



## CHAPTER – 8

### HUMAN HEALTH AND DISEASE

**Health:** The state of complete physical, mental and social well beings is called health. Health simply does not simply mean disease-free condition or physical fitness. Health is affected by:

- Genetic disorders – the defect which child inherits from it parents.
- Infection from microbes or other organisms.
- Lifestyle- includes food and water we take, exercise and rest.

We can maintain good health by:

- A good balanced diet.
- Maintaining personal hygiene
- Do regular exercise
- Spreading awareness about the disease
- Getting Immunized against the infectious disease
- Disposing waste in a proper way
- Controlling vectors

**Disease:** these are of two types:

- Infectious diseases:** Diseases that get easily transmitted from one person to another, are called infectious diseases. AIDS, common cold, malaria are some examples.
- Non-infectious diseases:** Diseases that cannot be transmitted from one person to another, are called non-

infectious diseases. cancer, hypertension, diabetes are some examples.

Diseases can be caused by bacteria, viruses, fungus, protozoa, and helminthiasis, they are grouped under the category of pathogen.

#### Brush Up Your Understanding

**Q1.** A non infectious disease among the following is.

- Hypertension
- AIDS
- Malaria
- Common cold

**S1. (a)**

**Q2.** Diseases can be caused by.

- |              |                      |
|--------------|----------------------|
| (a) Fungi    | (b) Bacteria         |
| (c) Protozoa | (d) All of the above |

**S2. (d)** Pathogens can enter the body by various means and there in the presence of a suitable environment multiply and interfere with the usual activities that result in morphological changes and cause functional damage.

Here are some of the pathogens, the diseases caused by them, and their symptoms.

Disease	Test	Pathogen	Symptoms	Effect
Elephantiasis/ filariasis	-	<i>Wuchereria (W. bancrofti and W. malayi)</i>	Causes inflammation of the lower limb/ genital organs.	The lymphatic vessels of the lower limb get affected.
Malaria	-	Caused due to a protozoan- <i>Plasmodium sp. (P. vivax, P. malaria and P. falciparum)</i>	High fever that re-occurs in 3 to 4 days	Multiplication of parasite takes place in the liver cells they then attack the RBCs.
Typhoid	Widal Test	<i>Salmonella typhi</i>	High fever, weakness associated with stomach pain,	-
Amoebiasis or Amoebic dysentery	-	<i>E. histolytica</i>	Constipation, severe abdominal pain, stool with mucous and blood.	Large intestine gets affected
Pneumonia		<i>Streptococcus pneumoniae</i> and <i>Haemophilus influenzae</i>	Fever is associated with chills, cough, headache	Alveoli in the lungs get filled with fluid leading to problem in respiration
Ascariasis		Ascaris	Causes internal bleeding, pain in muscles associated with fever and anemia.	-
Common cold		Rhino viruses	Causes nasal congestion, sore throat, intense cough associated with headache.	Infect the nose and respiratory passage.

## Brush Up Your Understanding

Q1. *Salmonella typhi* causes.

- (a) Malaria (b) Hepatitis A  
(c) Typhoid (d) Ascariasis

S1. (c)

Q2. An intestinal parasite among the following is.

- (a) *W. malayi* (b) Ascaris  
(c) *E. histolytica* (d) All of the above

S2. (b)

