HUMAN HEALTH AND DISEASE

(A) NCERT QUESTIONS & SOLUTIONS

1. What are the various public health measures, which you would suggest as safeguard against infectious diseases?

Ans. Few of the public health measures as safeguard against infectious diseases are :

- ☛ Proper disposal of waste and excreta
- ☛ Periodic cleaning and disinfection of water reservoirs, pools, cesspools and tanks
- ☛ Observing standard practices of hygiene in public catering

2. In which way has the study of biology helped us to control infectious diseases?

Ans. The advancements made in biological science have armed us to effectively deal with many infectious diseases.

- ☛ The use of vaccines and immunisation programmes have enabled us to completely eradicate a deadly disease like smallpox and to control other infectious diseases like polio, diphtheria, pneumonia and tetanus to a large extent.
- ☛ Biotechnology is at the verge of making available newer and safer vaccines.
- ☛ Discovery of antibiotics and various other drugs has also enabled us to effectively treat infectious diseases.

3. How does the transmission of each of the following diseases take place? [IMP.]

(a) Amoebiasis (b) Malaria (c) Ascariasis (d) Pneumonia

Ans. (a) Amoebiasis:- Houseflies act as mechanical carriers and serve to transmit the pathogen (*Entamoeba histolytica)* from faeces of infected person to food and food products, thereby contaminating them. Drinking water and food contaminated by the faecal matter are the main source of infection.

(b) Malaria :- Malaria is transmitted to a healthy person with the bite of an infected female *Anopheles* mosquito. The female *Anopheles* mosquito is the vector (transmitting agent) for the pathogen (*Plasmodium*).

(c) Ascariasis:- The eggs of the pathogen (*Ascaris*) are excreted along with the faeces of infected persons which contaminate soil, water, plants, etc. A healthy person acquires this infection through contaminated water, vegetables, fruits, etc.

(d) Pneumonia :- A healthy person acquires the infection by inhaling the droplets/aerosol released by an infected person or even by sharing glasses and utensils with an infected person.

4. What measure would you take to prevent water-borne diseases?

Ans. Measures particularly essential to prevent water-borne diseases are:

(1) Maintenance of personal hygiene by :

- Keeping the body clean
- Consumption of clean drinking water, food, vegetables, fruits, etc

(2) Maintenance of public hygiene by :

- Proper disposal of waste and excreta
- Periodic cleaning and disinfection of water reservoirs, pools, cesspools and tanks
- Observing standard practices of hygiene in public catering

5. Discuss with your teacher what does 'a suitable gene' means, in the context of DNA vaccines.

Ans. 'A suitable gene' means that a disease-resistant gene present on the genome of lower organisms. By the technique of genetic engineering, this 'suitable gene' is transferred in a vaccine to inject in human beings to induce the development of immunity.

6. Name the primary and secondary lymphoid organs. **[IMP.]**

Ans. Primary lymphoid organs - Bone Marrow, Thymus gland.

Secondary lymphoid organs - Spleen, Lymph nodes, Tonsils, Peyer's patches of small intestine, Appendix.

7. The following are some well-known abbreviations, which have been used in this chapter. Expand each one to its full form: **[IMP.]**

(a) MALT **(b) CMI** **(c) AIDS** **(d) NACO** **(e) HIV**

Ans. (a) MALT = Mucosa Associated Lymphoid Tissue

(b) CMI = Cell Mediated Immunity

(c) AIDS = Acquired Immuno Deficiency Syndrome

(d) NACO = National AIDS Control Organisation

(e) HIV = Human Immunodeficiency Virus

8. Differentiate the following and give examples of each:

(a) Innate and acquired immunity **(b) Active and passive immunity**

Ans. (a) Difference between innate and acquired immunity :

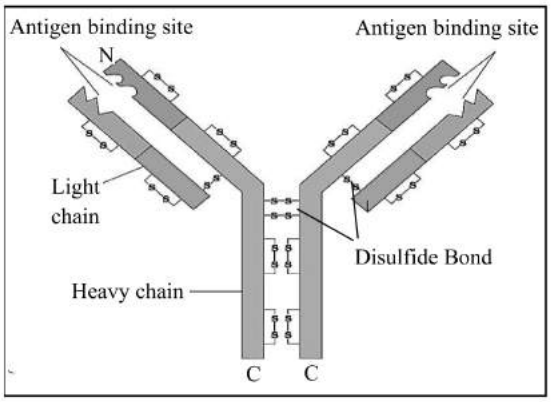
S.N.	Innate Immunity	Acquired Immunity
1.	Pathogen non specific type of defence	Pathogen specific type of defence
2.	Not characterised by memory	Characterised by memory
	Examples : Different barriers(Skin etc.)	**Examples :** B and T lymphocytes

(b) Difference between active and passive immunity :

S.N.	Active Immunity	Passive Immunity
1.	Active participation of immune system of host	No participation of immune system of host
2.	Antibodies are produced actively by immune system of host	Preformed antibodies are received passively by/administered to host
3.	Slow and takes time to give its full effective response	Quick response
	Examples : Vaccines etc.	**Examples :** Antiserums, Antivenoms etc.

