CLASS – 12

BIOLOGY

Chapter – 8

Human Health and Diseases

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PGT- Biology

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Health

- It is ***a state of wellbeing***.
- According to **Hippocrates** and **Indian Ayurveda system it** is health of a *state of body and mind*.
- **According to WHO:** "*state of complete physical, mental and social well being a not mere the absence of disease or infirmity*".

Factors affecting by health:

1. It is affected by genetic disorders.
2. Infections
3. Life style (i.e. balanced diet, rest sleep, stress, exercise and habits).

Maintenance of good health:

1. ***Balance diet*** (*viz. contain different type of food in right quantity and proportion*).
2. ***Personal hygiene*** (*i.e. personal cleanliness and surrounding, washing hand before eating and take care one's nail, hair, teeth, eyes and general body hygiene*).
3. ***Regular exercise (i.e. yoga)***
4. ***Relaxation and regular sleep***
5. ***Awareness about diseases***

Diseases

- *Disturbed state of body of an organism that impairs body function by specific symptoms and signs*.
- It cause by *external and internal dysfunctions*.
- It can be categories in two basic type:

1. **Congenital:**

- Present *at the time of birth* due to ***genetic inheritance*** from parent.

- It may lead to *malfunctioning of any organ or system*.
- Non- infectious and permanent (*i.e. generally not curable*).
  Example: *Colour blindness, Haemophilia* ect.

2. **Aequired diseases:**

- It ***develops after birth*** at any stage of life.
- Basically categories into two categories:

a. **Communicable or infectious diseases:** Caused by ***pathogen*** and can be *transmitted from one person to another* and some disease could be infectious. Like COVID -19

b. **Non-communicable or non infectious diseases:** it could *not transmit from one person to another by any mean and confined to the person*.

- It can be various reason and following type – **degenerative diseases** (*due to malfunction of organ or system like heart kidney*), **deficiency diseases** (due *to lack of hormone or nutrient*), **allergies** (*due to hypersensitivity of the body to foreign substance*), **cancer** (*due to uncontrolled growth of tissue or organ in the body*), **other diseases** (*due to physical agents like heat, cold, radiation, pressure and sound*).

Pathogen

- Disease causing organism (i.e. bacteria, fungi, protozoans, viruses etc) or agent is called pathogen.

Diseases causing agents

- Any substance which cause diseases by its excess or deficiency is called disease agent.
- It could be following type:

1. **Biological infection agent** (i.e. viruses, bacteria, fungi, protozoan etc).

2. **Nutritive agents** (i.e. minerals, carbohydrate, protein, fats, vitamins and water).

3. **Chemical agents** (i.e. urea or uric acid , pollutants, spore or pollens present in atmosphere).

4. **Physical agent** (i.e. heat, cold, humidity, electricity).

5. **Mechanical agent** (i.e. friction or other mechanical force that may cause injuries, fracture, sprains, dislocations etc).

Transmission of Diseases

1. **Direct Transmission:**

- In this pathogen reach and infect a healthy person directly ***without any intermediate agents***.
- Intermediate agent could be various mean such as:

I. ***Direct contact between the infected and healthy person***. **Example:** *small pox chicken pox syphilis, gonorrhoea* etc.

II. ***Droplet infection:*** droplets emitted in to air from sneeze, cough and spit cause air-born respiratory infection like *influenza, whooping cough, pneumonia, tuberculosis and COVID-19*.

III. ***Contact with soil containing disease causing bacteria or viruses*** like tetanus.

IV. ***Bite of animals*** like *Rabies*

V. ***Tranplacental transmission*** like *German measles and syphilis*

2. **Indirect transmission:**

Transmission of pathogen from infected to healthy person occurs ***through intermediate agent*** like ***by vector*** (*i.e. house flies female anopheles mosquito*) or ***by air borne***.

3. **Fomite borne** (*i.e. one get infected by touching any article that has been in contact with the infection like –COVID-19*).

4. **Unclear hand and finger** are also source of various digestive and respiratory diseases.

Disease caused by Virus

- Viral disease grouped into four types based on the site of infection:

1. Pneumotropic – affects respiratory system. **Example:** *Influenza, Common cold, SARS*

2. Dermotropic – involving mainly skin. **Example:** *Herpes simplex, Chickenpox, Small pox, Measles, Rubbella, Mumps*

3. Viscerotropic – affects blood and visceral organs. **Example:** *Yellow fever, Dengue fever, Chikungunya, Hepatitis*

4. Neurotropic – affects the central nervous system. **Example:** *Rabies and Polio*

Influenza

- Generally 3 type of influenza viruses A,B and C are present in which type A virus cause serious flu epidemic in human.
- **Cause –** by RNA virus – *Myxovirus influenza*.
- **Mode of infection –** through ***air by droplet infection*** which emitted into air from sneeze, cough or split of infected person.
- **Symptom-** ***Bodyarch, felling discomfort, cough and cold and fever***.
- **Preservation –** keeping away from flu patient.
- **Control-** no effective control.

Common cold

- It is one of the most infectionous human elements.
- **Cause –** by ***Rhinoviruses*** which infect nose respiratory tract but not lungs.
- **Mode of infection –** ***droplets, through contaminated objects***.
- *Symptom- nasal congestion and discharge, sore throat, headarch, tiredness fever and it last about 3-7 days*.
- **Prevention** –stay away from congested place, wash hand before eating or using objects (i.e. contaminated).
- **Control –** no effective control.

Severe Acute respiratory syndrome (SARS)

- **Cause** by ***SARS corona virus*** and caused infectious disease of respiratory system.
- **Mode of infection –** it spread through ***person to person contact*** by touching one's eyes, nose or mouth after contact with the skin of someone with SARS.
- **Symptom-** disease includes fever, head arch, feeling discomfort, body arch and after two days patient may develop a dry cough and trouble in breathing.

Herpes simplex

- **Caused** by double strand DNA virus of the family Herpesviridae.
- Main herpes infections are – cold sores, herpes encephalitis and genital herphes.

Chicken pox

- **Cause –** by Varicella virus (DNA virus).

Spread through dried scabs, clothing, coughing and air droplets in air.

- **Symptoms** – *dew drop like rash at stomach and chest, high fever, itching, aches etc*.
- **Prevention** – patient should be isolated for 10-14 days.
- No vaccine available so far.

Swine flu

- It is also known as ***H1N1 flu*** and cause by ***oxthomyxo virus*** *(i.e. usually affects pigs but due to mutation it starts to effects human as well*).
- **Mode of infection:** through air by droplet infections.
- **Symptom:** fever with or without chills, sore throat, respiratory symptom like ***dyspnea*** (i.e. difficulty in breathing) or ***pneumonia, fatigue and lethargy, headarch, diarrhea and vomiting***.
- **Treatment:** ***Oseltamivir*** (*i.e. trade name Tamiflu*) and ***Zanamivir*** *(i.e. trade name Relenza*) found to be effective.
- **Prevention:** avoid close contact with any person suffering from flu, wash hand after touching objects and other people with antimicrobial soap or sanitizer and use facemask as well as avoid infected one near and dear one.
- **Diagnosis:** testing of mucus is the confirmatory the diagnosis.

Chikungunya

- Viral disease spread by bite of infected Aedes aegypti mosquito (viz. bite during day time).
- Cause; stagnated water in and around human inhabitation.
- Symptom: incubation period days it starts with chills, high fever, vomiting, nausea, and head arch and persistent join pain.
- Treatment: no treatment.
- Prevention: avoid mosquito bite and it spreads from human to human only, mosquito breeding control is the best way to fight chikungunya.

Dengue fever

- Cause by- RNA virion of the ***Flaviviridae*** which multiply in WBCs cells and platelets.
- Mode of transmission – spread by ***Aedes aegypti*** and ***A. albopictus***.
- Detected by tourniquet test.
- Symptoms: high fever severe frontal headache pain behind eyes, muscle and joint pain loss of appetite, measles- like rashes over chest and upper limbs, nauea and vomiting.