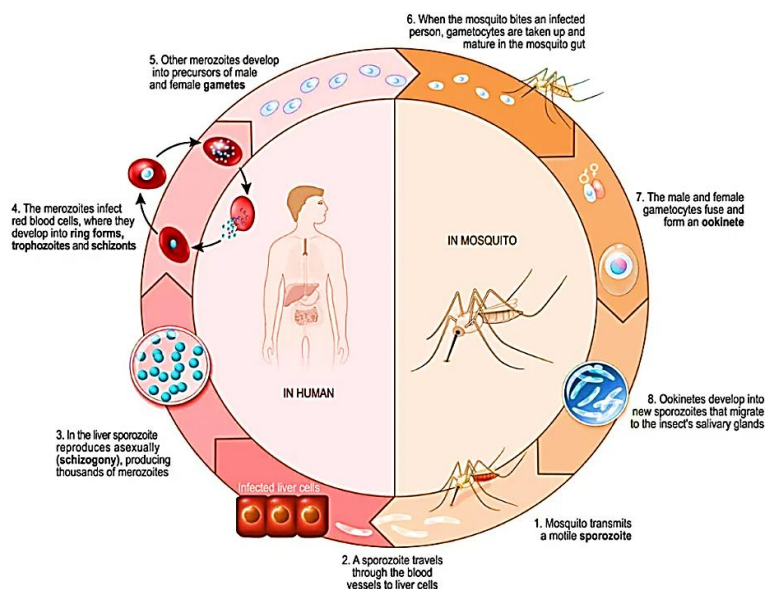
### Plasmodium: Life Cycle

#### Let's have a look at the life cycle in detail:

- When a female Anopheles mosquito bites an infected person, these parasites enter the mosquito's body and undergo further development.
- The parasites multiply within them to form **sporozoites (infectious stage)** that are stored in their **salivary glands**.
- When these mosquitoes bite a human, the sporozoites are introduced into his/ her body, thereby initiating the events mentioned above.

Plasmodium enters the human body as microscopic sporozoites from the bite of an infected female anopheles mosquito and multiplies within liver cells. Later, the RBCs are attacked, leading in rupture and the production of a poisonous chemical, **haemozoin**, which is responsible for high fever and chills that re-occur every three to four days.

**Malaria parasites require two hosts to complete their life cycle: humans and anopheles' mosquitos. Female anopheles is the disease's vector to humans.**



Life cycle of plasmodium

## Brush Up Your Understanding

- Q1.** Sporozoite is the infectious form of.  
 (a) Mosquito (b) Plasmodium  
 (c) *Streptococcus* (d) All of the above
- S1. (b)**
- Q2.** Gametocytes of plasmodium parasite develop inside the.  
 (a) Liver (b) RBC  
 (c) Salivary gland (d) All of the above
- S2. (b)**

**Immunity:** Immunity refers to the ability of host cells to resist disease-causing microorganisms through the immune system.

### Immunity is classified into two types:

- Innate immunity:** The immunity that an individual gets from birth is called innate immunity. **It is a non-specific type of defense.** It has four types of barriers:
  - Physiological barriers: e.g. acid in the stomach wall, saliva, and tears in the eyes.
  - Physical barriers: e.g. skin, the mucus coating of the epithelium lining of the respiratory tract, gastrointestinal tract, and the urogenital tract.
  - Cellular barriers: Certain types of leukocytes (WBC) of our body like polymorpho-nuclear leukocytes (PMNL-neutrophils) and monocytes and natural killer (type of lymphocytes) in the blood as well as macrophages in tissues can phagocytose and destroy microbes.
  - Cytokine barriers: Virus-infected cells secrete proteins called interferons which protect non-infected cells from further viral infection.
- Acquired Immunity:** Pathogen-specific defence is distinguished by memory. When our body first meets a virus, it creates a response known as the initial response that is of modest intensity. **Due to the memory of the initial contact, subsequent encounters with the same virus create a significantly heightened response known as the secondary response or anamnestic response.**

Primary and secondary reactions are carried out with the assistance of B- and T-lymphocytes. B-lymphocytes create an army of proteins known as **antibodies**, each of which has two light and two heavy chains.

