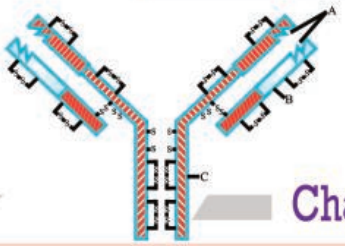
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CLASS XII BIOLOGY NOTES

Key Notes and Important Questions with Answers

HUMAN HEALTH AND DISEASE





Chapter - 8 Human Health and Disease

Addiction : A psychological attachment to effects like euphoria and temporary well being associated with drugs and alcohol.

Carcinogens : Cancer causing agents e.g., gamma rays, UV rays, dyes and lead.

Interferon : The glycoproteins produced by our body cells in response to a viral infection.

Incubation Period : The time period between infection and first appearance of symptoms.

Metastasis : The property in which the cancer cells spread to different sites through blood and develop secondary tumours.

Oncogenes : Viral genome which causes cancer/Cancer causing genes.

Retrovirus : A virus having RNA as genetic material and forms DNA by reverse transcription and then replicate e.g., Human Immunodeficiency Virus (HIV).

Sporozoites : The infective stage of protozoa Plasmodium which is injected into human blood through saliva of female Anopheles mosquito.

Withdrawal Syndrome : If a drug dependent person stop taking drugs then his body stop functioning normally and he feels severe physical and psychological disturbance called withdrawal syndrome.

Contact Inhibition : It is a property of normal cells in which the cells stop dividing when comes in contact with its surrounding cells.

Abbreviations

PMNL	:	Polymorpho-Nuclear Leukocytes
CMI	:	Cell Mediated Immunity
ELISA	:	Enzyme Linked Immunosorbent Assay

HLA	:	Human Leukocyte Antigen
MALT	:	Mucosal Associated Lymphoid Tissue
SCID	:	Severe Combined Immuno Deficiency
NACO	:	National AIDS Control Organisation
MRI	:	Magnetic Resonance Imaging

- **Health :** The state of complete physical, mental and social well beings
- Goods health can be achieved by
  - (i) Awareness about disease and their effects on different body functions.
  - (ii) Vaccination
  - (iii) Control of vectors
  - (iv) Proper disposal of wastes
  - (v) Maintenance of hygienic food and resources,
- **Infectious Diseases**
  - (i) Viral Diseases—e.g., polio, common cold, measles, rabies
  - (ii) Bacterial diseases—e.g., Typhoid, Pneumonia, Diptheria, Tetanus.
  - (iii) Fungal diseases—e.g., Ring worm & Scabies
  - (iv) Helminthic diseases—e.g. Ascariasis, Filariasis, Taeniasis
  - (v) Protozoan diseases—e.g. Malaria, Amoebiasis.

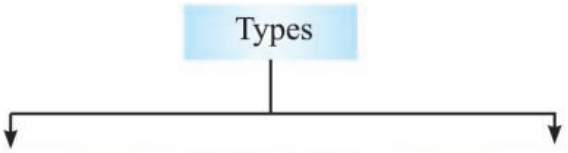
Disease	Causative Agents	Symptoms
1. Common cold	*Rhinoviruses*	Nasal congestion and discharge, sore throat cough, headache, tiredness and hoarseness.
2. Typhoid	*Salmonella typhi*	sustained higher fever, stomach pain, loss of appetite, constipation, headache.
3. Pneumonia	*Streptococcus pneumoniae* and *Haemophilus influenzae*	fever, headache, cough, chills in sever cases finger nails may turn grey to bluish in colour

4. Malaria	*Plasmodium viz P. malaria, P. vivax. P. falciparum*	acute headache, muscular pain, feelings of chillness and shivering, nausea and high temperatures.
5. Amoebic dysentry	*Entamoeba histolytica*	Adbominal pain, cramps, stool with excess mucus and blood clots, constipation.
6. Ringworm	*Microsporum, Epidermophyton and Trichophyton*	Dry scaly lesions on skin, nails and scalps itching
7. Ascariasis	*Ascaris lumbricoides*	Anaemia, muscular pain, internal bleeding, insomnia, blockage of intestinal passage.
8. Filariasis or Elephantiasis	*Wuchereria bancrofti* and *W. malayi*	Fever, blockage of lymphatic vesles, enormous swelling of affected part viz. arm, foot, leg.

