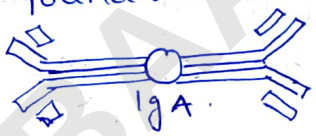
Because these antibodies found in blood so called humoral



GAME D :-

IgG :- Abundant (80%.)
Readily cross placenta & protect Foetus.
- act as opsonin.

IgA :- 13%
- mucous secr^{n} of Respiratory tract ; Digestive tract (upper part) vagina
- found in colostrum.



IgM :- Largest Size (6%.)
- form pentamer.
- form during 1° response (first antibody)

IgE :- Less than 1%.
allergy Antibodies.
activate histamine Secreting cells, play role in parasitic Infn.

IgD :- Less than 1%.
role in activating & supressing lymphocyte Activity.

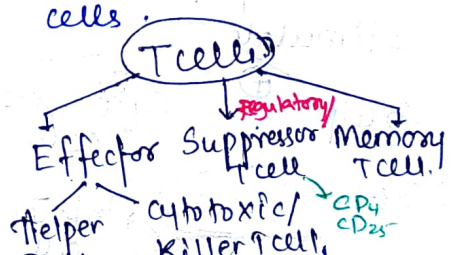
Antigen Antibody Inter^{n}
1. Agglutinat^{n} → 2. opsonisation or Adherence
3. precipitation ← 4. Neutralization
↓
5. Lysis.

- On encountering a pathogen 1st time Body produce low Intensity Respones called primary Response.
- Subsequent encounter with same elicit highly Intensified called 2° or Anamnestic Response.

1° Response – IgM
2° " – IgG.

Cell Mediated Immunity :-

- Cellular Immune Response is directed against antigen that have become established within cell of host animal.
- Detects, destroys Virus Infected/mutated cells Such as Cancer cells.



Helper T cell → Stimulate B cell to produce antibodies & Killer T cell to destroy nonself cell.

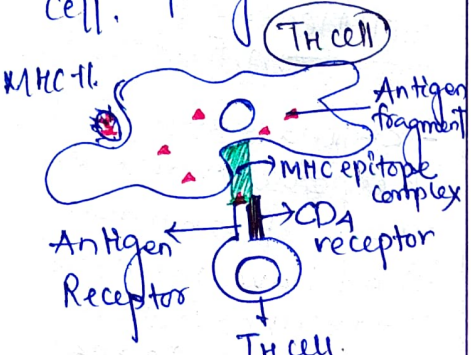
Killer T cell → Secrete perforin which create pores in Invader cell membr. for H_2O to enter, cell swell up & lyse.

- Work with protein of Major Histocompatibility Complex.

① 1st a foreign molecule must be present that can bind specifically to Antigen Receptor of T cell.

② 2nd, this antigen Must be displayed on Surface of ~~Antigen~~ Presenting cell. (MHC-II)

Dendritic cell. Macro phage. B cell



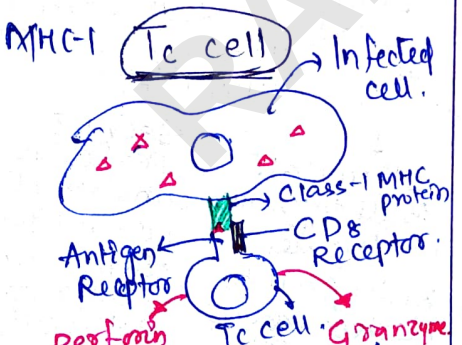
T cell → Activated one

↓

Proliferates & Secrete lymphokines to Stimulate

⊕ B cell

⊕ Cytotoxic T cell.



Perforin → form pores fluid enter into Infected cell.

Granzyme → Cause Apoptosis (programmed cell death)

Death of Infected cell deprives pathogen of a place to multiply

** Transplantation may cause rejection of transplanted organs. as it is recognised as foreign initiating Cellular Immunity (mainly Tc cells)

Histocompatibility

MHC / HLA (Human leucocyte Antigen)

Is a set of molecules displayed on cell surface responsible for leucocyte recognition & Antigen presentn.