9. Draw a well-labelled diagram of an antibody molecule. **[IMP.]**

Ans.



Structure of Antibody molecule

10. What are the various routes by which transmission of human immuno - deficiency virus takes place?

Ans. Transmission of HIV-infection generally occurs :

- By sexual contact with infected person
- By transfusion of contaminated blood and blood products
- By sharing infected needles as in the case of intravenous drug abusers
- From infected mother to her child through placenta

11. What is the mechanism by which the AIDS virus causes deficiency of immune system of the infected person?

Ans. HIV enters into helper T-lymphocytes and produce progeny viruses. The progeny viruses released in the blood attack other helper T-lymphocytes. This is repeated leading to a progressive decrease in the number of helper T-lymphocytes in the body of the infected person.

Due to progressive decrease in the number of helper T-lymphocytes, the person becomes immuno-deficient.

12. How is a cancerous cell different from a normal cell?

Ans. Unlike a normal cell,

- Cancerous cell undergoes uncontrolled mitotic divisions.
- Cancerous cell leads to the formation of tumour.
- Cancerous cell does not show contact inhibition.

13. Explain what is meant by metastasis.

Ans. Cells sloughed from such tumors reach distant sites through blood and wherever they get lodged in the body & they start a new tumor there. This property called metastasis is the most feared property of malignant tumors.

14. List the harmful effects caused by alcohol/drug abuse.

Ans. Few of the harmful effects caused by alcohol/drug abuse are :

- ☛ Immediate adverse effects of drugs and alcohol abuse are reckless behaviour, vandalism, violence etc.
- ☛ Excessive doses of drugs may lead to coma, death due to respiratory failure, heart failure or cerebral haemorrhage.
- ☛ A combination of drugs or their intake along with alcohol generally results in overdosing and even deaths.
- ☛ The chronic use of drugs and alcohol damages nervous system and liver (cirrhosis).
- ☛ The use of drugs and alcohol during pregnancy is also known to adversely affect the foetus.

15. Do you think that friends can influence one to take alcohol/drugs? If yes, how may one protect himself/herself from such an influence?

Ans. One of the reasons for alcohol drinking or drug abuse is peer pressure, so one can be easily influenced by one`s friends to take alcohol /drugs. One must avoid undue peer pressure with one`s own will-power or may seek the help of one`s parents and teachers.

16. Why is that once a person starts taking alcohol or drugs, it is difficult to get rid of this habit? Discuss it with your teacher.

Ans. Use of alcohol or drugs even once can be a fore-runner to addiction. Thus, the addictive potential of drugs and alcohol, pull the user into a vicious circle leading to their regular use (abuse) from which the person may not be able to get out. In the absence of any guidance or counselling, the person gets addicted and becomes dependent on their use. Dependence is the tendency of the body to manifest a characteristic and unpleasant withdrawal syndrome if regular dose of drugs/alcohol is abruptly discontinued. This is characterised by anxiety, shakiness, nausea and sweating, which may be relieved when use is resumed again.

In some cases, withdrawal symptoms can be severe and even life threatening and the person may need medical supervision.

17. In your view what motivates youngsters to take to alcohol or drugs and how can this be avoided? [IMP.]

Ans. Causes for motivation among youngsters towards alcohol or drugs use include :

- ☛ Natural curiosity
- ☛ Need for adventure and excitement
- ☛ Experimentation
- ☛ Perception that it is 'cool' or progressive to smoke use drugs or alcohol
- ☛ To escape facing problems (like stress, from pressures to excel in academics or examinations)
- ☛ Unstable or unsupportive family structures and peer pressure

And measures particularly useful to avoid alcohol or drugs abuse among youngsters include:

- ☛ Avoid undue peer pressure
- ☛ Education and counselling
- ☛ Seeking help from parents and peers
- ☛ Looking for danger signs
- ☛ Seeking professional and medical help

(B) PREVIOUS YEAR QUESTIONS

1. Tetanus antitoxin (Tetanus toxoid) when injected into the human body it immediately provides: **[CBSE 2023]**

(a) Innate immunity (b) Passive immunity

(c) Auto immunity (d) Active immunity

Ans. (b) Passive immunity

2. Select the pathogen mismatched with the symptoms of disease caused by it from the list given below : **[CBSE 2023]**

(a) *Entamoeba histolytica :* Constipation, abdominal pain.

(b) *Epidermophyton :* Dry scaly lesions on nail.

(c) *Wuchereria bancrofti :* Chronic inflammation of lymphatic vessels of lower limb.

(d) *Haemophilus influenzae :* Blockage of the intestinal passage.

Ans. (d) Haemophilus influenzae : Blockage of the intestinal passage.

3. Interferons are proteins. In humans they are secrted by : **[CBSE 2023]**

(a) Thymus gland (b) B-lymphocytes

(c) Viral infected cells (d) Tonsils

Ans. (c) Viral infected cells

4. The decrease in the T - lymphocytes count in human blood will result in : **[CBSE 2023]**

(a) Decrease in antigens (b) Decrease in antibodies

(c) Increase in antibodies (d) Increase in antigens

Ans. (b) Decrease in antibodies

5. Immunotherapy these days is one of the most efficient way of treatment of cancer. The therapy involved activates the immune system and destroys the tumour.