Dengue

Caused by—Viruses DEN-1, DEN-2, DEN-3, DEN-4

Vector—Female mosquito *Aedes aegypti*



Classical Dengue fever Symptoms-high fever, headache, backache, joint pains, muscles pain, chill and rashes on arms, chest, back.	Dengue Haemorrhagic fever Symptomes-high fever, nausea, vomiting, abdominal pain, palpable liver, internal bleeding, fall in platelets **Drugs :** Paracetamol + blood platelet replacement Aspirin and dispirin is harmful.

Chikungunya

Caused by—*Alpha virus*

Vector—mosquitoes (*Aedes aegypti* and *A. albopictus*)

Symptoms—rashes on limbs and trunk, asrthritis of multiple joints, fever (102–104°F), etc.

Drug—Chloroquine phosphate reduces impact of disease.

Treatment—Rest & increase in fluid intake.

Preventation of Dengue and Chikungunya : Protection against mosquitoes by wearing long sleeves and fullpants, window and doors should have wire gauze screens, use mosquito repellents and there should be no stagnant water nearby.

Life cycle of *Plasmodium*

(A) A Sexual Phase

- When female anopheles mosquito bites human sporozoites (infective stage) are injected into blood stream.
- Parasite reaches the liver cells and multiply.
- Liver cell burst releasing parasite into the blood.
- Parasite than enters into RBCs and multiply.
- RBCs ruptured and release haemozoin that causes symptoms of malaria like chill and high fever.
- Finally gametocytes develop in RBCs and are released in blood.

(B) Sexual Phase :

- Female *Anopheles* mosquito takes up gametocytes with blood meal from infected person.
- Fertilisation and development takes in mosquito's stomach.
- Mature infective stage (sporozoites) escape from intestine.
- Sporozoites migrate to the salivary gland.

Immunity : Resistance to infections or antigens.

Two types of immunities.

(i) Innate immunity : inherited by the organism from the parents and present at the time of birth. It consists of four types of barriers :

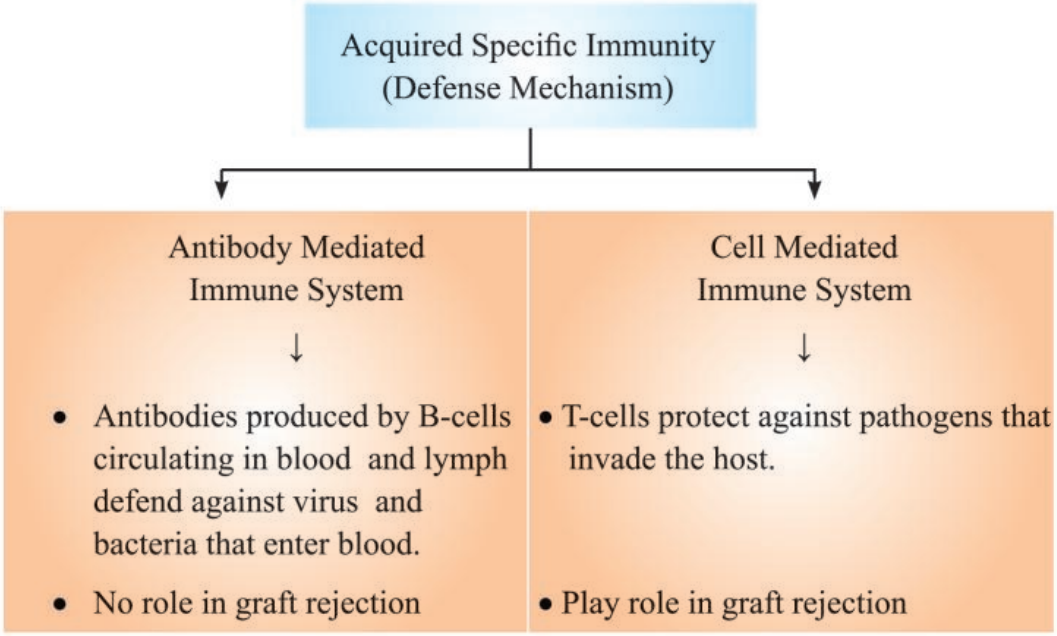
(a) Physical : e.g. skin, mucus coating of epithelium of respiratory, gastrointestinal and urinogenital tracts.

(b) Physiological : e.g. acid of stomach, lysozymes of saliva and tears

(c) Cellular e.g. PMNL, monocytes, neutrophils and macrophases

(d) Cytokine barriers : e.g. virus infected cells secrete proteins called interferons which protect non-infected cells from further infection

(ii) Acquired Immunity. Acquired by a person after birth by vaccination or contacting the disease.