→ Encoded by several genes on Human Chromosome - 6

Immunosuppressive Drugs

used to prevent rejn.

e.g. Cyclosporin

↓

destroy T cell mediated Immune response (CMI)

Immunity

1) Active :-

develop due to exposure to Antigen, Slow.

(a) Natural

Acquired when antigen Gain access into body during Natural Infectn.

e.g. a person recovered from Small pox / measles / mumps have this developed in body.

(b) Artificial

Resistance Induced by Vaccine.

Passive - Develop by administering preformed antibodies.

2) passive :-

(a) Natural

Colostrum Secreted by mother during Initial day of lactn has IgA.

foetus receive IgG through placenta

(b) Artificial

preformed Antibodies directly Injected into body.

e.g. Anti Venom (snake bite)

~~Antitetanus Serum~~

** Vaccination & Immunisation based on property of Memory of Immune system.

Vaccination

1st Gen
Attenuated Vaccine or Inactivated Vaccine (Killed / weakened) like
- Small pox,
- OPV,
- BCG,
- Influenza,
- Typhoid,
- Rabies,
- Cholera,
- Salk's polio inj.
- ~~Tetanus~~

Attenuated

Killed type.

2nd gen
Subunit Toxoids like Diphtheria, tetanus,

① Toxoid.

② Subunit / Recombinant / Polysaccharide
Hepatitis-B
HPV

3rd gen
DNA Vaccine
RDT Vaccine

Immune Disorder

(a) Allergy / Hypersensitivity :-

- Exaggerated response of Immune system to foreign subst i.e., Allergens
- Antibodies produced IgE type
  ↓
  It attach to Mast cell
  ↓ release
  Histamine, Serotonin
  ↓
  Dilation of Blood vessels (vasodilator)
  constrict^n of Bronchiole
- symptom: sneezing, Watery eyes, breathing difficulty, running nose
- Use of drug to reduce symptom: Steroids, Anti Histamine, Adrenaline.

Types of allergy :-

(i) Hay fever.
(ii) Asthma.
(iii) Anaphylactic shock
(iv) Eczema.

(b) Autoimmunity :-

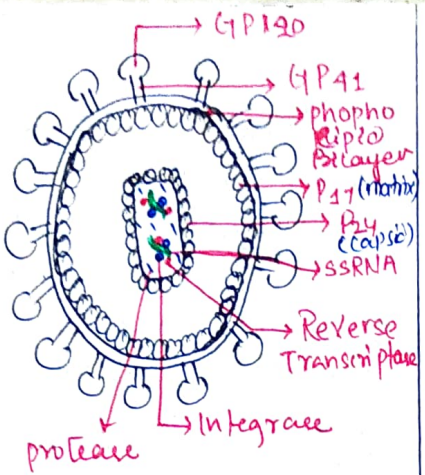
Higher Vertebrates have Memory based aquired Immunity, but due to genetic & other reason the body attack self cells leading to Autoimmune disorders.

e.g.

- Addison's Disease :- self Antibodies attack adrenal cortex.
- Myasthenia Gravis :- self Antibodies attack neuro-muscular cells.
- Rheumatoid arthritis :- Auto-Antibodies attack synovial joints.
- pernicious anaemia :- Auto antibodies attack oxyntic cells that secrete Castle's Intrinsic factor which help in Vit B12 absorption.
- Alopecia areata :- Auto Ab attack hair follicles & Bald patches appear.
- Guillain Barre Syndrome :- Auto Ab attack nerve that join Brain & spinal cord to Body parts
- SLE (systemic lupus erythematosus) :- Inflamm^n of skin, joints, kidneys & among other organs.
- Hashimoto's thyroiditis : Thyroid Gland (thyroglobulin) is attacked by Auto Ab
- Grave's Disease :- Auto Ab mimic TSH.
- Celiac Disease : Immune rea^n to eating Gluten, a protein found in Wheat, Barley, Rye.
- Multiple sclerosis : Immune system eats away at the protective covering of nerves.
- Type 1 Diabetes (IDDM) :- a chronic condition in which pancreas produce little / no Insulin.
- psoriasis :- a condition in which skin cells build up & form scales & itchy patches.
- Vitiligo :- disease in which the pigment cells of skin, melanocytes, are destroyed in certain Areas.
- chronic anaemia :- Auto ab are RBCs then the body destroys its own RBCs
- chronic hepatitis :- If Auto ab are liver cells
- ulcerative colitis etc