Disease cause by bacteria

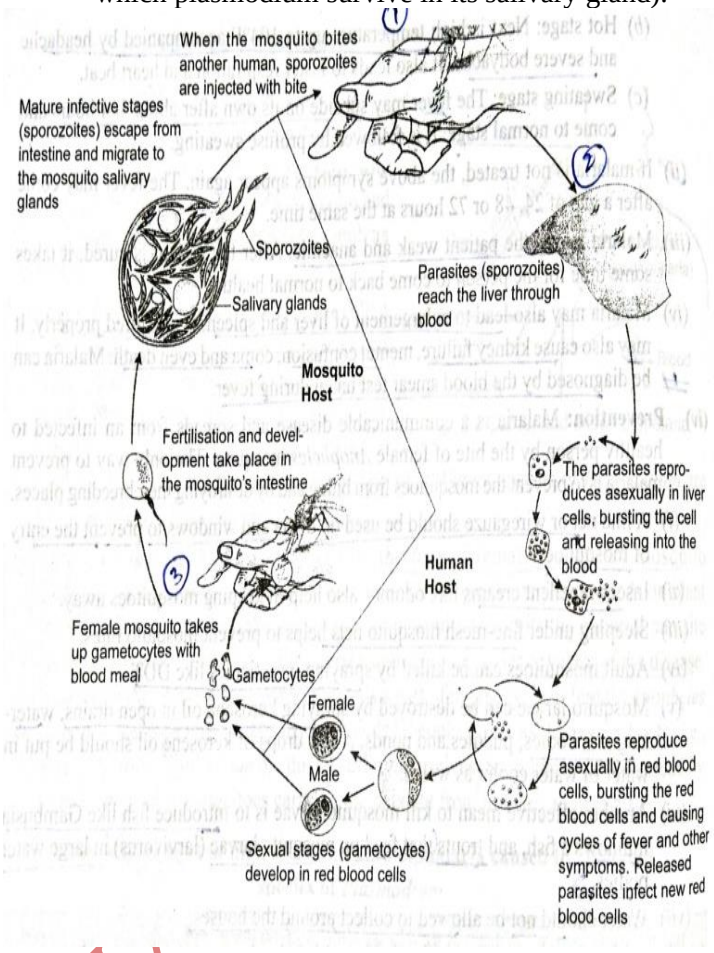
Bacterial disease	Bacteria	Mode of infection/ spread	Symptoms	Prevention and cure
Typhoid	*Salmonella typhi*	Through food and water contaminated by faecal matter or excreta of a typhoid patient.	Loss of appetite, tiredness, high fever in the afternoon, stomach pain constipation or diarrhea	Vaccination – TAB vaccine. Antibiotic drug- chloromycetin
Pneumonia	*Diplococcus pneumoniae*	Spread by inhaling infected droplets release by sneezing and coughing	Inflammation in lung, difficulty in breathing cough, cold and fever	Specific dose of antibiotics – Penicillin, Amphicillin-clavulanate and Erythomycin. Good personal hygine and sanitary conditions.
Tuberculosis	*Mycobacterium tuberculosis*	Inhaling infected droplets	Prolong low fever, cough, chest pain blood-stained sputum, secretion and swelling of lymph glands.	Hygienic and sanitary condition, BCG vaccination and ATT for control of TB
Diarrhea	*E. coli, shigella bacteria, viruses and protozoa*	Contaminated food and water	Frequently loose watery stools, vomiting fever loss of appetite, stomach pain, dehydration	Personal hygiene and sanitary conditions.ORS to be given repeatedly
Cholera	*Vibrio cholera*	Contaminated food and water, through houseflies	Watery diarrhea, vomiting, nausea, dehydration.	Hygienic and sanitary condition, cholera vaccine for prevention, ORS to control dehydration.
Tetanus	*Clostridium tetani*	Through wounds and injuries by accidents and use of improperly sterilized surgical instruments	Painful muscular spasms stiffness of neck and rigid jaw muscles, convulsions and paralysis of muscles.	ATS injection within hours of injuries.
Syphilis (Infect urinogenital tract, oral cavity and many part of the body)	*Treponema pallidum*	Sexual contact with infected person, new born baby get it from the infected mother	Sores and lesions the urinogenital tract and oral cavity.	Specific sulpha drugs and antibiotics control the infection.
Leprosy	*Leprosy*	Contagious and dreaded disease, spread through long and close contact with the infected person	Formation of ulcers, nodules, scales, deformities of finger and toes, chronic infection of skin and other nerves	Prolong use of Dapsone, children idsolation from leper parents early in life , rehabilation of cured patients and social stigma to be remove by education, active

				immunization.
Gonorrhoea	*Neisseria gonorrhoeae*	Spread by sexual contact with the infected person	Inflammation of the mucus membrane of urinogenital tract, arthritis, female sterility etc.	Sulfa drug and antibiotics help to cure the infections.

Disease cause by Protozoans

Malaria

- Caused by *Plasmodium vivax, P. ovale, P. malariae, P. falciparum.*
- Mode of spread – bite of female Anopheles mosquito (i.e. carrier or vector of the diseases in which plasmodium survive in its salivary gland).



- Symptoms- fever after a gap of 24, 48 or 72 hours, anemia , if not cure it may also lead to enlargement of liver and spleen, kidney failure, mental confusion, coma nd even death.
- Prevention and control – use of net or wiregauze on door and window, use of insect repellent, fine mesh mosquito nets, spraying of insecticides like DDT and kerosene oil in open drains, water stagnant bodies, malaria controlled by quinine (but now malaria become resistant due to overdose and over prescription of people) so now days Chloroquine and sulphadoxine.

Amoebiasis

- Caused by – Extamoeba histolytica (i.e. intestinal parasite occurs in the colon and rectum of small intestine).
- Symptoms – fever constipation, stomach pain, stomach cramping, stool with excess mucous and blood clots.
- House fly act as mechanical carriers and serve to transmit from faeces of infected person to food and food products.
- Drinking water and food contaminated by feaceal matter are the main source of infection.

Disease cause by Helminths

Taeniasis

- Caused by- Taenia solium (i.e. tapeworm live in the small intestine of man).
- Mode of infection – eating improperly cooked pork, unwashed raw vegetables as the egg of the worms are present.
- Symptom abdominal pain, vomiting, discomfort, loss of appetite and chronic indigestion.
- Cure – taeniasis can be cured by drugs while scolex can be removed by surgery only.
- Prevention – eating properly cooked pork, maintain hygienic and sanitation, washing and cooked vegetables properly before eating.

Ascariasis

- Cause by – Ascaris lumbricoides (i.e. round worm parasite in intestine of man).
- Mode of infection – by swallowing food or vegetables contaminated with such soil or water or by eating with dirty hands.
- Symptoms – abdominal discomfort, colic pains, internal bleeding, muscular pain, anemia, fever, nausea, cough and in severe cases may block the intestine and appendix.
- Cure – 10g dose of Piperazine phosphate with calcium sennosides and nemocide.
- Preventing measures – personal cleanliness and washing hands before eating, eating properly

cooked food, proper disposal of human faeces washing all eatables before consuming.

Filariasis (Elephantiasis)

- Caused by Wuchereria bancrofti or W. malayi (i.e. filarial worm live in the lymphatic glands of man which cause chronic inflammation of the organ.
- Mode of infection – through bite of female culex mosquito (i.e. acts as vector and transfer the larva into the skin which travel to lymph glands and mature).
- Symptoms – excessive growth of connective tissue which cause the enlargement of certain part like legs and arms.
- Cure and prevention – drug like – Methyl carbamazine (i.e. distroys the microfilariae to restrict further infection.

Disease caused by fungi

Ringworm

- Caused by Microsporum, Trichophyton and Epidermophyton are responsible for causing ringworm.
- Mode of transmission – generally acquired from soil, by using towels, clothes or even the combs of infected person.
- Symptom – scalp, groin, skin and nails, affected area appears red, discolored and covered by dry scaly lesions and vesicles, itchy and irrigation.
- Cure and prevention – use of fungicide cream or poder like undecylnic acid or Desenex and mixture of acetic acid and benzoic acid (whitfield's ointment).

Home Work: 1) write down the causing pathogen and mode of transmission of following diseases: Hepatitis, Polio, Rabies, Yellow fever, Trichomoniasis, Sleeping sickness, Kala azar, Trichhinosis, Guinea-worm diseaes, Eyeworm diseases, Cryptococcosis, Candidiasis, Aspergillosis and Ergotism.

2) Measures for personal hygiene and public hygiene.

Immunity

- ***Ability to resist with all type of foreign particle*** (i.e. bacteria, fungi, parasites and toxic substance).

OR

Over all ability of host to fight the disease causing organism which conferred by immune system.

- **Immunology:** study of resistance towards disease or immune system is known as immunology.
- Two type of immunity found in living organism

1. **Innate immunity (i.e. immunity from birth)**

- It is **nonspecific immunity** (*it does not distinguish in invading pathogen to other*) which **present that the time of birth** and **provide fist line defense** against infection.

Barrier of innate immunity

- It consist of following 4 type of barrier

1. **Physical barrier:**

- It blocks ***the entry of microorganism*** into body.
- It includes skin and mucus membrane.

Skin:

- It is hard keratinized outer layer and form barrier for the entry of pathogen.
- Sebaceous gland associated with hair follicle produce **sebum** (*i.e. contain lactic acid and fatty acid which maintain the acidic pH range between 3- 5*) ***inhibit growth*** of most microorganism.