(i) Write an example of one such biological response modifier used in immunotherapy.

(ii) Why do patients need such substances if immune system is already working in body?

(iii) State what is 'Contact inhibition'. [CBSE 2023]

Ans. (i) α - interferon

(ii) Because tumor cell have been shown to avoid to detection and destruction by immune system.

(iii) Contact inhibition:-normal cell show a property called contact inhibition by virtue of which contact with other cell inhibit their uncontrolled growth.

5. (a) *"Plasmodium* protozoan needs both a mosquito and human host for its continuity. "Explain.

OR

(b) We all must work towards maintaining good health because 'health is wealth' Enlist any six ways of achieving good health. [CBSE 2023]

Ans. (a) Plasmodium enters the human body as sporozoites (infectious form) t f infected female Anopheles mosquito.

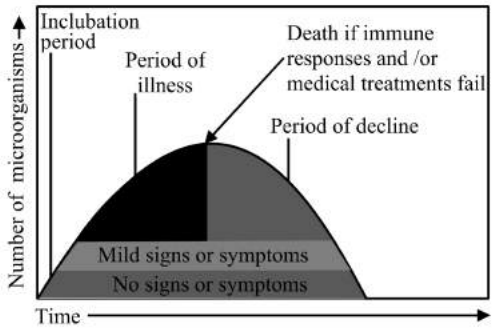
- The parasite initially multiply within the liver cells and then attack the red blood cells (RBCs) resulting in their rupture. The rupture of RBCs is associated with release of a toxic substance, haemozoin, which is responsible for the chill and high fever recurring every three to four days.
- When a female Anopheles mosquito bites an infected person, these parasites enter the mosquito's body and undergo further development.
- When these mosquitoes bite a human, the sporozoites are introduced into his /her body, thereby initiating the events mentioned above.
- It is interesting to note that the malarial parasite requires two hosts - human and mosquitoes - to complete its life cycle. the female Anopheles mosquito is the vector (transmitting agent) too.

OR

(b) Balanced diet, personal hygiene and regular exercise are very important to maintain good health.

- Yoga has been practised since time immemorial to achieve physical and mental health.
- Awareness about diseases and their effect on different bodily functions, vaccination (immunisation) against infectious diseases, proper disposal of wastes, control of vectors and maintenance of hygiene in food and water resources are necessary for achieving good health.

6. When a microorganism invades a host, a definite sequence of events usually occur leading to infection and disease, causing suffering to the host. This process is called pathogenesis. Once a microorganism overcomes the defense system of the host, development of the disease follows a certain sequence of events as shown in the graph. Study the graph given below for the sequence of events leading to appearance of a disease and answer the questions that follow :



(a) In which period, according to the graph there are maximum chances of a person transmitting a disease/infection and why?

(b) Study the graph and write what is an incubation period. Name a sexually transmitted disease that can be easily transmitted during this period. Name the specific type of lymphocytes that are attacked by the pathogen of this disease. [CBSE 2023]

OR

(b) Draw a schematic labelle diagram of an antibody.

(c) In which period, the number of immune cells forming antibodies will be the highest in a person suffering from pneumonia? Name the immune cells that produce antibodies.

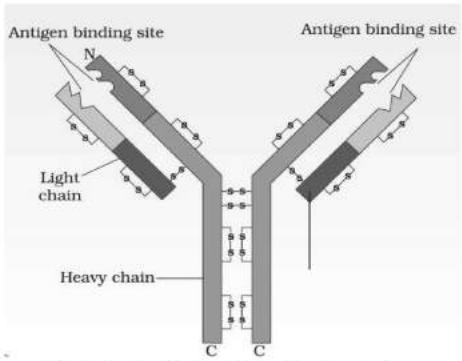
[CBSE 2023]

Ans. (a) Incubation period. Because we can't identity the disease at early stage.

(b) The incubation period means the time between catching the pathogens and beginning to have symptoms of the disease. AIDS , T cells.

OR

(b)



Structure of an antibody molecule

(c) At the pick of diseases, B cells.

8. Why a malignant tumour considered to be more damaging than a benign tumour? Explain.

[CBSE 2023]

Ans. Tumours are the celluar mass that develop inside the body due to accumulation of cells or their over growth. These are divided into categories of benign and malignant tumors. Benign tumours are less harmfull as compared to malignant tumours. It is because, malignant tumours have maignant property i.e., the cells of malignant tumours can detach from their main site and spread in other parts of the body. Thus, malignant tumours spread easily in the body. This leads to chances of cancer spread in the patient with malignant tumours.

9. A boy developed some allergic reactions when he straight entered into his air conditioned room after a game of football outside his house. Write any two symptoms that could be noticed in such condition. How does our body combat such conditions? [CBSE Term – II 2022]

Ans. Symptoms of allergic reactions include sneezing, watery eyes, running nose and difficulty in breathing. Immune system overreacts by producing antibodies called Immunoglobulin E (IgE). These antibodies travel to cells that release chemicals, causing an allergic reaction.

10.(a) (i) Write the Scientific name of the plant from where natural cannabinoids are obtained.