** AIDS :-

- Acquired Immuno deficiency syndrome
- HIV Virus :- Retro Virus Group Human Immune Deficiency virus.
- 1st case of AIDS occured in USA in 1981 amongst Homosexuals & in the last 25 yrs or so it has spread all over World killing more than 25 million persons.
- It is Not a Congenital disease
- HIV is a Descendant of Simian Immunodeficiency Virus, (SIV) — which affect Monkeys.



- HIV: core RNA with Reverse transcriptase
- major cell infected by HIV & the Helper T-lymphocyte that bear CD_4 receptor site.
- the attachment of virus to CD_4 receptor site by the help of GP120 on the protein coat of virus.

- **Transmission:-**
  - → Sexual contact with infected person.
  - → Blood transfusion
  - → through intravenous drug
  - → mother to foetus by placenta

life cycle:

- After getting into body of person the virus enters Macrophages, where RNA genome of the virus replicates to form viral DNA with help of **Enzyme Reverse Transcriptase.**

↓

This Viral DNA gets incorporated into host cell's DNA & directs infected cells to produce virus particles.

↓

Macrophage continue to produce virus & act as HIV factory.

↓

HIV enters into Helper T-lymphocytes (T_H cells) replicates & produce progeny virus.

↓

the progeny virus released in blood to attack other T_H cells (T lymphocyte)

↓

This is related to progressive decrease in no. of T_H lymphocyte

↓

During this period the Person suffers from Bouts of fever, diarrhoea & weight loss.

↓

Due to dec in no. of T_H lymphocytes, person starts suffering from diseases of bacteria e.g. mycobacterium, virus, fungi, parasite like Toxoplasma.

stages:-

- **Acute infection:**
  During this large amt. of virus are being produced, person develop flu like symptom
- **clinical latency:**
  HIV reproduce at slow rate. Asymptomatic last for 5-10 yrs.
- **AIDs**
  As CD_4 cells fall below 200/mm³ body become prone to opportunistic infect.

opportunistic Infect.

1. candidiasis
2. cytomegalovirus retinitis
3. Herpes simplex virus
4. Kaposi sarcoma
5. Mycobacterium tuberculosis
6. pneumocystis carinii pneumonia
7. Toxoplasmosis of brain.

Diagnosis:-

1) **Elisa:-**
tests check for HIV. It generally take 2-8 weeks for body to produce antibodies, but in some cases it can take upto 6 months (Widow period)

2) **Western Blot:-**
Assay is confirmatory test. only performed if an elisa is true.

3) **PCR:-**
finds either RNA of HIV or HIV DNA in white blood cells infected with virus

Treatment:-
Highly Active Anti-Retroviral Therapy (HAART).

It includes.
- NRTI.
(Nucleoside Reverse transcriptase Inhibitors)
e.g. Retrovir (AZT, zidovudine)

(2) NNRTI
(Non-nucleoside Reverse transcriptase Inhibitor)
e.g. Nevirapine

• PI (protease inhibitor)
e.g. Crixivan

Preventⁿ of AIDS:-

• December 1
↓
WORLD AIDS Day

• National AIDS control organisation (NACO):
A division of ministry of health & family welfare that provides leadership to AIDS.