- It is based on the principle of memory and immunity
- The antigenic preparations of proteins of pathogens or a solution of inactivated or weakened pathogens are introduced in the body.
- The antigenic properties are recognised.
- Cascade of reactions forms antibodies.
- History of reactions is stored as memory.
- Subsequent exposures result in intensified response.

Active Immunity	Passive Immunity
1. Body prepares antibody itself due to exposure of antigen (Pathogen) Example : Typhoid vaccination	Preformed antibodies are injected in the body in case of deadly microbe attack. Example : Anti-snake venom, ATS.
2. Immunity is not immediate	Very quick immune response.
3. It has very few side effects.	May show side effects like allergic reaction.
4. It lasts for long period.	It lasts for limited period.

Vaccination : A preparation of weakened or attenuated pathogen is introduced in the human body. Antibodies are formed against the pathogen. B and T memory cells are generated that recognises the pathogen quickly on subsequent exposure kills it with quick and massive production of antibodies.

Allergy : Exaggerated response of immune system to certain antigens present in the environment.

Allergens : Substances to which immune system shows exaggerated response.

e.g. mites in dust, pollens, animal dander, perfume, wool, nail polish and drugs.

Symptoms of Allergy : Sneezing, watery eyes, rashes, running nose and difficulty in breathing.

Auto Immunity : When the immune system of body starts destroying 'self' cells and molecules, called auto immune diseases e.g. Rheumatoid arthritis, multiple sclerosis and insulin-dependent diabetes.

Immune system in the body plays an important role in organ transplantation, allergic reactions and auto immune diseases.

Lymphoid Organs : Organs where lymphocytes are formed proliferate and mature are called lymphoid organs.

Bone Marrow : It is a primarylymphoid organ. Lymphocytes maturing here are called B-lymphocytes.

Thymus : Lymphocyte which matures in thymus are called T-lymphocyte.

Secondary Lymphoid Organs : Spleen, lymph nodes, tonsils, Peyer's patches of small intestine are secondary lymphoid organs.

MALT : (Mucosal associated lymphoid tissue) is a lymphoid organ present in the lining of respiratory tract, digestive tract and urinogenital tract.

AIDS-(Acquired Immuno Deficiency Syndrome)

- caused by HIV (Human Immuno deficiency Virus) which belongs to retrovirus category of viruses.

Modes of transmission

- By sexual contact with infected person
- By transfusion of contaminated blood and blood products
- By Sharing the infected needles
- From infected mother to child through placenta

Persons who are at high risk of getting infection include

- Individuals who have multiple sex partners.
- Drug addicts taking drugs intravenously, individuals who require repeated blood transfusions
- Children born to HIV infected mother.

Prevention of AIDS

- Using disposal syringes and needles, screening the blood of HIV, controlling drug abuse, free distribution of condoms and advocating safe sex.
- Main test for AIDS is ELISA (Enzyme Linked Immuno Sorbent Assay)

Cancer

- Cells loose the property of contact inhibition.
- Carcinogens induce the transformation of normal cells into cancerous cells e.g. UV rays, X-rays, gamma-rays, aniline dyes and tumour viruses, cadmium oxide, mustard gas, Ni & Cr compounds etc.
- **Two types of tumors,** (a) Benign—confined to the area of formation and do not spread to other parts, (b) Malignant—show metastasis i.e. cells of

these tumors can be carried by blood stream or lymph to other parts of body and form secondary tumors in neighbouring organs.

- **Treatment**—through surgery, radiotherapy, chemotherapy, immunotherapy.
- **Detection and diagnosis**—By radiography (X-rays), CT Scan, MRI, Biopsy.

Drugs

Criteria	Opiods	Cannabinoids	Coca alkaloids
Source	*Papaver somniferum* (Poppy Plant)	*Cannabis sativa* (Hemp Plant)	*Erythroxylum coca* (Coca plant)
Part of Plant	Fruits (Unripen Capsules)	Inflorescence, leaves resin	Leaves and Young twigs
Product	Opium, Morphine Heroin/Smack	Charas, Ganja Hashish, Marijuana	Cocaine (Coke/ Crack)
Mode of Intake	Snorting, Injection	Oral, Inhalation	Snorting
Effects (Property)	Neuro depressant, Slow down the functions of the body	Interact with cannabinoid receptors, Cardio-vascular system effects	Sense of euphoria interferes with neunotransmitters, Hallucination

Drug Abuse :

Adolescents are vulnerable for drug abuse

1. Need for adventure, experimentation
2. First use of drugs for curiosity but later uses to escape facing problems (like academic stress)

Sports person use drugs to enhance performance to fluid up muscles and for aggressiveness. e.g. dopamine.