(ii) Mention the parts of the plant that are used for extracting the drug. [3]

(iii) How does the drug affect human body ?

OR

(b) Epithelial lining of our intestine is considered as secondary lymphoid organ. Justify the statement. [CBSE Term – II 2022]

Ans. (a) (i) *Cannabis sativa*

(ii) Cannabinoids are obtained from the inflorescence of the plant .

(iii) These drugs affect cardiovascular system of the body. They affect brain areas that influence pleasure, memory, thinking, concentration, movement and coordination.

OR

(b) There is lymphoid tissue also located within the lining of the major tracts (respiratory, digestive and urogenital tracts) called mucosal- associated lymphoid tissue (MALT). It constitutes about 50 percent of the lymphoid tissue in human body.

11. (a) Write the complete name of the diagnostic test for AIDS. Explain the principle it works on.

(b) Name the type of genetic material present in AIDS causing pathogen.

[CBSE Term – II 2022]

Ans. (a) ELISA – Enzyme Linked Immuno Sorbent Assay. It is based on the principle of antigen-antibody interaction where a pathogen can be detected by the presence of antibodies (proteins, glycoproteins, etc.) on it.

(b) HIV is a retrovirus, which means it carries single-stranded RNA as its genetic material rather than the double-stranded DNA human cells carry.

12. A patient complains of suffering from constipation, stomach ache, stool with blood clots and excess mucous. The physician diagnosed it as amoebiasis, after stool test.

(a) Write the scientific name of the microbe identified in the stool sample.

(b) How do you think, the patient must have contracted it? [CBSE Term – II 2022]

(c) Write your suggestions to the patient to avoid infection in future.

Ans. (a) *Entamoeba histolytica*

(b) Houseflies act as mechanical carriers and serve to transmit the parasite from faeces of infected person to food and food products, thereby contaminating them. Drinking water and food contaminated by the faecal matter are the main source of infection.

(c) Perform hand hygiene frequently, especially before handling food or eating, and after using the toilet or handling faecal matter. Wash hands with liquid soap and water, and rub for at least 20 seconds.

13. Identify and name the disease in which the patient's cells lose the property of contact inhibition. State its possible causes and explain any <u>three</u> methods to accurately detect the pathological and physiological changes that take place due to the disease in living tissues.

[CBSE Imp. Question]

OR

A patient had tested positive to ELISA Test. Identify the disease and the pathogen responsible, give reasons for the reduced/ weak immunity of the patient and trace the path, spread and effects of this pathogen in the human body. [CBSE Imp. Question]

Ans. Disease: Cancer

Probable Causes:

Physical/ Environmental- Exposure to X – rays/ gamma rays/ UV rays; Chemicals/Nicotine in tobacco/ other carcinogens

Biological- Viral oncogenes/ Mutations

Detection and diagnosis:

1. Cancer detection is based on biopsy and histopathological studies of the tissue; blood and bone marrow tests for increased cell counts in the case of leukemias. In biopsy, a piece of the suspected tissue cut into thin sections is stained and examined under microscope (histopathological studies) by a pathologist.
2. Techniques like radiography (use of X-rays), CT (computed tomography) and MRI (magnetic resonance imaging) are very useful to detect cancers of the internal organs. Computed tomography uses X-rays to generate a three dimensional image of the internals of an object. MRI uses strong magnetic fields and non-ionising radiations to accurately detect pathological and physiological changes in the living tissue.
3. Antibodies against cancer-specific antigens are also used for detection of certain cancers.
4. Techniques of molecular biology can be applied to detect genes in individuals with inherited susceptibility to certain cancers. *(any three methods)*

OR

Disease: AIDS (Acquired Immuno Deficiency Syndrome)

Pathogen: Human Immuno deficiency virus (HIV).

Reason:

Due to decrease in the number of helper T lymphocytes, the person starts suffering from infections that could have been otherwise overcome such as those due to bacteria especially *Mycobacterium*, viruses, fungi and even parasites like

Toxoplasma.

The *path* of this pathogen and its spread and effect on the human body:

- After getting into the body of the person, the virus enters into macrophages where RNA genome of the virus replicates to form viral DNA with the help of the enzyme reverse transcriptase.
- This viral DNA gets incorporated into host cell's DNA and directs the infected cells to produce virus particles.
- The macrophages continue to produce virus and in this way acts like a HIV factory.
- Simultaneously, HIV enters into helper T-lymphocytes (TH), replicates and produce progeny viruses.
- The progeny viruses released in the blood attack other helper T-lymphocytes. This is repeated leading to a progressive decrease in the number of helper T lymphocytes in the body of the infected person.
- During this period, the person suffers from bouts of fever, diarrhoea and weight loss.

14. The main barrier that prevents the entry of micro organism into body is [CBSE 2020]

(A) Antibodies (B) Macrophages (C) Monocytes (D) Skin

A

15. It is often observed that the chances of a person suffering from meas r lifetime are low, if he or she has suffered from the disease in their early childhood. Justify the statement. **[CBSE 2020]**

Ans. When our body encounters a pathogen for the first time produces a response called primary response which is of low intensity. Subsequent encounter with the same pathogen elicits a highly intensified secondary or anamnestic response. This is ascribed to the fact that our body appears to have memory of the first encounter.