★ Cancer:-

• A multigene, multistep disease originating from single abnormal cells
• Successive round of mutation lead to mass of abnormal cell i.e. tumor/Neoplasm
+
abnormal tissue capable of continued growth, tumor formⁿ, disruption of normal cells

Type
(1) Benign Tumor:
Remain confined to their original locations & don't spread to other organs / part of body

(2) Malignant Tumor:-
large mass of abnormal tissue which is capable of invading adjacent sites

Hallmark
1. Immortality
2. lost contact inhibition property.
3. Apoptosis lost
4. new blood vessels will be formed near tumor.
5. Metastasis;
cells slough from such tumor reach distant site through blood.

Types:-
(a) Carcinomas:
Malignant growths of epithelial (ectodermal) tissues that cover/line the body organs
e.g. Skin cancer, lung cancer, Breast ", cancer of stomach, pancreas cancer.
(>85% of all tumors)

(b) Sarcomas:
Derived from mesodermal connective tissue
(<1% of total)
e.g. bone tumors, cancer of lymph nodes

(c) Leukaemias:
unchecked proliferⁿ of cell type in blood & bone marrow

(d) Melanoma
Cancer of pigment cells of skin

(e) Adenocarcinoma
Cancer of gland

(f) Lymphoma
Cancer of lymphatic tissue

(g) Glioma
Cancer of glial cells of CNS

Causes:-
(i) physical agent:-
• Ionising radiation like X rays, γ rays
• Non Ionising radiation like UV rays
cause DNA damage & neoplastic transformⁿ.

(ii) chemical agent:-
• Prt in Tobacco smoke
+
major causing cancer

chemical	Cancer
1. Benzo pyrene	skin, lungs
2. N-nitroso dimethylene	lungs
3. cadmium oxide	prostate
4. Aflatoxin	Liver
5. DES	vagina
6. vinyl chloride	Liver.

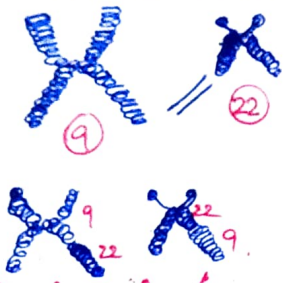
Soot & coal tar

(iii) Biological agents:-

Tumor promoters

↓

- promote proliferation of cells which are already transformed.
- By chromosome translocⁿ e.g. philadelphia chromosome



~~Chronic~~ myelogenous leukaemia

- By chromosome translⁿ

e.g. Burkitt's lymphoma

8 ⇌ 14

c-myc myelocytomatosis.

- Tumor viruses are associated with Oncogenic transformⁿ. These virus have gene called V-Onc (viral Oncogene)
- several Gene called c-Onc. (cellular oncogene) or proto oncogene have been found in humancell
- proto oncogene → code for protein → stimulate cell divⁿ

Oncogenic virus	type of cancer
Epstein Barr virus	Burkitt's lymphoma
Hepatitis B Virus	Liver cancer
HPV	Cervical Cancer
Human Herpes Virus-8	Kaposi sarcoma
HTLV-1	T cell leukaemia
Hepatitis C Virus	Liver cancer

Diagnosis

(a) Biopsy, histopathological studies of suspected tissue: A piece of tissue taken for cancer detectⁿ under microscope

(b) Blood & Bone Marrow test:- for Tot. cell count in case of leukaemia

(c) Radiography (use of X Rays)

CT (Computed tomography) - 3D image of Internal organ

MRI (Magnetic Resonance Imaging) - strong magnetic field use & non ionising radⁿ "

(d) positron Emission Tomography (PET): measure change in physiological fun like metabolism etc.

(e) Use of Monoclonal Antibodies:- By radiolabelling them e.g. Herceptin

Treatment:

(a) surgery:- Generally a tumor surgically removed wherever possible

(b) Radiotherapy / Radiation :- Tumor cell irradiated lethally by γ radⁿ e.g use of I^{131} for thyroid cancer

(c) Chemotherapy:- certain medicine used which inhibit cell division e.g. Taxol, Vincristine side effect: Hair loss, Anaemia

(d) Immunotherapy:- Natural anticancer defence mechanism is augmented, In this Biological response modifiers i.e., α-Interferons used i.e., Activate their immune system & help in destroying tumor.