Mucous membrane:

- Respiratory tract lined by **mucus** which ***entrap foreign microorganism*** and synchronous movement of **cilia *propel microorganism out of the body***.

2. **Physiological barrier:**

- It includes ***body temperature or fever, acidic pH in stomach and body secretion*** (*i.e. Saliva and tears*) that *prevent the growth of microorganism*.

a) **Body temperature or Fever:**

- During fight between microorganism and WBCs result rising of temperature or **fever** which *inhibit the growth of germ* and *activate body defense mechanism*.
- Fever cause by – ***toxins release by pathogen or chemical*** (*i.e. pyrogens*) ***release by WBCs***.

b) **Acidic pH**

- Gastric acidity (*i.e. pH 3-5)* kills most of bacteria swallowed with food.

c) **Body secretion:**

- It include ***saliva and tears*** which contain ***lysozyme*** (*i.e. hydrolytic enzyme*) which *kill bacteria or digest the peptidoglycane layer of bacterial cell wall* and prevent from eye infection.

3. **Cellular barrier:**

- It provide immunity by **phagocytosis** (i.e. ingestion of extracellular material or pathogenic microorganism).
- Phagocytosis conduct by specialized cells like – ***monocytes, neutrophils and macrophages***.

a) **Monocytes:**

- It ***liberates at site of infection and converts into macrophages*** (*i.e. large phagocytic cells that develop from monocytes*) which warden the actively in interstitial fluid, eating any bacteria and virus infected cells by **phagocytosis**.

b) Neutrophils or polymorphonuclear leukocytes:

- It is type of **WBCs** which ***ingest and kill bacteria by phagocytosis*** and ***also release chemical*** (***i.e. kill other bacteria in the vicinity***).

c) **Natural Killer Cells:**

- It is a type of leucocytes (WBCs) which ***do not attack the invading microbe directly*** but they release **perforins** (*i.e. protein*) which ***create a large pore or hole in plasma membrane of target cell*** (*i.e. virus infected cells or cancer cells*) which allow water rush into target cells and results **swelling and burst of target cells**.

4. **Cytokine barriers:**

- Viral infected cells secrete **interferon** (*i.e. glycoproteins*) which *protect non infected cell in the vicinity from further viral infection*.
- **Interferon** has been found to be very effective against hepatitis virus and influenza virus.

5. **Inflammatory barriers:**

- A ***complex sequence of event*** which induces by ***invading pathogenic microorganism*** or ***by wound*** is called **inflammatory response**.
- It occurs due to release of ***histamine, prostaglandin*** by damage **mast cells**.

Acquired immunity (i.e. immunity acquire after birth)

- ***Immunity acquire after birth***, ***specific immunity*** (*i.e. capable to recognized and selective elimination of specific organism and molecules*).
- It *supplements the protection provided by the innate immunity and takes several days for defense mechanism to get activated*.
- Found only in vertebrate and have following characteristics:

1. **Antigen specificity** (*i.e. It permit immune system to distinguish subtle difference among antigen*).

2. **Diversity** (*i.e. capable of generating tremendous diversity in its recognition molecule and recognize structural difference of foreign antigens*).

3. **Immunological memory** (*i.e. when once immune system has recognized and responds to foreign antigen so its exhibits immunological memory which helps to induce high state of immune reactivity with same antigen*).

4. **Self and non self recognition** (*i.e. it is ability of immune system to distinguish self from non-self and respond only non self molecule).*

Lymphoid organs

- Human immune system made up of **lymphoid organs, tissue, cells and soluble molecules** (*i.e. antibody*).

Lymphoid organs (*i.e. a place where origin, maturation and multiplication of lymphocytes occurs*)	
Primary lymphoid organs	**Secondary lymphoid organs**
Organs where newly *formed lymphocytes mature and differentiate* into antigen sensitive lymphocytes.	**It is a *place where mature lymphocytes are migrate* and provide *opportunity for interaction of lymphocytes with antigen* and proliferate to become effectors cells.**
Example : *Bone marrow, Thymus glands*	**Example: *spleen, lymph nodes, Tonsil, payer's patches of small intestine.***

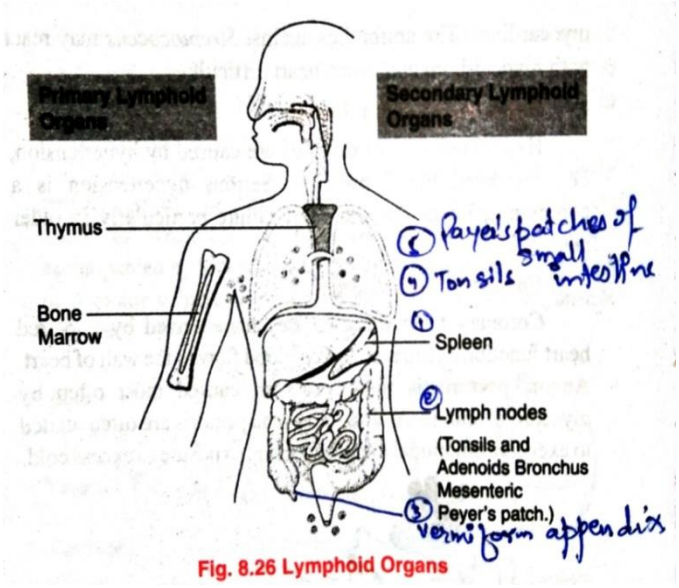


Fig. 8.26 Lymphoid Organs

Bone marrow:

- It is organ where all blood cells including lymphocytes are formed.

Thymus:

- It is lobed endocrine gland located below sternum near heart viz. Well develop at the time of birth butt at the time of puberty it reduce very small in size (i.e. size is reduced with age).

 # Bone marrow and thymus gland provide environment for development and maturation of T-lymphocytes.

Spleen:

- Large lymphatic organ that contain lymphocytes and phagocytes.
- It acts as filter of the blood by trapping blood born microorganism.

Lymph node:

- It helps to trap microorganism or other antigen which happen to get into lymph tissue.

 # Antigen present in lymphocytes is responsible for activating immune responses.

 # Lymphoid tissue located within lining of the respiratory, digestive and urogenital trace term Mucosal Associated Lymphoid Tissue (MALTs).

Types of cells in acquire immunity

- Immune system is based on the activity of two types of the cells (*i.e. B- cells, and T- cells*) which ***produce in bone marrow*** by the process of **haematopoiesis**.

1. **B - lymphocytes:**

- Involve in ***humoral immunity or antibody mediated immunity*** by producing army of protein (*i.e. antibody*) in response of pathogen.
- It **matures in bone marrow** and when it leaves it then each B-cell expresses a unique ***antigen-binding receptor*** (*i.e. membrane bound antibody molecules*) on its membrane.
- When antigen bind with B-cells receptor or antibody cause division of B-cell and differentiate into :

Memory B-cells	Memory B-cells
It is short live and express the same membrane bound antibody.	**Plasma does not bound antibody but responsible for secrete enormous amount of antibody (*i.e. 2000 molecule of antibody /sec*) which are major effectors molecule of humoral immunity.**

2. **T– lymphocytes:**

- It functions in **cell mediate immunity** and it do not ***secrete antibody*** but help **B-cell to produce them**.
- It **originates from stem cells in bone marrow and** migrates **to thymus gland for maturation.**
- During maturation T-cells express **T-cell receptor** (*i.e. unique antigen binding receptor molecules*) on its membrane.
- Which recognize only **antigen** that bound to **Major Histocompatibility Complex** (MCH) molecules.
- The rejection of transplanted organ is due to activity of T-Cells.

Defense system of acquired immunity

- Acquire immunity has specific defense system which done by **antibodies** (i.e. acts against a specific bacteria or **antigen**s only).