Hence, the chances of a person suffering from measles in his or her lifetime are low, if he or she has suffered from the disease in their early childhood.

16. A student on a field trip suddenly felt breathlessness and started to sneeze very badly. Nature this response and explain what it is due to. **[CBSE 2019]**

Ans. It could be because of allergy to pollen, mites, etc., which are different in different places.

The exaggerated response of the immune system to certain antigens (or allergens) present in the environment is called allergy. Allergy is due to the release of chemicals like histamine and serotonin from the mast cells.

17. Mention one application for each of the following: **[CBSE 2018]**

(a) Passive immunization

(b) Antihistamine

(c) Colostrum

(d) Cytokinin-barrier

Ans. (a) Provides preformed antibodies for quick response in case of infection by deadly microbes(e.g. tetanus) or snake bite etc.

(b) Reduces symptoms of allergy

(c) Provides passive immunity (IgA antibodies) to new born

(d) Protects non-infected cells from further viral infection

18. Name a human disease, its causal organism, symptoms (any three) and vector, spread by intake of water and food contaminated by human faecal matter. **[CBSE 2018]**

Ans.
- Disease spread by intake of water and food contaminated by human faecal matter : Amoebiasis (Amoebic Dysentery)
- Causal organism : *Entamoeba histolytica* (a protozoan)
- Vector : Housefly
- Symptoms : Constipation, abdominal pain and cramps, stools with excess mucous and blood clots, etc

19. Explain the relationship between B-lymphocytes and T-lymphocytes in developing an immune respons. **[CBSE 2017]**

Ans. B-lymphocytes- produce antibodies to fight pathogen.

T - lymphocytes - do not produce antibodies but help B cells to produce them

can also destroy pathgen directly.

(C) MULTIPLE CHOICE QUESTIONS

1. Widal test is done for detecting.

(1) Pneumonia (2) Malaria (3) Typhoid (4) Cholera

Ans. (3) Typhoid

2. The name of 'Mary Mallon' is associated with the disease

(1) typhoid (2) leprosy (3) tuberculosis (4) smallpox

Ans. (1) typhoid

3. The elephantiasis is caused due to infection of

(1) *Entamoeba* (2) *Ascaris*

(3) *Wuchereia* (4) *Perionyx*

Ans. (3) *Wuchereia*

4. Dengue fever is transmitted by :-

(1) *Aedes aegypti (Tiger mosquito)* (2) *Culex fatigaus*

(3) Anopheles (4) *Aedes donovoni*

Ans. (1) *Aedes aegypti (Tiger mosquito)*

5. Plasmodium enters in the human body as :-

(1) Female Anopheles mosquito (2) Sporozoite

(3) Trophozoite (4) Haemozoin

Ans. (2) Sporozoite

6. *Haemophilus influenzae* causes :-

(1) Typhoid (2) Plague (3) Pneumonia (4)Influenza

Ans. (3) Pneumonia

7. House flies are mechanical carriers of :-

(1) Amoebiasis (2) Malaria (3) Common cold (4) Plague

Ans. (1) Amoebiasis

8. Ringworm in humans is caused by :

(I) Viruses (2) Bacteria (3) Fungi (4) Nematodes

Ans. (3) Fungi

9. Infection of *Ascaris* usually occurs by :

(1) mosquito bite

(2) drinking water containing eggs of Ascaris

(3) eating imperfectly cooked pork.

(4) Tse-tse fly

Ans. (2) drinking water containing eggs of *Ascaris*

10. Sporozoites of Plasmodium is seen in :

(1) Human RBCs (2) Human liver

(3) Gut of male Anopheles (4) Salivary gland of Aedes

Ans. (2) Human liver

11. Antigen is :-

(1) Substances which stimulates the production of venom

(2) Vaccine

(3) Antibody production stimulating agent

(4) Part of the body defence system

Ans. (3) Antibody production stimulating agent

12. Which cell is not phagocytic in nature :-

(1) Monocyte (2) Macrophage (3) Neutrophil (4) N.K. cell

Ans. (4) N.K. cell

13. Colostrum, the first milk secretion of mammary gland is rich in immunoglobulin

(1) IgE (2) IgM (3) IgA (4) IgG

Ans. (3) IgA

14. Surgical removal of thymus of a new born shall result in failure to mature -

(1) Monocytes (2) B – lymphocytes (3) T – lymphocytes (4) Basophils

Ans. (3) T - lymphocytes

15. Vaccination is categorized under

(1) *Pathophysiology* (2) *Pathogenesis* (3) Diagnosis (4) Prophylaxis

Ans. (4) Prophylaxis

16. Vaccine is :-

(1) Type of antibody (2) Inactivated antigen

(3) Inactivated pathogen (4) Activated pathogen

Ans. (3) Inactivated pathogen

17. AIDS is caused due to :-

(1) Reduction in number of helper T-cells (2) Lack of interferon

(3) Reduction in number of killer T-cells (4) Autoimmunity

Ans. (1) Reduction in number of helper T-cells

18. The antibody produce during allergy are

(1) IgG type (2) IgM type (3) IgA type (4) IgE type

Ans. (4) IgE type

19. Which one of the following techniques is safest for the detection of cancers?

(1) Magnetic resonance imaging [MRI] (2) Radiography [X-Ray]

(3) Computed tomography [CT] (4) Histopathological studies

Ans. (1) Magnetic resonance imaging [MRI]

20. What are the reasons of spread of cancer in humans :

(1) Cell growth (2) Cell death

(3) Uncontrolled differentiation of cell (4) Both (1) and (3)

Ans. (4) Both (1) and (3)

(D) ASSERTION & REASON QUESTIONS

Directions: In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as:

(1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

(2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

(3) If Assertion is true but Reason is false.