Vincristine — catharanthus roseus (common periwinkle)
Vinblastine /

Drugs & Alcohol Abuse :-

Psychotropic drugs

Mood altering drugs as these act on CNS.

1. Sedatives & Tranquilizers.
2. Opiate Narcotics
3. Cannabinoids.
4. Stimulants
5. Hallucinogens.

1. Sedatives

produce a feeling of calmness, relaxn & in higher doses induce deep sleep.

Tranquilizers

Reduce tension, anxiety without inducing sleep.

⇒ clinically used for Relieving Anxiety, Hypnotic.

like Barbiturates & Benzodiazepines.

e.g. valium, Diazepam sleeping pills.

⇒ these drugs are CNS depressants as bind to GABA receptor in Brain.

2. Opoids :-

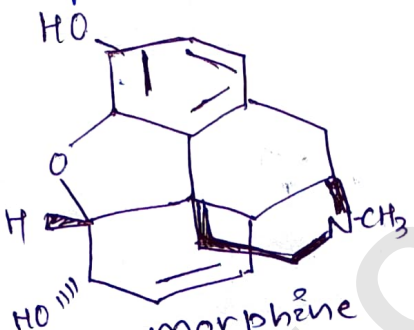
Derived from Papaver Somniferum (poppy plant)

Extracted from the latex.

- It contain 10% (nearly) morphine. (an opiate alkaloid).

+

most frequently processed chemically to produce Heroin



morphine

+

Analgesic

* Heroin (Smack) - Brown Sugar

+

- chemically Diacetyl morphine
- White, odourless, Bitter crystalline compound.
- Depressant & slows down body function.

other e.g. Codeine, pethidine, methadone

- opioids bind to sp. opioid receptor in CNS & GIT.
- produce temporary Euphoria, Relieve intense pain, supress brain fun^{n}.

clinical use :-

Analgesic (Pain killer)

Generally taken by Snorting & Injection.

3. Stimulant :-

- Stimulate Nervous system, make a person more wakeful increase alertness & excitement.

e.g. cocaine, amphetamine, caffeine etc.

- clinical uses :-

Attent^{n} Deficit, weight control, Narcolepsy.

1) Coca alkaloid/cocaine

+

Erythroxylum coca (plant)

native to South America

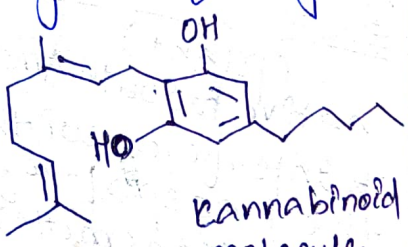
- It interferes with the transport of the neurotransmitter Dopamine.
- cocaine - coke/crack & is usually snorted.
- potent stimulating act^{n} on CNS, produce sense of euphoria & Inc. energy.
- Excessive dose cause Hallucinat^{n}.

4. Cannabinoids :-

- Group of chemicals which interact with Cannabinoid receptor principally in brain.
- Natural cannabinoid are obtained from inflorescence of cannabis sativa (Hemp plant)

- The flower tops, leaves & Resin of Cannabis plant are used in various Comb^{n} to produce marijuana, hashish, charas, Ganja.
- Generally taken by Inhalation & Oral Ingestion,

Effects on Cardio Vascular system of body



Cannabinoid molecule.

Cannabis sativa leaf

5. Hallucinogens:-
found in Amanita claviceps | purpurea
(LSD, sugar, blotter)
~~Atropa belladona~~
Psilocybe mexicana.
~~Datura~~

ex., LSD, mescaline, psilocybin (charas, hashish, Ganjan, Cannabinoids

Effect:-
Alter thought, feeling, percept^{n}, hallucinogens

No clinical uses.