**The B-lymphocytes show humoral immune response and the T-lymphocytes show cell-mediate immunity.**

## Brush Up Your Understanding

- Q1.** The lymphocytes that mediate the cell-mediated immunity.  
 (a) B-lymphocytes (b) T-lymphocytes

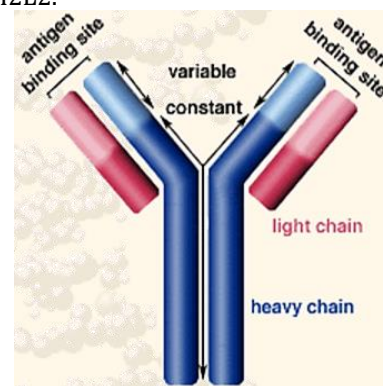
(c) Both (a) and (b) (d) None of the above

- S1. (b)**
- Q2.** Which of the following is important before undertaking any graft/transplant?  
 (a) Tissue matching  
 (b) Blood group matching  
 (c) Both (a) and (b)  
 (d) None of the above
- S2. (c)**

### Antibody: Structure

**IgA, IgM, IgE and IgG are various types of antibodies produced by our body.**

Each antibody molecule is made up of four polypeptide chains, two of which are long and are known as heavy chains, and two of which are short and are known as light chains. Because both are organised in the form of a 'Y,' an antibody is denoted as H2L2.



Structure of an antibody molecule

### Immunity is again of two types as per antibodies produced by the body:

- Active immunity:** The body generates its own antibodies against antigens. Active immunity is slow and takes time to give its full effective response.
- Passive immunity:** When ready-made antibodies are directly given to protect the body against foreign agents, it is called passive. **E.g colostrum secreted by mother in the initial days of lactation contains numerous IgA antibodies, it protects the baby during initial days of lactation from infections.**

**Note:** The body is able to differentiate 'self' and 'nonself' and the cell-mediated immune response is responsible for the graft rejection

**Autoimmunity:** The human immune system can differentiate between self and alien molecules or foreign entities. Sometimes, the body attacks its own cells for unclear reasons, the reason can be genetic also. This causes harm to the body and is known as auto-immune illness. **E. g rheumatoid arthritis.**

**Vaccine:** 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.

**Passive Immunisation:** Sometimes a person gets infected with some deadly microbes to which quick immune response is required **E.g tetanus.**

In such case, 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.**

### Brush Up Your Understanding

- Q1.** Rheumatoid arthritis is an example of.  
(a) Allergy (b) Auto-immunity  
(c) Both (a) and (b) (d) None of the above
- S1. (b)**
- Q2.** A person is given an injection against snake-bite, the type of immunisation he receives through this injection is.  
(a) Active immunisation (b) Passive immunisation  
(c) Both (a) and (b) (d) None of the above
- S2. (b)**

**Allergy:** Allergy is defined as an excessive immune system reaction to particular antigens in the environment. Allergens are substances that cause such an immunological reaction. **IgE antibodies are created as a result of this. Allergies are caused by the mast cells secreting substances such as histamine and serotonin.**

**Lymphoid Organs:** The lymphoid organs, tissue, cells, and soluble chemicals such as antibodies comprise the human immune system.

Lymphoid organs are the sites of lymphocyte formation, maturation, and proliferation. **The bone marrow and thymus are primary lymphoid organs** where immature lymphocytes differentiate into antigen-sensitive lymphocytes.

Lymphocytes travel to **secondary lymphoid organs such as the spleen, lymph nodes, tonsils, Peyer's patches of the small intestine, and the appendix** after maturation. They serve as locations for lymphocytes to engage with antigens. The secondary lymphoid organs provide the sites for interaction of lymphocytes with the antigen, which then proliferate to become effector cells.

**Bone Marrow:** The bone marrow is the main lymphoid organ where all blood cells including lymphocytes are produced.

**Thymus:** The thymus is a lobed organ located near the heart and beneath the breastbone. The thymus is quite large at the time of birth but keeps reducing in size with age and by the time puberty is attained it reduces to a very small size.

**Note:** Both bone-marrow and thymus provide micro-environments for the development and maturation of T-lymphocytes

**Spleen:** The spleen is a large bean-shaped organ. It mainly contains lymphocytes and phagocytes. It acts as a filter of the blood by trapping blood-borne microorganisms. Spleen also has a large reservoir of erythrocyte.