(4) If both Assertion and Reason are false.

1. **Assertion:** There is no chance of malaria to be spread in a man after the bite of male *Anopheles* mosquito.
Reason: It carries a non-virulent strain of *Plasmodium*.
Ans. (2)

2. **Assertion :** *Plasmodium vivax* is responsible for malaria.
Reason : Malaria is caused by polluted water.
Ans. (3)

3. **Assertion :** Tapeworm, roundworm and pinworm are endoparasites of human intestine.
Reason : Improperly cooked food is the source of all intestinal infections.
Ans. (1)

4. **Assertion :** *Escherichia coli, Shigella sp.* and *Salmonella sp.* are all responsible for diarrhoeal diseases.
Reason : Dehydration is common to all types of diarrhoeal diseases and adequate supply of fluids and electrolytes should be ensured.
Ans. (2)

5. **Assertion :** Rabies is an infection of mammals, it involves central nervous system which may result in paralysis and finally death.
Reason : This is caused by neurotropic bacteria in saliva of rabies animal.
Ans. (3)

6. **Assertion :** β-cells work chiefly by secreting substances called antibodies into the body fluids.
Reason : Antibodies ambush foreign antigen circulating in the blood stream.
Ans. (1)

7. **Assertion :** Interferons help in the elimination of viral infections.
Reason : Interferons released by infected cells, reach nearby unaffected cells and make them resistant to viral infection.
Ans. (1)

8. **Assertion :** An antibody is represented by H_2L_2.
Reason : Each antibody is made of four peptide chains.
Ans. (1)

9. **Assertion :** Innate immunity is non-specific defence.
Reason : It consists of four types of barriers.
Ans. (1)

10. **Assertion :** T-lymphocytes mediate CMI response.
Reason : The above response makes it easy to transplant organs.
Ans. (3)

(E) VERY SHORT ANSWER QUESTIONS

1. **Malaria, typhoid, pneumonia and amoebiasis are some of the human infectious diseases. Which ones of these are transmitted through mechanical carriers?**

Ans. Malaria and amoebiasis are transmitted through mechanical carriers.

2. **Name the two intermediate hosts which the human liver fluke depends on to complete its life cycle so as to facilitate parasitization of its primary host.**

Ans. Snail and Fish

3. **How does haemozoin affect the human body when released in blood during malarial infection?**

Ans. Haemozoin is responsible for the chill and high fever recurring every three to four days during malarial infection.

4. **State two different roles of spleen in the human body.**

Ans. Spleen is the secondary lymphoid organ that stores lymphocytes, it filters microbes and acts as a reservoir to store erythrocytes.

5. **A body of ten years had chicken pox. He is not expected to have the same disease for the rest of his life. Mention how it is possible.**

Ans. The boy when encounters a pathogen for the first time, his body produces antibodies that results in the memory of the first encounter, to protect the body in future.

6. **Why do pollen grains of some flowers trigger 'sneezing' in some people?**

Ans. Pollen grains trigger sneezing by causing allergic reaction.

7. **Why is secondary immune response more intense than the primary immune response in humans?**

Ans. This is because of presence of antiboides developed during primary.

8. **How do cytokine barriers provide innate immunity in humans?**

Ans. Cytokine barriers provide innate immunity by releasing interferons. These interferons are secreted by virus infected cells and protect the non-infected cells from further viral infection.

9. **Name any two physiological barriers that provide innate immunity?**

Ans. Acid in Stomach/Saliva in mouth/tears in eyes.

(F) SHORT ANSWER QUESTIONS

1. Name two diseases whose spread can be controlled by the eradication of Aedes mosquitoes.

Ans. Dengue and Chikungunya

2. (a) Name the source plant of heroin drug. How is it obtained from the plant?

(b) Write the effects of heroin on the human body.

Ans. (a) Heroin is obtained by acetylation of morphine, which is extracted from the latex of poppy plant *Papaver somniferum*.

(b) Heroin is a depressant and slows down body functions.

3. A student on a field trip suddenly felt breathlessness and started to sneeze very badly. Nature this response and explain what it is due to.

Ans. It could be because of allergy to pollen, mites, etc., which are different in different places.

The exaggerated response of the immune system to certain antigens (or allergens) present in the environment is called allergy. Allergy is due to the release of chemicals like histamine and serotonin from the mast cells.

4. What is morphine? Give its use and abuse.

Ans. Morphine is obtained from opium. It acts as useful analgesic and abuse causes addition.