Antigens:

- Any ***foreign protein or polysaccharide*** that is not found in the organism body.
- Microorganism (*i.e. viruses, bacteria or their toxins and cell of other persons*) all contain protein which is ***not recognized in the body*** so that they act as antigens *(viz. stimulate the body*

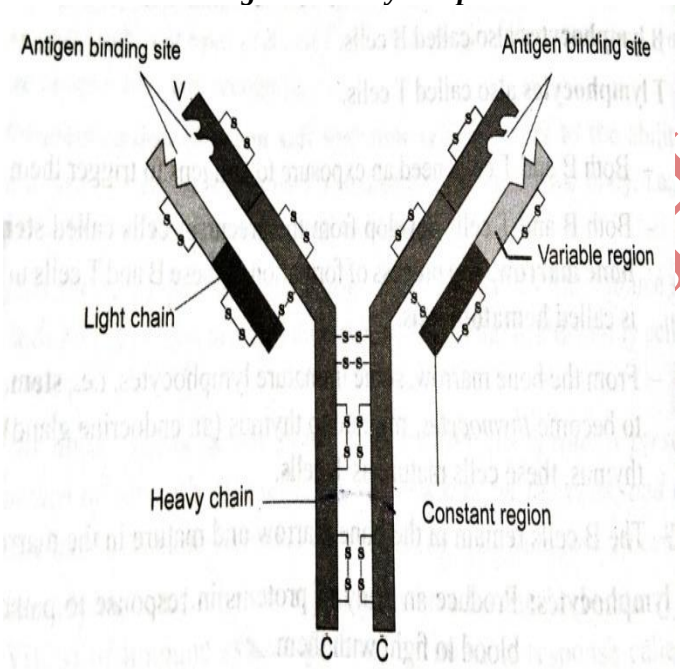
to produce specific antibody which interact with antigen and destroy them or make them inactive).

Antibody:

- Antibodies are **protein molecule** (*i.e. immunoglobulin Ig*) produce by **lymphocytes** which specifically ***inactivate an antigen***.

Structure of antibody

- Each antibody made up of **4 polypeptide chain** in which **2 identical short polypeptide** called ***light chain*** **(L-chain)** while **2 identical long polypeptide** called ***heavy chain*** **(H – chain)** and whole antibody represented as **H2L2**.
- The polypeptide chain of antibody molecule is bound together by **disulphide (-S-S-) bond** and form ***Y-shaped molecule***.
- Top tips of Y-shaped molecule are ***antigen binding site (F ab)*** which ***recognize and bind to specific antigen*** in lock and key fashion and form an ***antigen-antibody complex***.



Both the arm of Y have same antigen binding sites and recognize the same antigen.

- Each of the four chains has ***constant (C) region*** and ***variable (V) region***.
- The stem of the antibodies formed by constant region of the heavy chains.

Types of Antibody

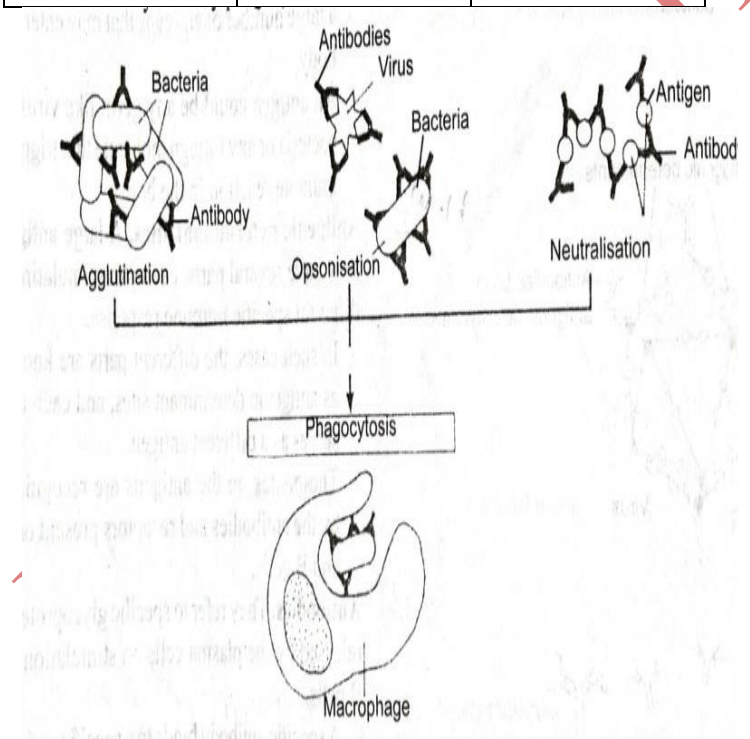
- In mammals including human have five different classes of heavy chain which form five type of antibodies or immunoglobulin's (i.e. IgA, IgD, IgE, IgG, IgM).

Types of Antibodies	**Location**	**Function**
Ig-A	Present in extracellular secretion (*i.e. saliva and mother's milk*)	Attack pathogen before they reach blood stream.
Ig-D	Present as a receptor on B lymphocytes. Found in circulation in extreme low quantity.	Serve as **receptor for antigen on B lymphocytes, Activation of B cells**.
Ig- E	Present as membrane bound receptor on basophils in blood and mast cell in tissue.	Promote the release of ***histamines*** and other antigen in allergic reactions.
Ig- G	Abundant fund in blood plasma in circulation. Only antibody that can cross placenta	***Stimulate phagocytes***. ***Attack on pathogen*** *(i.e. virus and bacteria)* ***and bacteria toxin***. *Provide* ***passive immunity to foetus***.
Ig –M	Present as receptor on lymphocyte surface	***Secrete during primary response***, *cause* ***activation of B cells*** *and promote* ***clumping of cells*** *by causing antigen containing particle to stick together.*

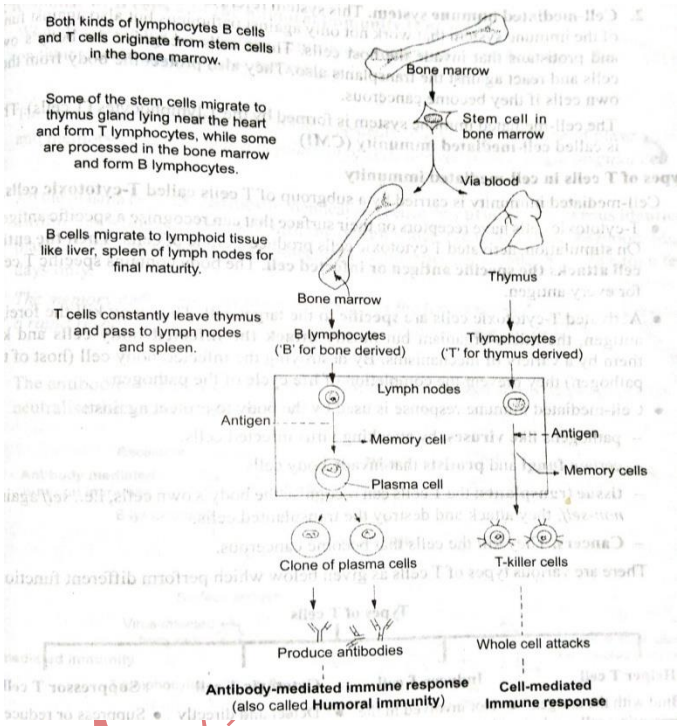
Mechanism of antibody action

- Antibody present in immune system by binding with cell membrane of B cells or may remain free.
- These free antibodies destroy or neutralize the living microbes by forming antigen-antibody complexes in following mean.

Agglutination	Opsonisation	Neutralisation
It means the clumping of bacteria, viruses or foreign cells. These clump of foreign cell s hold by antibody which macrophages to capture and destroy the by phagocytosis.	It mea the coating of bacteria or viruses to facilitate their subsequent phagocytosis by macrophages.	In this antibody physically block the harmful antigens or the toxin release by bacteria and make them harmless which destroyed by phagocytosis.



Formation of T- Lymphoctes and B lymphocytes and their action in the immune system



Component of Acquire immunity

1. **Humoral immune system or antibody mediate immunity:**

- It is made up of various type of **specific antibodies** which present in ***blood plasma and lymph***.
- This antibody (Ig) defense against specific antigen when they enter into blood and lymph.
- ***B lymphocytes*** involve in humoral immune system.

2. **Cell mediate immune system or cell mediated immunity:**

- It is very high specialized cell of immune system that works not only against pathogens but also against ***fungi and protista*** which invade the host cells.
- It recognizes the body s of **our cells** (*i.e. if they become cancerous)* and also react with **transplants** also.
- In cell mediated immunity ***T- lymphocytes*** are involve.
- It also called cell mediated immunity (CMI).

Types of cells in cell mediated immunity

- CMI carried out by various subgroup of ***T-cells or T-lymphocytes cells***.
- T-cells have **receptors** on their surface that ***recognize a specific antigen and stimulate to***

active T-Cells for production of **clone cells** (*i.e. attacks the specific antigen or infected cells*).

- Cell mediate immunity response are used by body to protect against-

1. Pathogens (i.e. virus)
2. Certain fungi and protists
3. Tissue transplants
4. Cancers.

 # T-cells which become memory cell remain in lymph nodes and persist even after the antigen has destroyed and respond in any further attack by same antigen.