Adverse Effects :

In males : Acne, mood swing, depression, premature boldness, reduced male hormones.

In females : Masculinisation, aggressiveness, hirusitism (excessive hair growth) disturbed ovulation, stunted growth.

Withdrawl Symptoms : Dependence or addiction is a state of compulsion to take drug in absence of which body shows withdrawl symptoms such as insomnia, craving, tremors, cramps, twitching and convulsions.

Harmful effects of Drugs and Alcohol Abuse

- Change in behaviour i.e. vendelism, violence
- Damage to liver and kidney
- Disturbed respiratory system
- Affects cardiovascular system
- Sexual dysfunctions
- Nausea, vomiting
- Influence body coordinations
- Economic loss to family

Preventing Alcohol/Drug Abuse

- Avoid peer pressure
- Education and counselling
- Help from parents and peers
- Identify danger signals
- Seeking medical help.

Questions

VSA (I Mark)

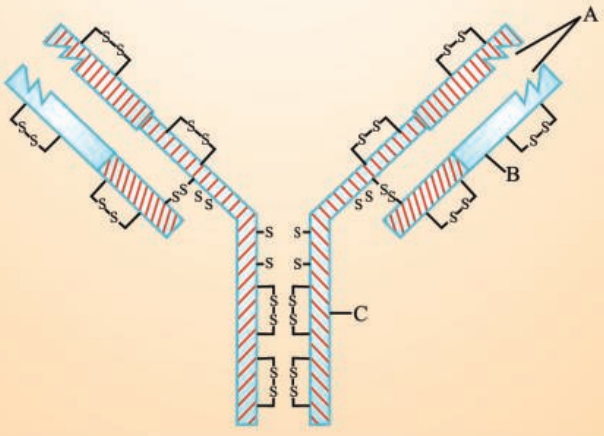
1. Name the diagnostic test which confirms typhoid.
2. You have heard of many indicences of Chickengunya in our country. Name the vector of the disease.
3. Breast fed babies are more immune to diseases than the bottle fed babies. Why ?
4. Name the pathogen which causes malignant malaria.

SA-I (2 Marks)

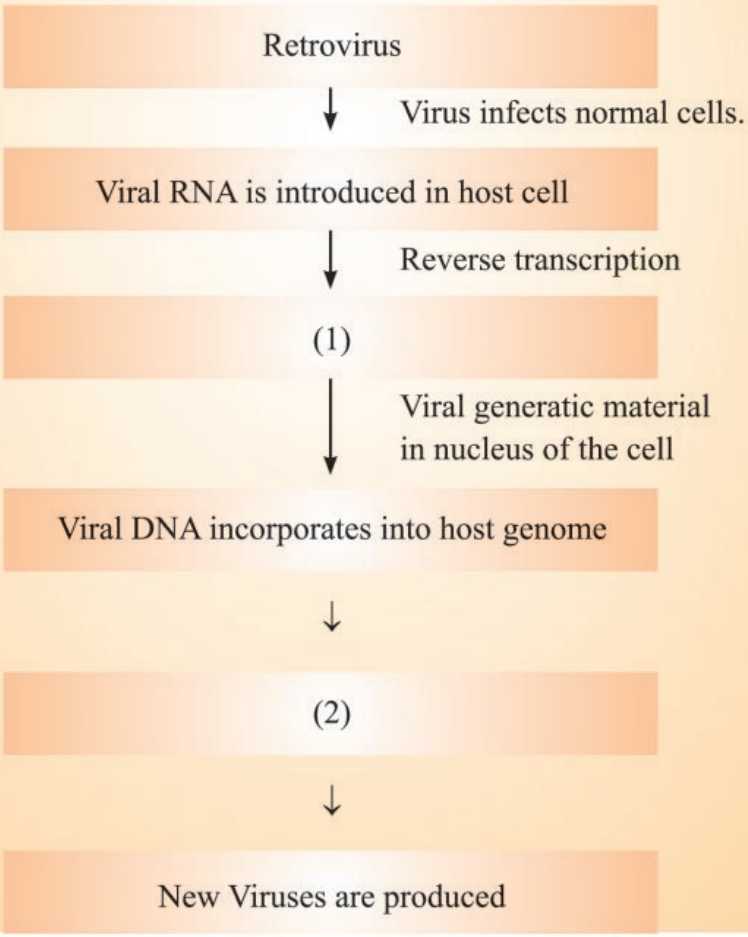
5. Where are B-cells and T-cells formed? How do they differ from each other ?
6. Lymph nodes are secondary lymphoid organs. Describe the role of lymph nodes in our immune response.
7. What is the role of histamine in inflammatory response ? Name few drugs which reduce the symptoms of allergy.