5. Name any two physiological processes which assist in increasing immunity of the body?

Ans. 1. Presence of HCl in stomach

2. Presence of bile in duodenum

6. Why is secondary immune response more intense than the primary immune response in humans?

Ans. Body will have memory B cells of the first encounter/presence of antibodies developed during primary immune response.

7. Why is *Gambusia* introduced into drains and ponds?

Ans. Gambusia is a king of fish that prays upon the larvae of mosquito. It is therefore introduced into the drains and ponds. To feed on Mosquito larvae / to eliminate the vectors responsible for causing malaria. It thus helps in controlling malaria.

8. How do interferons protect us?

Ans. Interferons are antiviral agents produced by virus infected cells and can fight tumors. The virus-infected cells stimulate neighboring cells to release antiviral proteins by releasing interferons. Thus, interferons protect non-infected cells from further viral infections by creating cytokine barriers.

(G) LONG ANSWER QUESTIONS

1. Mention one application for each of the following:

(a) Passive immunization (b) Antihistamine (c) Colostrum (d) Cytokinin-barrier

Ans. **(a)** Provides preformed antibodies for quick response in case of infection by deadly microbes (e.g. tetanus) or snake bite etc.

(b) Reduces symptoms of allergy

(c) Provides passive immunity (IgA antibodies) to new born

(d) Protects non-infected cells from further viral infection

2. Name a human disease, its causal organism, symptoms (any three) and vector, spread by intake of water and food contaminated by human faecal matter.

Ans. • **Disease spread by intake of water and food contaminated by human faecal matter:**

Amoebiasis (Amoebic Dysentery)

- **Causal organism:** *Entamoeba histolytica* (a protozoan)
- **Vector:** Housefly
- **Symptoms:** Constipation, abdominal pain and cramps, stools with excess mucous and blood clots, etc.

3. Principle of vaccination is based on the property of "memory" of the immune system. Taking one suitable example, justify the statement.

Ans. In vaccination, a preparation of antigenic proteins of pathogen or inactivated/weakened pathogen (vaccine) are introduced into the body. The antibodies produced in the body against these antigens would neutralise the pathogenic agents during actual infection. The vaccines also generate memory – B and T lymphocytes that recognise the pathogen quickly on subsequent exposure and overwhelm the invaders with a massive production of antibodies.

4. Name a human disease, its causal organism, symptoms (any three) and vector, spread by intake of water and food contaminated by human faecal matter.

Ans. • **Disease spread by intake of water and food contaminated by human faecal matter:-**

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- **Vector:-** Housefly
- **Symptoms:-** Constipation, abdominal pain and cramps, stools with excess mucous and blood clots, etc.

5. (a) Why is there a fear amongst the guardians that their adolescent ward in drug/alcohol abuse? **d**

(b) Explain 'addiction' and 'dependence' in respect of drug / alcohol abuse in youth.

Ans. (a) Curiosity, need for adventure & excitement, experimentation and the perception among adolescents that it is 'cool' or progressive to use drugs or alcohol constitute common causes, which motivate adolescents to get trapped in drug / alcohol abuse.

(b) 'Addiction' is a psychological attachment to certain effects – such as euphoria and a temporary feeling of well-being – associated with drugs / alcohol.

'Dependence' is the tendency of the body to manifest a characteristic and unpleasant withdrawal syndrome if regular dose of drugs / alcohol is abruptly discontinued.

6. (a) It is generally observed that the children who had suffered from chicken - pox in their childhood may not contract the same disease in their adulthood. Explain giving reasons the basis of such an immunity in an individual. Name this kind of immunity.

(b) What are interferons? Mention their role.

Ans. (a) When our body encounters a pathogen for the first time produces a response called primary response which is of low intensity. Subsequent encounter with the same pathogen elicits a highly intensified secondary or anamnestic response.

This is ascribed to the fact that our body appears to have memory of the first encounter. Hence, the children who had suffered from chicken pox in their childhood may not contract the same disease in their adulthood.

This kind of immunity is called as acquired immunity.

(b) Interferons are cytokines secreted by virus-infected cells, and protect non-infected cells from further viral infection.

7. How to detect cancer? What are a few approaches to treat cancer?

Ans. Cancer can be detected at early stages and early detection is essential. Following are a few can diagnosis and detection areas:

- Tests for increases cell counts (blood cancer)
- Histo-pathological and biopsy of blood/tissues/bone marrow
- Radiography, CT, MRI to detect cancer of internal organs
- Identification of cancer-specific antigens
- Application of molecular biology techniques to detect genes with inherited susceptibility to a few cancers

Treatment of cancer: Listed below are a few approaches that can be used to treat cancer.

- Surgery to remove the tumour
- Immunotherapy to boost the killing of cancer cells
- Radiotherapy to kill cancerous cells
- Chemotherapy
- Administration of biological response mediators such as $\propto$-interferons that activate the immune system thus helping in destroying the tumour

(H) CASE-STUDY BASED QUESTIONS

1. Read the following and answer the questions given below:

The word AIDS stands for Acquired Immuno Deficiency Syndrome. This means deficiency of immune system, acquired during the lifetime of an individual indicating that it is not a congenital disease. 'Syndrome' means a group of symptoms. AIDS is caused by the Human Immuno deficiency Virus (HIV), a member of a group of viruses called retrovirus, which have an envelope enclosing the RNA genome Transmission of HIV-infection generally occurs by

(a) sexual contact with infected person,

(b) by transfusion of contaminated blood and blood products,

(c) by sharing infected needles as in the case of intravenous drug abusers and

(d) from infected mother to her child through placenta.