Types of T-cells

Various types of T-cells formed which perform different function:

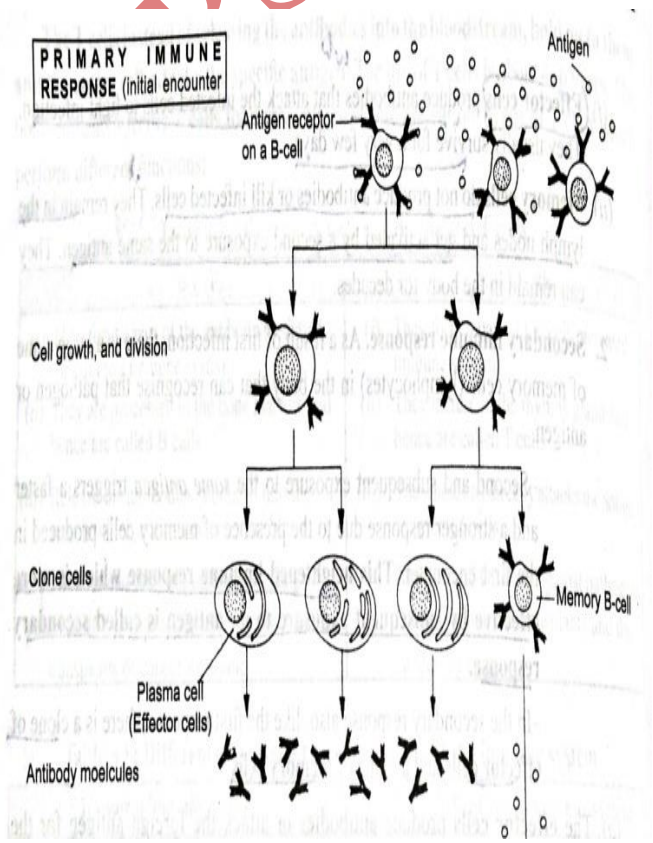
Helper T-cell	- It binds with antigen presenting cells and detecting infection as well as stimulates the production of both B-cells and cytotoxic T-cells. - It secretes lymphokine (*i.e. messenger molecule*) which recruits other WBCs to the battle site. **Example of lymphokines secreted by T - cells** : Interlukin, Granulocytes-monocyte colony stimulating factor, Interferon
Inducer T – cell	- It is not involve in *immediate response to infection* and *mediate the maturation of T-cell* in thymus.
Cytotoxic T- cell	- It directly or indirectly kill the *infected body cells* by releasing or secrete Perforins (*i.e. hole forming protein*) that punch large round holes in membrane of attacked cells.
Suppressor T –cell	- It suppress or reduce the activity of *T and B cells* after the infection has been controlled

Primary and secondary immune responses

1. Primary immune responses:

- Immune response which generate after first time encounter of pathogen is known as primary immune response.
- It is weak immune response and very few lymphocyte expose to an antigen.
- Expose of antigen tiger reaction and two types of cells are formed:

1. ***Effectors cells*** (*i.e. produce antibody which attack the infected cells to fight infection*)
2. **Memory cells** (*i.e. it do not produce antibody or kill infected cells and remain in lymph nodes and get inactivated by second exposure to same antigen).*

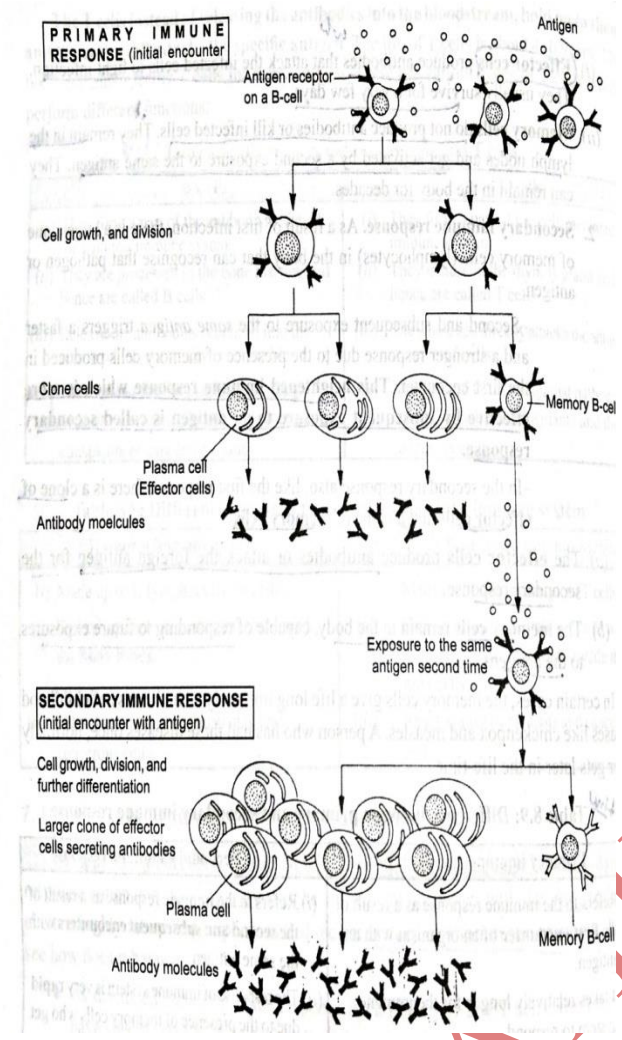


2. Secondary immune responses:

- The subsequent encounter (*i.e. after first encounter)* with same pathogen elicited a highly intensified response celled **secondary or anamnestic response**.

OR

Heightened immune response which is more effective by subsequent expose to an antigen is called secondary response.



- Secondary response also formed **effectors cells** *(i.e. produce antibody or attack the foreign antigen for the secondary response)* and **memory cells** (*i.e. remain in body and responding the future exposures to the antigens*).

Active and Passive Immunity

1. Active Immunity:

- When host is ***exposing to antigen*** (i.e. living or dead microbe or protein) results ***production of antibody inside the host body*** is called **active immunity**.
- It is ***last for long time*** because *manufacturing of antibody against antigen occurs inside the host body which results formation of* ***memory cells*** *(i.e. produce immune response in subsequent expose of same antigen*).
- On the basis of mechanism for development of acquire immunity it could be categorized into two types:

a) Natural Acquire Active Immunity:

- In this immunity **acquire** due to ***infection after entry of pathogen in the body.***
  Example: person who has recovered from attack of **measles or COVID -19** develop natural acquire active immunity to measles for life time or COVID -19.

b) Artificial Acquired Active Immunity:

- Here ***immunity is acquired artificially by vaccination*** (*i.e. vaccine introduce into the body to stimulate the formation of antibody by immune system*).
  Example: ***Polio vaccine, BCG vaccine and hopefully COVID -19***.

2. Passive immunity

- In this immunity is acquired when ***readymade antibody are received by the host*** body.

OR

Own body does not produce the antibody and **readymade antibody** (***i.e. produce in some other organism)*** are introduce to protect the body against disease.

- Passive immunity can be acquiring either by naturally or artificially.

a) Natural Acquire passive immunity

- Transfer of ***maternal antibody in to foetus*** (*i.e. through placenta before birth*) and ***infant*** (i.e. *through colostrums after birth*).

b) Artificial acquire passive immunity:

- In this immunity develop by ***injecting previously prepared antibody*** by using ***serum from human or animal***.

Example:

1. Antibody obtained from ***hyper immunized horse*** (*i.e. disease causing bacteria or virus is introduce into animal body an soon antibody appear in serum of horse*) are injected to human against ***tetanus, diphtheria, rabies or salmonella***.

2. ***Plasma therapy of COVID – 19***.

Vaccination and Immunization

- It is a process in which ***active immunity is induced in healthy person*** by ***administrating a vaccine to*** ensure that the *possible future*

infection does not take place is known as vaccination or immunization.

OR

It is procedure of ***Injecting harmless microbe in order to confer resistance*** to dangerous one.

***Principal of immunization or vaccination is based on the property of memory of the immune system.***

- First vaccination is performed by ***Edward Jenner in 1796***.
- **In vaccination** - a ***vaccine is introduced into the body*** that *stimulates the immune system in a way that it not only produces antibodies but also to generate large number of T or B memory cells*.

Example : if a person is infected with some deadly microbe in which quick response is required we need to directly inject performed antibody or antitoxin like in case of ***tetanus and snake bite*** the injection that is given too the patients that contain antibody against tetanus or snake venom so this type of immunization is called ***passive immunization***.

Vaccine

- It is ***the preparation of killed, inactivated or attenuated microorganism or toxin*** which induce immunity.
- First vaccine construct of wreaked microorganism against chicken were develop of in ***1880 by Louis Pasture.***
- ***Toxoid*** is used to ***induce active immunity to toxin-caused diseases*** (***like tetanus, botulism, diphtheria***) and ***attenuated germs*** are used to ***protect against poliomyelitis, yellow fever, measles smallpox and many other viral diseases.***
- Type of vaccine are ***attenuated whole –agent vaccine, inactivated whole agent vaccines, toxoids, conjugate vaccine*** etc.