**Lymph Nodes:** The lymph nodes are small solid structures located at different points along the lymphatic system. Lymph nodes serve to trap the micro-organisms or other antigens, which happen to get into the lymph and tissue fluid. Antigens trapped in the lymph nodes are responsible for the activation of lymphocytes present there and cause the immune response.

**MALT:** There is lymphoid tissue also located within the lining of the major tracts (respiratory, digestive and urogenital tracts) called mucosa-associated lymphoid tissue (MALT). It constitutes about 50 per cent of the lymphoid tissue in human body.

### Brush Up Your Understanding

- Q1.** A primary lymphoid organ among the following is.  
(a) Spleen (b) Thymus  
(c) Bone marrow (d) Peyer's patches

**S1. (b)**

**AIDS:** The first case of AIDS (Acquired Immuno Deficiency Syndrome) was recorded in the year 1981. It is caused by retrovirus HIV (Human Immunodeficiency virus). The HIV virus spreads primarily through-

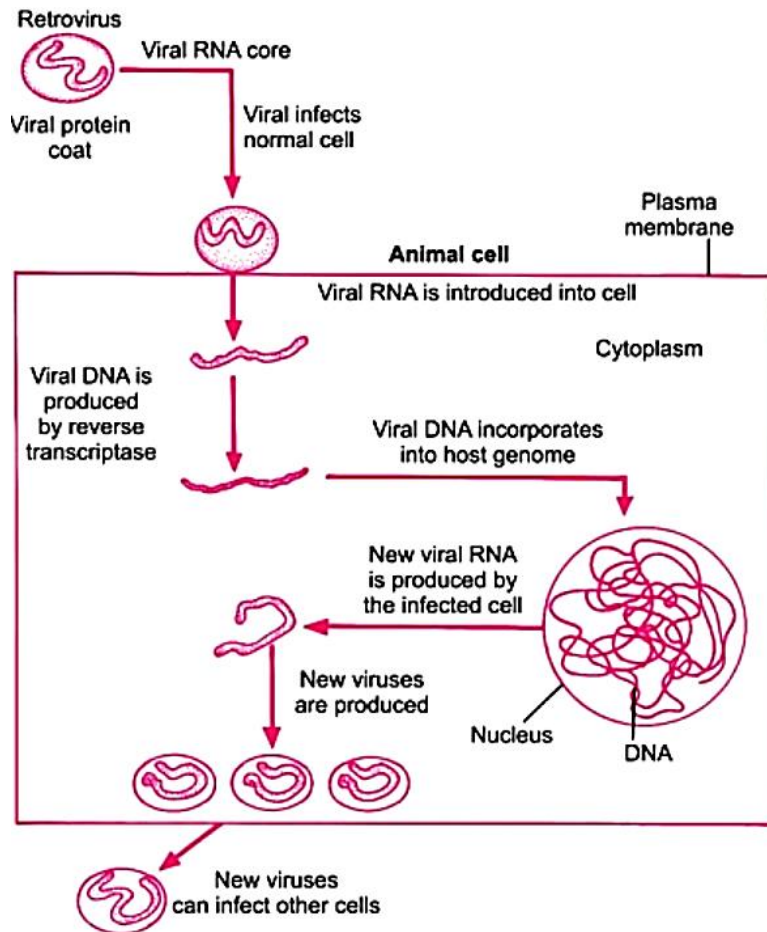
- (i) Sexual intercourse with an infected individual.
- (ii) The use of infected blood and blood products in transfusions.
- (iii) Sharing contaminated needles, as in the case of intravenous drug users.
- (iv) From an infected mother to her kid via the placenta.

Physical contact does not transfer AIDS/HIV. It is only transmitted by bodily secretions. **There is usually a time difference between infection and onset of symptoms, which can range from 5 to 10 years.**

**ELISA is an AIDS diagnostic test (Enzyme-Linked Immuno-sorbent assay).** The therapy of this condition with anti-retroviral drugs is only partially effective, extending life but not preventing death.