So, people who are at high risk of getting this infection includes - individuals who have multiple sexual partners, drug addicts who take drugs intravenously, individuals who require repeated blood transfusions and children born to an HIV infected mother.

(i) Expand AIDS?

Ans. AIDS → Acquired Immuno deficiency syndrome.

(ii) What is syndrome?

Ans. Group of symptoms are called as syndrome.

(iii) What is retrovirus?

Ans. AIDS is caused by the Immuno deficiency virus (HIV), member of group of viruses called Retrovirus.

(iv) Mention the site of transmission of HIV infection?

Ans. (a) Sexual contanct with inferted person

(b) From Infected mother to her child through placenta.

2. Read the following and answer the questions given below:

The exaggerated response of the immune system to certain antigens present in the environment is called allergy. The substances to which such an immune response is produced are called allergens. The antibodies produced to these are of IgE type. Common examples of allergens are mites in dust, pollens, animal dander, etc. Symptoms of allergic reactions include sneezing, watery eyes, running nose and difficulty in breathing. Allergy is due to the release of chemicals like histamine and serotonin from the mast cells. For determining the cause of allergy, the patient is exposed to or injected with very small doses of possible allergens, and the reactions studied. The use of drugs like anti-histamine, adrenalin and steroids quickly reduce the symptoms of allergy. Somehow, modern-day life style has resulted in lowering of immunity and more sensitivity to allergens – more and more children in metro cities of India suffer from allergies and asthma due to sensitivity to the environment. This could be because of the protected environment provided early in life.

(i) What is Allergy?

Ans. The exaggerated response of the immune system to certain antigens present in the environment is called allergy.

(ii) Which antibodies primarily Participate in allergic response?

Ans. IgE

(iii) State the function of mast cells in allergy response?

(iii) The function of mast cell in allergy response is that it release histamine which cause inflammatory reactions in the body.

(iv) Why do pollen grains of some flower triggers sneezing in some people?

Ans. Pollen grains are allergens that caused Allergy in some people due to release of chemicals like histamine & serotonin from mast cells. These triggers the inflammatory response in body. e.g., Sneezing, running nose etc.

3. Read the following and answer the questions given below:

The principle of immunisation or vaccination is based on the property of 'memory' of the immune system. In vaccination, a preparation of antigenic proteins of pathogen or inactivated/weakened pathogen (vaccine) are introduced into the body. The antibodies produced in the body against these antigens would neutralise the pathogenic agents during actual infection. The vaccines also generate memory – B and T-cells that recognise the pathogen quickly on subsequent exposure and overwhelm the invaders with a massive production of antibodies. If a person is infected with some deadly microbes to which quick immune response is required as in tetanus, we need to directly inject the preformed antibodies, or antitoxin (a preparation containing antibodies to the toxin). Even in cases of snakebites, the injection which is given to the patients, contain preformed antibodies against the snake venom. This type of immunisation is called passive immunisation.

(i) What is a vaccine?

Ans. Vaccine is a preparation of antigenic proteins of pathogen or inactivated / weakened pathogen introduced into the body.

(ii) What are Allergens?

Ans. Allergens are substances that cause allergy.

(iii) What is active immunity?

Ans. The immunity produced by an individual after undergoing primary immunity response.

(iv) Mention the site in the body where the B cells and T cells are formed.

Ans. Both the B cells and T cells are formed in the bone marrow.

(v) What is passive immunity?

Ans. The antibodies developed in other vertebrates in response to deliberate inoculation of antigen in the body.

4. Read the following and answer the questions given below:

Health is not just the absence of disease. It is a state of complete physical, mental, social and psychological well-being. Diseases like typhoid, cholera, pneumonia, fungal infections of skin, malaria and many others are a major cause of distress to human beings. Vector-borne diseases like malaria especially one caused by *Plasmodium falciparum*, if not treated, may prove fatal. Besides personal cleanliness and hygiene, public health measures like proper disposal of waste, decontamination of drinking water, control of vectors like mosquitoes and immunization are very helpful in preventing these diseases. Our immune system plays the major role in preventing these diseases when we are exposed to disease-causing agents.

(i) Which pathogenic bacterium causes typhoid fever in human beings?

Ans. *Salmonella typhi* is pathogenic bacterium that causes Typhoid fever.

(ii) Where is antigen binding site is found in an antibody?

Ans. Antigen binding site is found between one heavy and one light chain.

(iii) Why is tobacco smoking associated with rise in blood pressure?

Ans. Nicotine in tobacco stimulates adrenal glands to release adrenaline and nor-adrenaline in the blood circulation raising blood pressure.

(iv) What is a disease?

Ans. Malfunctioning of one or more organs characterised by signs & symptoms is called disease.

(v) How does haemozoin affect the human body when released in blood during malarial infection.

Ans. Haemozoin accounts for recurrence of high fever and chills in every 3-4 days.