Vaccine	**Age group**	**Diseases**	**Safety**
DPT-Hib	*2,3 and 4 month*	*Diptheria, tetanus, hopping cough and haemophilus influenza type b (Hib)*	*Between 90 and 99%*
Hepatitis B	*All whose closely related have hepatitis B*	*Hepatitis*	*Not yet known*
Polio	*2,3, and 4 month*	*Polio*	*Almost 100%*
BCG	*All children between 10-14 years*	*Tuberculosis (TB)*	*70%*

Immune system Disorder

1. Allergic or Hypersensitivity:

- Exaggerated response of the immune system to certain antigen present in environment.
- Antigens that cause allergy are called ***allergens*** (*e.g. pollen grain, dust, feathers, fur and fungal spores*).
- Symptom rashes on the ***skin, watery eyes, running nose, sneezing or breathing in difficult***.
- ***Antibody E,*** trigger allergy by ***combining with antigen and surface of mast cells***.

Allergies are treated with drug like ***antihistamines*** in case of normal allergic reaction and ***epinephrine*** in case of anaphylatic shock.

2. Inflammation:

- *Damage of body tissue* triggers a defense response called **inflammation**.
- It cause by **microbial infection, physical agents** (*i.e. heats, radiant, energy, electricity or sharp objects*).
- **Symptom – *redness, pain, heat, swelling***.
- It help *to destroy the injuries reagents, limit the effects of injurious agent on the body by confining or walling off, to repair and replace tissue damaged by the injurious agent*.
- **Pyrogens –** substance that tend to cause a rise in body temperature that release by WBCs and set the body thermostat at high temperature.
- ***Aspirin*** antipyretic drug which bring ***down fever*** (***i.e. pyrogenic response***) quickly by lowering the body temperature.

3. Autoimmune diseases:

- When the action of immune system is in respond to self antigen and cause damage of own organs results autoimmune diseases.

OR

- When immune system can distinguish between self and non self and does not produce antibody against self but when this self recognition system fails results autoimmune diseases.
- It lead production of ***antibody or response*** by ***sensitized T-cells against person own antigen*** hence destroying its own body system.

  Example : chronic anemia (*production of antibody against own RBCs*), **Insulin dependent diabetes** (*immunological destruction of insulin secreting cells of pancreases*), **rheumatoid arthritis** (*immune complexes of IgM , IgA and complement are deposited in the joints*), **chronic *hepatitis***(*destruction of liver cells*), **myasthenia gravis** (*destruction of muscles*), **grave disease** (*cause by antibody*), **glomerulonephritis** (*inflammation damage to kidney glomeruli viz. site of blood filtration*), **multiple sclerosis** (*caused by antibody that attack the myelin sheet of nerve cells*).

4. <u>Immunodeficiency diseases:</u>

- It is deficiency of immune system in which children born without T and B cells lack the ability to fight against the diseases so that they are highly prone to infection.
- It is cause due to gene mutation, infections, malnutrition and accidents.

  Example:

1. ***Severe combined immunodeficiency*** (absence of both B and T cells)
2. ***Chediak – Higashi disease*** (lysosome of phagocyte fail to unite with microorganism)
3. ***X-Linked infantile (Brutons) agammaglobinemia*** (fail to form B-cells decreased immunoglobulin).
4. ***Thymic aplasia (DiGeorge's syndrome)*** – defective thymus causes deficiency of T-cells.

<u>Acquired Immune Deficiency Syndrome</u>

- AIDS is due to the ***deficiency of immune system*** and acquired during lifetime of individual and it is not a congenital disease.
- It was ***first reported in 1981*** and in last 25 years it has spread all over the world and killing more than 25 million people.
- It caused by virus that can ***passed on from one person to another*** during ***sexual contact or through sharing of intravenous drug, needle and syringes***.

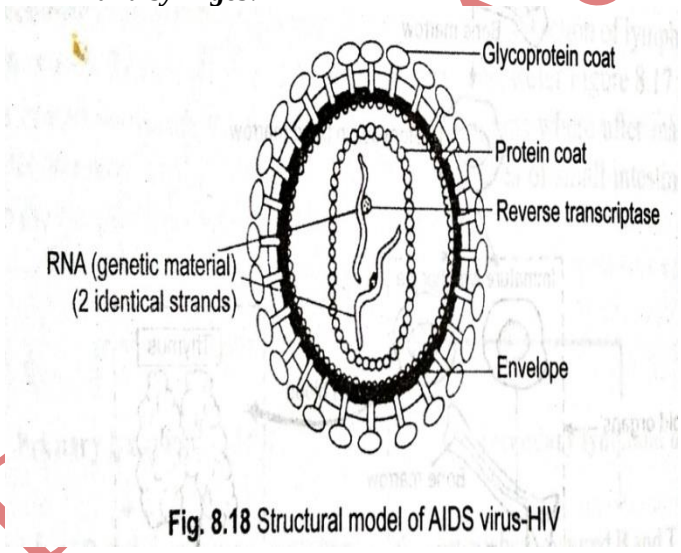


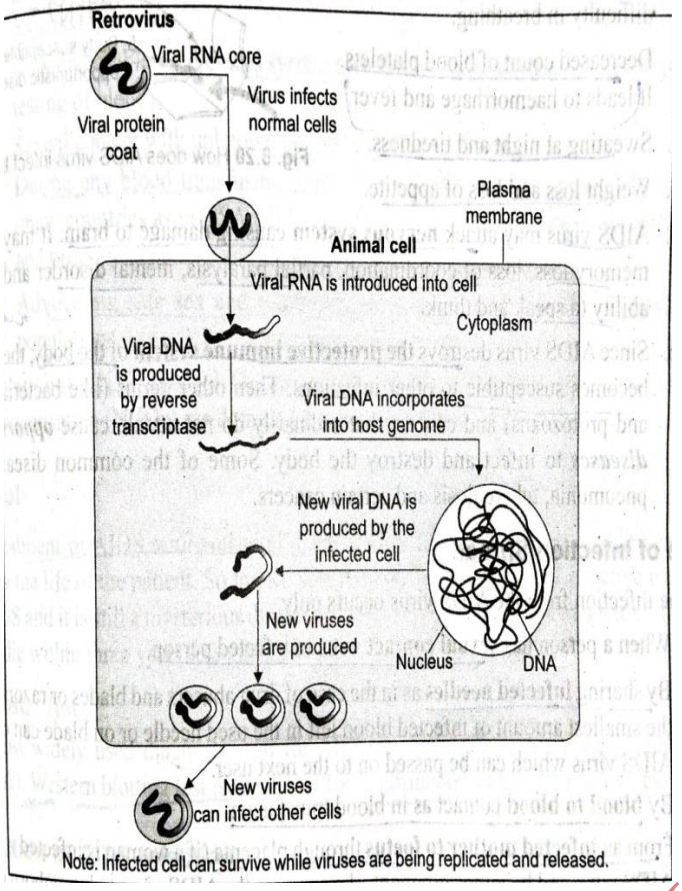
Fig. 8.18 Structural model of AIDS virus-HIV

- AIDS is immune deficiency disease caused by ***retrovirus*** *(i.e. human immunodeficiency virus*) that has RNA as genetic material.
- HIV have ***ability to make RNA copies of themselves*** which can be ***recopied to make double stranded DNA*** that can be integrated randomly into the one of the chromosome of host DNA.

<u>Infection by HIV</u>

- HIV selectively infects and ***kills T- helper cells*** which make the ***weak acquired immune response*** of the body.
- HIV attached and binds with the **plasma membrane of the T-helper cell** (***i.e. macrophages)*** and enter into the cell and by using ***reverse transcriptase*** (i.e. enzyme) and make cDNA copies of its genetic material.
- The *single strand DNA replicates into double strand DNA and* ***integrate into host cell DNA*** where it directs the production of viral RNA.
- Each strand of viral RNA brings the synthesis of viral proteins which lead the assembly of RNA strand and protein and give rise many viruses that released from the host cell before its dies.

Macrophage acts like an HIV factory.



Sign and Symptoms:

- Swollen lymph nodes and fever.
- Decrease count of blood platelets (i.e. lead the hemorrhage and fever).
- Sweating at night and tiredness.
- Weight loss and loss of appetite.
- AIDS virus attack nervous system cause damage to brain which lead memory loss, loss of coordination, partial paralysis, mental disorder and loss of ability to speak and think.
- Destroyed the protective immune system of body and person become susceptible to other infections.

