

EXERCISE

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

Solution:

The public health measures are the measures taken to prevent and check the spread of different infectious diseases. It is taken to lessen contact with infectious agents.

Some of these preventive measures are as follows:

- Isolation – it prevents the spreading of air-borne diseases (chicken pox, pneumonia, tuberculosis etc) which is required to isolate infected person to reduce the chances of diseases to spread
- Vaccination – it is the protection of the body from diseases that can be communicated which is done by administering some agents which impersonate the microbe in the body. This helps in rendering passive immunization to the body. Vaccines are available for some of the diseases such as mumps, polio, measles etc
- Vector eradication – diseases such as dengue, malaria etc that spread through vectors can be prevented by ensuring a clean environment and checking the breeding of mosquitoes which is facilitated by regulating water, looking for it to not stagnate in residential areas. Some other measures are periodic cleaning of coolers, use of mosquito nets and insecticides. It can also be controlled by introducing Laxvivorous fish such as Gambusia in ponds, as they control mosquito larvae-breeding in stagnant water
- Maintaining public and personal hygiene is one of the most important practices to prevent the spread of infectious diseases as it includes maintaining a clean body, consuming healthy and nutritious food, clean water etc. Proper disposal of wastes, excreta, disinfection of water reservoirs are some of the measures that can be adapted as part of public hygiene.

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

Solution:

Biology is a vast field of science dealing with life forms and its processes. It has helped in controlling infectious diseases in the following ways:

- Complete eradication of a fatal diseases such as small pox was possible with the use of immunization schemes and vaccines
- Other infectious diseases such as diptheria, polio, pneumonia etc have been successfully controlled with the use of vaccines
- Treatment of several infectious diseases have successfully been carried out with the use of antibiotics and other drugs

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

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

Solution:

The transmission of diseases is as given in the table:

Name of the disease	Transmission
Amoebiasis	Ingestion of quadrinucleated cysts of <i>Entamoeba histolytica</i> via water and food. Cysts can be passed from the faeces of patient of water and food
Malaria	Plasmodium or the malarial parasite is communicated to a healthy person from a patient when bitten by a female <i>Anopheles</i> mosquito
Ascariasis	it can be passed by ingesting contaminated water and food with the embryonated eggs of <i>Ascaris</i>
Pneumonia	Transmitted by droplets and sputum given out when patient coughs. It is a bacterial disease

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

Solution:

Measures taken to prevent water-borne diseases are as follows:

- Provision of clean water for drinking
- Industries should be prohibited from discharging wastes into water bodies
- Frequent cleaning and disinfecting water tanks and reservoirs

5. Discuss with your teacher what does ‘a suitable gene’ mean, in the context of DNA vaccines.

Solution:

The term ‘suitable gene’ is used to refer to a particular section of DNA that can be altered in the host in order to synthesize a particular protein which attacks and kills a specific disease-causing entity.

6. Name the primary and secondary lymphoid organs.

Solution:

Primary lymphoid organs are – Thymus and bone marrow

Secondary lymphoid organs are – Mucosal-associated lymphoid tissues (MALT), Lymph nodes, Spleen, Peyer’s patches (small intestine)

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

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

Solution:

The expansion is as follows:

- (a) MALT - Mucosal-associated lymphoid tissues
- (b) CMI – Cell mediated immunity
- (c) AIDS – Acquired Immuno-deficiency syndrome
- d) NACO – National Aids Control Organization
- (e) HIV – Human Immuno-deficiency virus

8. Differentiate the following and give examples of each:

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

Solution:

The differences are as follows:

(a) Innate and acquired immunity

Innate immunity	Acquired immunity
Non-specific in nature	Specific in nature
Present from birth	It is acquired in response to a particular pathogen
Has different barriers	Has a memory of antibody
For instance, mucus traps bacteria and other particles	For instance, post vaccination antibodies respond

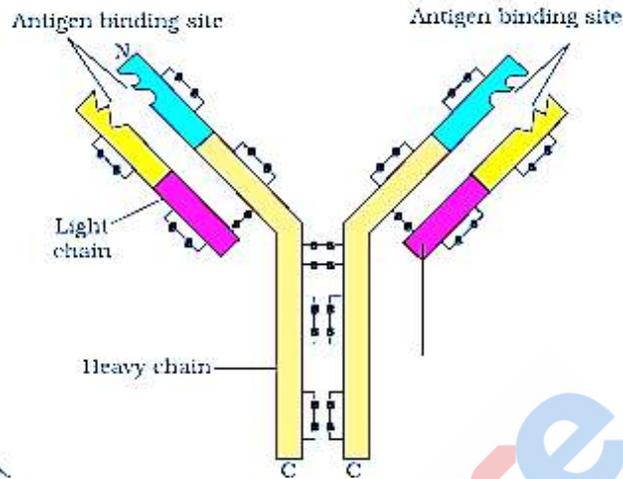
(b) Active and passive immunity

Active immunity	Passive immunity
In response to pathogens, body releases antigens	To initiate immunity, antigen is injected
Slower response	Faster response
For instance, post vaccination antibodies respond	For instance, Colostrum is rich in antibodies