### Brush Up Your Understanding

- Q1.** AIDS was reported in the year.  
(a) 1980 (b) 1981  
(c) 1982 (d) 1983
- S1. (b)**
- Q2.** AIDS is caused due to.  
(a) Rhino virus (b) Retro virus  
(c) Both (a) and (b) (d) None of the above
- S2. (b)**



**Replication of reterovirus**

**Cancer:** In human body, cell growth and differentiation is a highly controlled process. In cancer cells, there is a breakdown of these regulatory mechanisms.

#### Difference between a cancer cell and a normal cell

Cancer Cell	Normal Cell
Cancer cells come in a wide range of sizes and forms.	Normal cells have regular shapes and sizes.
Cancer cells do not cease proliferating, resulting in the formation of a tumor ( a cluster of mutant cells)	These cells divide and expand in a regulated manner, following a predictable life cycle.
Cancer cells do not interact with one another.	Normal cells communicate with one another in order to operate properly.
The cells loose the property of adhesion	Normal cells are bonded with each other with the help of external membranes
These cells invade other places of the a body	They do not invade other places of the body
They do not have the ability of recognition of symbols	The cells have the ability of recognition of signals

**Tumor:** When the cancerous cells continue to divide giving rise to a mass of cells then it is called tumor. It is again of two types:

1. **Bengian tumor:** it remains at the place where it has arose, rate of growth is slow, causes minimum damage to the body, it has no latent stage, no metastasis is there and the last it is non-cancerous.
2. **Malignant tumor:** it spreads to other parts of the body, shows vigorous growth, show a latent stage, there is metastasis and it is cancerous.

#### Causes of cancer: It is caused by:

1. **Carcinogens** are physical, chemical, and biological factors that can cause transformation of normal cells into cancerous neoplastic cells.
2. **Oncogenic viruses** have viral oncogenes, which are genes that cause cancer. In normal cells, many genes known as cellular oncogenes (**c-onc**) or **proto oncogenes** have been found that, when activated under particular conditions, can lead to oncogenic transformation of the cells.

**Detection and diagnosis:** Biopsy and histological examination of tissues, blood and bone marrow tests for elevated cell counts are used to identify cancer. Internal organ tumors benefit greatly from radiography, CT (computed tomography), and MRI (magnetic resonance imaging).

**Treatment:** it may be treated by radiation; immunotherapy may be given or may be removed surgically.

**Note:** Tumor cells have been shown to avoid detection and destruction by immune system. Therefore, the patients are given substances called biological response modifiers such as  $\alpha$ -interferon which activates their immune system and helps in destroying the tumor.

### Brush Up Your Understanding

- Q1. The tumour that remains confined to their original location is called as.  
 (a) Malignant tumour (b) Benign tumour  
 (c) Both (a) and (b) (d) None of the above

S1. (b)

- Q2. The technique that is very useful in the detection of cancers of the internal organs is.  
 (a) Radiography  
 (b) Computed tomography  
 (c) MRI  
 (d) All of the above

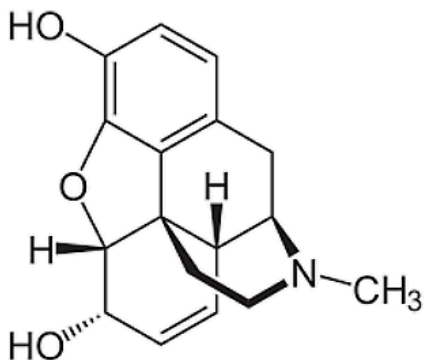
S2. (d)

### Drugs and Alcohol abuse

**Most common drugs that are abused are:**

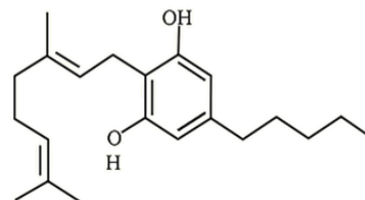
- Opioids: Opioids are medications that get attach to opioid receptors in our central nervous system and gastrointestinal tract. **Heroin, sometimes known as smack, is a white, odourless, bitter crystalline substance, it is chemically diacetylmorphine and is derived from the latex of the poppy plant (*Papaver somniferum*).** Heroin is a depressant that slows down biological functioning and is commonly snorted or injected.