SA-II (3 Marks)

8. In the figure, structure of an antibody molecule is shown. Observe it and Give the answer of the following questions.
   (i) Label the parts A, B and C.
   (ii) Which cells produce these chemicals ?
   (iii) State the function of these molecules.



9. A person shows unwelcome immunogenic reactions while exposed to certain substances.
   (a) Name this condition.
   (b) What common term is given to the substances responsible for this condition?
   (c) Name the cells and the chemical substances released which cause such reactions.
10. In the given flow diagram, the replication of retrovirus in a host cell is shown. Examine it and answer the following questions.
   (a) Why is virus called retrovirus?
   (b) Fill in the blank (1) and (2)
   (c) Can infected cell survive while viruses are being replicated and released by host cell ?



LA **(5 Marks)**

11. Answer the following with respect to Cancer.
    (a) How does a cancerous cell differ from a normal cell?
    (b) Benign tumor is less dangerous than malignant tumor. Why?
    (c) Describe causes of cancer.
    (d) Mention two methods of treatment of the disease.
12. The pathogen of a disease depends on RBCs of human for growth and reproduction. The person with this pathogen suffers with chill and high fever.
    (a) Identify the disease.
    (b) Name the pathogen.
    (c) What is the cause of fever?
    (d) Represent the life cycle of the pathogen diagrammatically.
13. The immune system of a person is suppressed. He was found positive for a pathogen in the diagnostic test ELISA.
    (a) Name the disease, the patient is suffering from.
    (b) Which pathogen is identified by ELISA test?
    (c) Which cells of the body are attacked by the pathogen?
    (d) Suggest preventive measures of the infection.

Answers

VSA **(1 Mark)**

1. Widal test
2. *Aedes* mosquitoes.
3. The mother's milk consists of antibodies (lgA) such antibodies are not available to bottle fed babies.
4. *Plasmodium falciparum.*
5. B-cells and T-cells are formed in bone marrow. B-cells produce antibodies but T-cells do not produce antibodies but help B-cells produce them.

6. Lymph nodes provide the sites for interaction of lymphocytes with the antigen. When the microorganisms enter the lymph nodes, lymphocytes present there are activated and cause the immune response.

7. Histamine acts as allergy-mediator which cause blood vessles to dilate. It is released by mast cells. Antihistamine steroids and adrenaline quickly reduce the symptoms of allergy.

SA-II **(3 Marks)**

8. (a) A-Antrigen binding, B-Light chain, C-Heavy chain

   (b) B-lymphocytes.

   (c) Heavy Chain

   (d) Antibodies provide acquired immune response.

9. (a) Allergy (b) Allergens

   (c) Mast Cells—Histamine, Serotonin

10. (a) HIV has RNA genome. It produces DNA by reverse transcription.

    (b) 1 : Viral DNA is produced by reverse transcriptase.

    2 : New Viral RNA is produced by the infected cell.

    (c) Infected cell can survive.

LA **(5 Marks)**

11. (a) In normal cells, growth and differentiation is highly controlled and regulated (contact inhibition). The cancerous cells have lost the property of contact inhibition, hence continue to divide giving rise to masses of cells (tumors).

    (b) The benign tumor remains confined in the organ affected as it is enclosed in a connective tissue sheath and does not enter the metastatic stage.

    (c) Cancer may be caused due to carcinogens which are physical (X-rays, gamma rays and UV rays), chemicals (Nicotine, Aflatoxin, Cadmium oxide, Asbestos) and biological (viral oncogens and proto oncogenes).

    (d) Surgery, radiotherapy, Chemotherapy, immunotherapy by using biological response modifiers like α-interferons.

12. (a) Malaria

(b) Different species of *Plasmodium viz P. vivax, P. Malariae and P. falciparum.*

(c) Malaria is caused by the toxins (haemozoin) produced in the human body by the malarial parasite. This toxin is released by the rupturing of RBCs.

(d) Life cycle of Plasmodium : Fig. 8.1 Page 148, NCERT book, Biology- XII

13. (i) AIDS (Acquired Immuno Deficiency Syndrome)

(ii) HIV (Human Immunodeficiency Virus)

(iii) Helper T-cells, macrophages, B-lymphocytes.

(iv) Preventive measures :

(a) People should be educated about AIDS transmission.

(b) Disposable needles and syringes should be used

(c) Sexual habits should be changed immediately

(d) High-risk groups should be discouraged from donating blood.

(e) Routine screening may be done.