9. Draw a well-labelled diagram of an antibody molecule.

Solution:

The diagram is as follows:



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

Solution:

The various routes by which transmission of human immunodeficiency virus(HIV) takes place is as follows:

- Sexual relation with the person infected
- Organ transplantation from an infected person
- Transfusion of contaminated blood products and blood
- Transmitted from mother to the child through the placenta

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

Solution:

Upon managing to enter the body, this virus enters into macrophages where the RNA genome of the virus duplicates for the formation of viral DNA by the action of the reverse transcriptase enzyme. The viral DNA is then incorporated into the DNA of the cells of the host which targets the infected cells to synthesize virus particles. The macrophages continue to produce virus, serving as an HIV factory. On the other hand, HIV enters the helper T-lymphocytes, replicating and producing progeny viruses, which when released in the blood, target other helper T-lymphocytes which is reiterated causing a progressive decrease in the count of helper T-lymphocytes in the patient's body. In the long run, there is a significant decline in the count of helper T-lymphocytes resulting in weakening of the defense mechanism of the body. This is referred to as acquired immunodeficiency.

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

Solution:

The differences are as follows:

Cancerous cell	Normal cell
As these cells do not possess the property of contact inhibition, they keep dividing forming a cluster of cells	As these cells possess the property of contact inhibition, they stop dividing once they come in touch with other cells
Do not experience differentiation	Experience differentiation after attaining growth
Cells are not confined, they move to the adjacent tissues and interrupt their functioning	The cells are confined to a specific location

13. Explain what is meant by metastasis.

Solution:

Metastasis is a pathological process that is observed in malignant tumors. In this process, the cancerous cells spread to different body parts and divide indefinitely to form a cluster of cells known as tumor. Some of these cells from the tumor get sloughed off and manage to enter into the blood stream from where they arrive at the distant parts of the body and thus the formation of new tumors is initiated as they actively divide.

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

Solution:

The harmful effects of alcohol and drug abuse are as follows:

Harmful effects of alcohol:

- **On individual** – has an adverse effect on the body. When excess alcohol is consumed, it damages the nervous system and the liver, which is a vital organ. This leads to other symptoms such as fatigue, depression, weight loss, aggression, loss of appetite. In extreme cases, heart failure leading to coma and death is also observed.
- **On family** – excess alcohol consumption by any family member can have destructing effects on the family members as it may lead to domestic violence, verbal abuse, irritation, insecurity etc
- **On society** – impulsive behavior, fading social web, violence, lack of interest in social activities.

Harmful effects of drugs:

- **On individual** – effect of drugs on one’s body is severe, more so on the central nervous system.

It can lead to malfunctioning of different organs of the body such as liver, kidney etc. in such individuals, HIV spreads rapidly as they share used needles while they inject drugs into the body. Drug addicts face both short-term and long-term effects, some of which are mood swings, aggressiveness, depression etc

- **On family and society** – A drug-addict creates issues within the family and the society. When a person is dependent on drugs, he/she becomes irritated, frustrated, and anti-social.

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?

Solution:

Yes, friends can have an influence on friends to start taking drugs and consume alcohol. The following actions can be taken as precautionary measures to protect oneself from alcohol/drug abuse, they are:

- One must have a strong control over his/her will. One should refrain from experimenting with alcohol just for the sake of trying/curiosity/fun etc.
- Stay away from people who are into drugs
- Seek elderly advise, peer or medical assistance
- Enlighten yourself with enough knowledge about the consequences of drug abuse
- Go in for a counselling session
- Take up some hobby/extracurricular activity
- If depression or frustration levels persist or heightens, seek immediate medical or professional help.

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.

Solution:

Alcohol consumption and usage of drugs has a severe, addictive impact linked with euphoria, rendering a momentary feeling of well-being. Regular intake of drugs can increase the tolerance level of the receptors of the body which furthermore leads to more drug consumption.

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

Solution:

There are many factors that are accountable to motivate the youth towards drugs or alcohol. Some of the initial causes are curiosity, excitement, adventure, experimentation etc. Some switch to consuming drugs and alcohol to overcome negative emotions such as pressure, depression, stress, frustration etc. in order to perform fairly well in other streams. Few media such as internet, television, newspaper, movies etc are responsible to endorse to the youth the idea of alcohol. Some more reasons can be unsupportive family structure, unstable relationships, peer pressure can also cause individuals to take up drugs and

alcohol.

Some of the preventive measures against the use of drugs and alcohol are as follows:

- Motivation from parents and elders to develop a strong will power against it
- Awareness about the ill-effects of alcohol should be educated to children by parents. Proper counselling and knowledge regarding the repercussions of alcohol addiction must be carried out.
- Parents should take responsibility to monitor the social circle of their children and must advise them against the wrong company
- Encourage students to dedicate their energy in other activities
- Proper medical and professional assistance should be provided if symptoms of depression and frustration is observed.