**Note:** Morphine is a very effective sedative and painkiller, and is very useful in patients who have undergone surgery.



### Chemical Structure of morphine

- Cannabinoids: Cannabinoids are a class of substances that bind to cannabinoid receptors in the brain. **The inflorescence *Cannabis sativa* is used to extract natural cannabinoids. Some of the examples of cannabinoids are marijuana, hashish, charas, and gangja are among them.** They are renowned for their effects on the circulatory system of the body and are commonly administered through inhalation and oral consumption.



### Structure of cannabinoid molecule

- Coca alkaloids: **Coca alkaloid/cocaine is derived from the South American coca plant *Erythroxylum coca*. It disrupts the transit of the neurotransmitter dopamine. Cocaine, often known as coke or crack, is typically snorted.** It has a strong effect on the central nervous system, causing euphoria and enhanced vitality.

Note: Some other plants with hallucinogenic properties are *Atropa belladonna* and *Datura*.

**Nicotine:** Tobacco contains a large number of chemical substances including nicotine, an alkaloid. Nicotine stimulates adrenal gland to release adrenaline and nor-adrenaline into blood circulation, both of which raise blood pressure and increase heart rate. Smoking is associated with increased incidence of cancers of lung, urinary bladder and throat, bronchitis, emphysema, coronary heart disease, gastric ulcer, etc. Tobacco chewing is associated with increased risk of cancer of the oral cavity. Smoking increases carbon monoxide (CO) content in blood and reduces the concentration of haembound oxygen. This causes oxygen deficiency in the body.

**Adolescence:** the period when a child becomes mature is called adolescence. The is 12-18 years.

Some of the adolescence get in drug abuse during this age.

**Causes of drug abuse:** it can be due to stress, companionship, excitement or simply experimentation.

**Harmful effects of drug abuse:** people taking drugs can become careless, mischievous, violent, can go in depression, can isolate themselves also.

**Dependence:** Dependence is the body's predisposition to exhibit a distinct and unpleasant withdrawal experience when a regular dose of

drug/alcohol is abruptly removed, it includes anxiety, shakiness, nausea, and sweating.

Counselling, education, parents help, professional help can help in prevention and control.

### Brush Up Your Understanding

- Q1. Opioid receptors are located inside the.  
(a) Peripheral Nervous System  
(b) Central Nervous system

- (c) Autonomous Nervous System  
(d) All of the above

- S1. (b)  
Q2. Cannabinoids affect the.  
(a) Central Nervous System  
(b) Cardiovascular system  
(c) Neural system  
(d) All of the above

- S2. (b)

### SUMMARY

Health can be defined as state of body and mind which allows a person to function well physically, mentally and socially. Our dietary habits, lifestyle, social environment, the kind of work that we do to earn our living, the mental state of mind, genetic and physical environment. A state when the functioning of one or more organs of the body is affected resulting in altered physiological state with signs and symptoms telling us that there is something wrong with our health, it is called as disease. Diseases can be infectious and non-infectious. Organisms that cause diseases in a host are called pathogens. They are usually microorganisms like bacteria, fungi, viruses, etc. The ability of the host to fight and protect against disease-causing organisms conferred by the immune system is called immunity that is of two types innate and acquired immunity. Humoral immune response is the kind of immune response that involve production of antibodies as these antibodies are present in the blood (body humor) and cell mediated immunity is an immune response that does not involve antibodies, but rather involves the activation of phagocytes, antigen specific cytotoxic T-lymphocytes, and the release of various cytokines in response to an antigen. Besides AIDS and cancer are diseases are affecting large number of people throughout the world. AIDS is caused due to HIV and can be detected by ELISA. Cancer is also a slowly spreading disease. Early detection of cancers is essential as it allows the disease to be treated successfully in many cases. Drugs are chemical substances which when taken inside the body for a purpose other than the medicinal use or in amounts and frequency that impairs ones physical, psychological functions, it constitutes a drug abuse. It can be prevented by counselling and seeking medical and professional help.