Mode of infection / spread:

- Sexual contact with an infected person.
- By sharing infected needles.
- By blood to blood contact as in blood transfusion.
- From infected mother to foetus through placenta.

High risk groups:

- The high risk group who become infected with AIDs are – homosexual men, bisexual men, male and female intravenous drug user, individual who required repeated blood transfusions, children born to a HIV infected mother.

Prevention:

- Use of fresh new blade at the barber's shop and common razor should not be used.
- Only disposable needles and syringes should be used.
- Sexual contact with unknown people should be avoided.
- During any blood transfusions blood transfused should be tested.
- Advocating safe sex and promoting regular checkup for HIV in susceptible populations.
- Education people about AIDS

Diagnosis:

- Most widely used diagnostic test for AIDS is **Enzyme linked immunosorbent assay (ELISA)** and **Western Blotting test** is also ***employed for the confirmation of ELISA positive cases***.

Treatments:

- First and most commonly used drug to treat AIDS is ***AZT (Azidothymidine), DDC (Dideoxycyriidine) and D4T (Stavudine)***.
- Another group of anti-HIV drug are protease inhibitors like ***Saquinavir (Invirase), indinavir (Crixivan) and Ritonavir***.

Vaccines:

- Considerable effort has been made but still vaccine is not available against HIV.
- Two glycoprotein's called ***GP120*** and ***GP41*** from the envelop spikes are investigated as possible vaccines.

Cancers

- **Cancer** is an ***uncontrolled growth and proliferation of the cells*** of the body.
- It is not a ***contagious disease***.
- Normally the body cell division is *highly regulated and show balance between the formation of new ells and cell deaths* because they ***exhibit a property of contact inhibition.***
- But the ***cancer cell suddenly start multiply uncontrollably*** and do not respond to ***normal growth mechanism*** and show ***breakdown of regulatory mechanism*** between cells because they ***do not respond to contact inhibition***.

- The continue division of cells results ***mass of cells*** called ***neoplasm*** (*i.e. abnormal mass of tissue that results when cells divide more than they should*) which give rise tumors.
- **Tumor** is ***mass of neoplasm*** which ***increase in size and disrupt the normal cells***.

Type of Tumors

Benign or non-malignant tumors:

- It enclosed in a connective ***tissue*** which results confined ***to the site of their origin***.
- They may grow in size but ***do not spread to other part of the body***.

Malignant tumors:

- It dose not enclosed in ***any specific tissue*** and ***not confined to the original tissue***.
- They ***carried by blood or lymph*** to other part of body and ***show metastasis***.

Type of cancers	
Carcinomas	Malignant growth of **epithelial tissue** that covers or lines the internal body organs or gland. **Example:** *skin, breast, lung and stomach cancer*.
Melanomas	These are the cancerous growth of **melanocytes** (i.e. type of *skin cells* that contain pigment melanin) **Example:** *type of skin cancer*
Sarcomas	Malignant growth of ***connective tissue*** that derive from primitive mesoderm. **Example:** *bone, muscle fat or cartilage cancer*
Leukemias or Lymphomas	Cancer of tissue in which ***blood or lymph*** is formed i.e. tumors of ***hematopoietic cells***. Or ***Blood cancer*** Lymphoma is ***cancer of lymphatic tissue*** **example** – *lymph nodes.*

Cause of cancer

- Agents that produce the cancer are known as carcinogen.

1. ***Overexposure to ionizing radiation*** (i.e. X-rays, UV rays and gamma rays).

2. ***Chemicals*** (e.g. nicotine, caffeine, steroids, air pollutant.

3. ***Chronic physical abrasions of skin***.

4. ***Irrigation of buccal epithelium by chewing betal leave pr tobacco or irrigation to lung epithelium by heavy smoking may cause mouth or lung cancer***.

5. ***Viral oncogenes*** (i.e. viruses having oncogene).

6. ***Cellular oncogenes***.

Cancer and Oncogenes

- Cancerous cell have certain **gene** that can be *incorporated into viruses* from where ***they transmitted to the healthy cells*** called ***oncogenes***(*i.e. cancer causing genes*)
- Oncogenes also have been ***found in normal cells but remain inoperative*** called ***proto oncogenes***.

Type of cancer-associated genes:

1. Gene that induced cellular proliferation (e.g. gene encoding growth, growth factor receptor and transcription factor)

2. Gene that inhibit cellular proliferation like tumor suppressor genes.

3. Gene that regulate programmed cell death.

All above gene are involve in the normal growth but cause cancer due to mutation due to that mutated cells proliferate uncontrollably and give rise tumor or cancerous growth.

Cancer warning signs

- Rapid weight loss without apparent cause.
- A scab or sore or ulcer that fails to heal within 3 weeks
- Severe recurrent headaches
- Difficult in swallowing
- Persistent hoarseness
- Coughing up blood sputum
- Persistent abnormal pain
- Change in shape and size of testis
- Blood in urine, with no pain on urination.
- Lump or change in breast shape
- Bleeding or discharge from nipple
- Vaginal bleeding or spotting between periods or after menopause.

Detection and diagnosis of cancer

The diagnosis of cancer is usually done by:

1. **Biopsy** (i.e. a piece of the suspected tissue cut into thin section is stained and examined under microscope by pathologist).

2. **X-ray, CT (computed tomography) and MRI (magnetic resonance imaging)** are very useful to detect cancers of internal organs.

3. **Histopathological study** of the tissue, blood and bone marrow.

Treatment of Cancer

1. **Surgery:**

   It is removal of cancerous cells surgically and useful in breast tumour or uterine tumour).

2. **Radiotherapy:**

   It is bombardment of X-rays on the cancer cells that damage or destroy the cancer cells and cause minimum damage to the surrounding normal tissue.

3. **Chemotherapy:**

- In that the anti-cancer drugs are used to produce more and more injury to cancer cells than normal cells which interfere with the cell division and growth of both normal and cancerous cells.
- It may lead to hair loss or anemia but both get corrected after the treatment is stopped.

4. **Immunotherapy:**

- Antibiotics are used to prevent the infection or transfusion is given to check the anemia.
- Also natural anti-cancer immunological defense mechanism is strengthened by monoclonal antibodies.

Transplantation

- It is ***the replacement of a diseased organ or tissue with the living healthy organs and tissue*** between donor and recipients.
- In the transplantation the ***recipient body recognizes the transplanted organs as a foreign body or antigen*** and produce ***antibodies*** against it which cause the ***destruction of the transplanted organs or rejections***.
- The transplanted organ or tissue can be prevented from rejection by -

1. **Using immunosuppressant –** (*i.e. counteract the immune system and stop the production of antibodies against the transplanted organs but they also inhibit the body normal immune response to disease causing organism*). **Example** – **cyclosporine A** and **tacrolimus.**

2. **Taking the transplant organs from siblings –** *it has more chances for acceptance because of comparative similar genetic constitution.*

3. **By using X-irradiation on bone marrow and lymph tissues –** *which suppresses the blood cell production and slow the phenomenon of rejection*

Tissue Typing

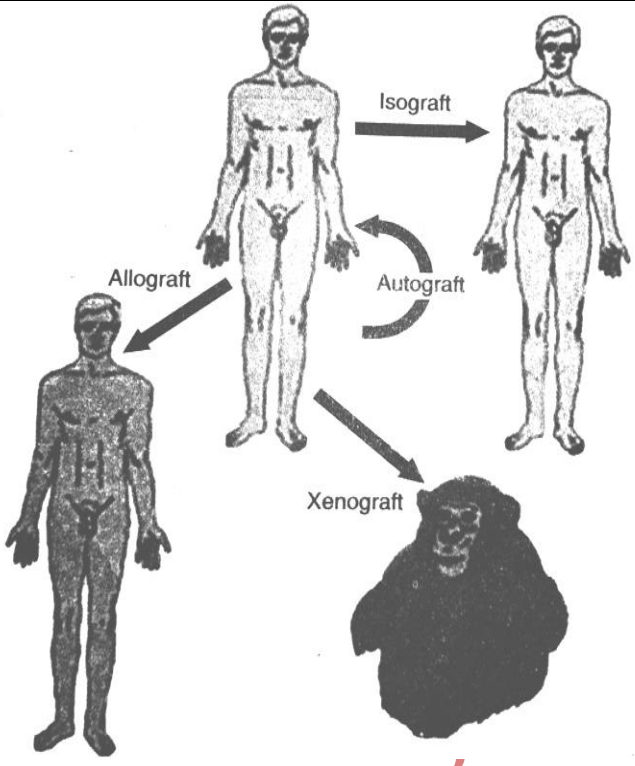
- **For the success of the organs transplants** the ***tissue typing or proper matching of antigens in donor and recipients*** is important.
- It is procedure in which ***the tissue of a prospective donor and recipient are tested for incompatibility*** prior in transplants.
- **Major histocompatibility complex** (*i.e. cluster of genes*) present on *chromosome 6* which in human called ***human leukocyte antigen (HLA) complex*** determined the **histocompatibility** (*i.e. compatibility between the donor and the recipient's tissue in transplants*).

If HLA protein are matched properly then the chances of survival for transplanted organ increases.

Type of transplants (grafts)

Autograft	In this *own tissue* is grafted to another part of the body. Example: *skin grafted from one part of the body to another part* of the body.
Isograft	For this transplantation *genetically identical donor* and recipients are required. Example: Graft between *identical twins*

Allograft	Transplant between *individual of the same species but different MHC/HLA* Example: Success depend on the *matching and administration of immunosuppressive* drugs.
Xenograft	Transplant between the *animals of different species* Example: It use only *human graft are not available*.



Adolescence

- Time of shifting from the immaturity of childhood into the maturity of adulthood.

OR

- Period which extends from puberty to complete sexual maturity (i.e. in girls 10-18 years and in boys 12-19 years).
- Important changes associated with adolescence are –

1. Accelerated physical growth

2. Development of reproductive organs

3. Behavioral changes in adolescents (i.e. emotional adjustment – self identity and self respect; frequent shifting of mood s and emotional turbulence due to increase production of hormone.

4. Addiction to drug, alcohol or tobacco due to per group, curiosity , advertisement, frustration, depression, feeling of independence and false believe of enhance physical mental and intellectual performance.

5. Social and moral implication like physiological and behavioral changes and expected to understand the social and moral value of society.

Drug Abuse

- Any chemical substance which when taken into the body and alter the way of boy function by modifying one or more mental or physical function.
- it use in number of ways:

1. *As a medicine to prevent or cure a verity of disease.*

2. *Promote better physical and mental health.*

3. *Use as alleviated anxiety, reduce pain or insomnia.*

4. *Use to alter the mood*.

- Self mediation is very harmful because mood altering drug have risk that patient become totally dependent on them and this is called ***drug dependence***.
- Some drug makes forms habit of consumption called **psychotropic drugs.**
- Psychotropic drugs act on brain and affect its normal functioning and slow down or interfere in the functioning of nervous system that result alteration in behavior, consciousness and power of perception which impair the person's judgment.
- Psychotropic drug classified into four categories: ***sedative and Tranquillisers, Opioids, Stimulants, Hallucinogens.***

Sedative and Tranquillisers

- These drug have ***depressing effect*** (*i.e. switching off)* on the activity of brain and

produce a feeling of ***calmness, relaxation or drowsiness.***

- In high dose **sedative** induce *sleep* and **tranquillizers** *reduce tension and anxiety without inducing sleep*.
- ***Barbiturates*** is most important ***sedative hypnotics*** (i.e. sold under the trade names Nemutal, Seconal, Tuinal and Amytal) which act on ***cerebra l cortex midbrain and hind brain*** and *reduce anxiety and induce drowsiness and sleep*.

Opioids

- It is obtained from the unripe seed pods of ***poppy plant***.
- It has an ***analgesic effect (painkilling), reduce anxiety and tension and lower the blood pressure and breathing rat***e.
- It has derivative like ***morphine*** (*has sleep and dream inducing properties*), ***Codeine*** (*used in cough syrup*), ***heroin*** (*narcotics*), **brown sugar or diacetylmorphine hydrochloride** (*i.e. more powerful analgesic than morphine*).
- Injection of opiods produces sudden pleasurable sensation.

Stimulants

- It is drug that temporarily increases the ***mental alertness, self confident and excitement***.
- It increases the activity of brain by initiating the release of noradrenalin.
- There are two main group of stimulant drugs like

1. ***Central nervous stimulants*** e.g. **amphetamine** (*i.e. reduces drowsiness and increase alertness by their action on the reticular activating system in the brainstem*).

2. ***Respiratory stimulants*** e.g. ***analeptic drugs*** (i.e. it act on the respiratory center in the medulla).

- ***Caffine*** is constituents of coffee tea chocolate etc which stimulate nerve cell metabolism, increase alertness and decrease fatigue and boredom, increase speed of heart or BP and urine formation.
- ***Amphetamines and cocaine*** are strong stimulants which include ***Benzedrine, Dexedrine and Methedrine*** which have similar properties like epinephrine and cause graet brust of enrgy that can overcome the feeling of fatigue.

Hallucinogens

- It also called psychedelic drugs such ***as LSD, marijuana, mescaline and psilocybin***.
- ***LSD*** is the one of the most dangerous hallucinogens which synthesized from lysergic acid produce by Ergot fungus.
- Initial reaction of LSD includes ***weakness dizziness and nausea***.
- The active ingredient in marijuana is ***tetrahydrocannabinols***.
- Smoke of marijuana has ***lung irritant and with regular use can bronchitis*** and temporarily ***reduces sperm production and cause production of abnormal sperm***.

Effect of drug abuse

- The side effect of use of anabolic ***steroids*** are :
- **In female:** ***masculinisation*** *(feature like male), increase aggressiveness, mood swings, depression, abnormal menstrual cycle, excessive hair growth on the face and body, enlargement of clitoris, deepening of voice.*
- **In male:** acne, increase aggressiveness, mood swings, depression, reduce of size of the testicles, oligospermia (*decrease sperm production*), potential for kidney and liver dysfunction, breast enlargement and premature baldness, enlargement of prostate gland etc.

Alcohol abuse

- Various type of alcohol manufacture by process of ***fermentation (i.e. Methyl alcohol, isopropyl alcohol, Ethyl alcohol***).
- ***Ethyl alcohol*** is also called drinking alcohol which is produce by the ***action of yeast on sugar (****i.e. Sugar from fruit, grains etc*).
- Alcoholism refers to ***chronic dependence on alcohol*** in which person who is dependent on alcohol is called ***alcoholic***.
- Alcoholic are heavy drinker due to that the *amount of alcohol in their blood keep rising and the nervous system gets affected* which results *distortions of vision, wobbly walk and garbled speech.*
- **Reason for the alcoholism are:**

1. Social and peer group pressure.

2. Just for the sake of fun and excitements.

3. To get a feeling of independence.

4. To relieve tension.

Effect of alcohol on Individuals

- Alcohol is a depressant which has ***anesthetic effects and act on CNS*** by affecting ***brain cortex*** which causes the *loss of judgment, and will power, vision gets distorted, muscular control being to disappear, decrease the blood sugar level which may lead permanent damage of nerve cells*.
- **Liver synthesis fat from alcohol** that *affect the production of enzyme and protein*, and also **convert into acetaldehyde** which cause **fatty liver syndrome** (*i.e. swelling in liver*) which may reach up to **cirrhosis** (*i.e. serious degradation of liver cells*)?
- Alcohol causes the *increase flow of gastric juice* which causes **gastritis** (*i.e. painful inflammation of stomach lining*).
- **Oxidation of alcohol in the cell** produce **water** which lead ***dehydration of tissue*** (*i.e. Excess water come out though skin during heat elimination*) and accumulation **of nitrogenous wastes in kidney** which affects the normal elimination of wastes by kidney.

Effect of alcohol on society

- Accident by drunk driver is on increase the cities and highways because of *impairment of judgment of distance, lack of alertness, blurred vision, increase reaction time and careless and discourteous behaviors*.
- Alcohol drinking ***impairs judgment*** which results *innocent youth are led to crime under the influence*.
- Alcohol reduces the ***mental resistance and self control*** which *give birth to number of corrupt practices in the society*.
- Alcoholism leads the ***more violence in society*** *because people become less tolerant and start using abusive language and react impulsive without thinking about its repercussions*.
- Alcohols spread ***anti-social and illegal activities*** like *distillation and sale of spurious liquor*.

Addiction and Dependence

- **Addiction** is psychological attachment to certain effects such as euphoria and temporary feeling of well being associated with drug and alcohol.
- Addiction drives people to take even when these are not required or even when their use becomes suicidal.
- In addiction - ***frequent intake of drug increase the tolerance level to receptor*** present in our body which results the ***receptor respond only high doses of drugs or alcohol*** that lead great intake and addiction.
- **Dependency –** it is the tendency of the body to manifest a characteristics and unpleasant withdrawal syndrome if regular dose of drug/ alcohol is abruptly discontinued which characterized by anxiety, shakiness, nausea and sweating.
- Dependence leads the patients to ignore all social norms in order to gets sufficient funds to satisfy his/ her needs which results in many social adjustment problems.

Home work

Assignment on smoking and tobacco cover following topic – short and long term effects of tobacco.