### IMPORTANT POINTERS

Common cold, malaria and AIDS are infectious diseases and cancer and diabetes are non-infectious diseases.

Typhoid fever is caused due to *Salmonella typhi*, pneumonia due to *Streptococcus pneumoniae*/ *Haemophilus influenza*, common cold due to Rhino virus, malaria due to *Plasmodium* (*P.falciparum*, *P.vivax*, *P. malaria*), amoebiasis (amoebic dysentery) due to *Entamoeba histolytica*.

The infectious form of plasmodium is sporozoite.

Ascariasis is caused due to *Ascaris*, Elephantiasis/Filariasis due to *Wuchereria bancrofti*, *W.malayi* and ringworms due to *Microsporum*, *Trichophyton*, *Epidermophyton*. They all are worms.

Skin, Mucus coating of the epithelium lining the respiratory, gastrointestinal and urogenital tracts are physical barriers, (PMNL-neutrophils), monocytes, natural killer (type of

lymphocytes) in the blood, as well as macrophages in tissues are cellular barriers.

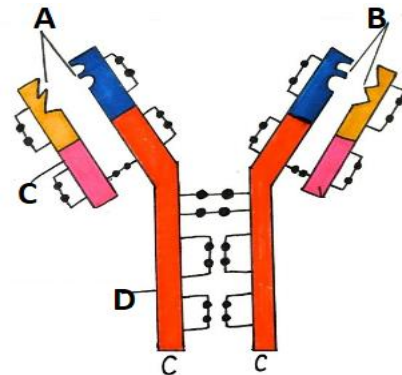
Vaccines like BCG, MMR provide active immunity and anti-tetanus injection, and injections for snake bite, colostrum (yellowish fluid produced by the mother in the initial days of lactation) contains abundant IgA antibodies to protect the infant against infections, they all provide passive immunity.

Rheumatoid arthritis is an example of auto-immune disease. The primary lymphoid organs are bone marrow, thymus, secondary lymphoid organs are spleen, lymph nodes, tonsils, Peyer's patches of small intestine and appendix.

Opioids / Diacetylmorphine is obtained from latex of Poppy plant (*Papaver somniferum*), cannabinoids is obtained from inflorescences of plant *Cannabis sativa* and coca alkaloids or cocaine from coca plant *Erythroxylum coca*.

## MULTIPLE CHOICE QUESTIONS

- Q1.** Which among the following is important for good health?  
 (a) Balanced diet  
 (b) Personnel hygiene  
 (c) Regular exercise  
 (d) All of the above
- Q2.** Which of the following causes typhoid in humans?  
 (a) Plasmodium  
 (b) Salmonella typhi  
 (c) W. malayi  
 (d) E. histolytica
- Q3.** Which disease is caused due to protozoa?  
 (a) Typhoid  
 (b) Elephantiasis  
 (c) Malaria  
 (d) Cancer
- Q4.** Which of the following causes AIDS?  
 (a) Helminth  
 (b) Virus  
 (c) Bacteria  
 (d) Protozoa
- Q5.** Which of the following is a vector for malarial parasite?  
 (a) Ringworm  
 (b) Housefly  
 (c) Female Anopheles  
 (d) Ascaris
- Q6.** Which is the filarial worm?  
 (a) Ascaris  
 (b) Wuchereria  
 (c) Plasmodium  
 (d) None of the above
- Q7.** What causes dengue and chikungunya?  
 (a) Male Anopheles  
 (b) Aedes mosquito  
 (c) Female Anopheles  
 (d) Plasmodium
- Q8.** Which of the following is physical barrier?  
 (a) Epithelial lining of respiratory tract  
 (b) Gastrointestinal tract  
 (c) Urogenital tract  
 (d) All of the above
- Q9.** What is the intensity of the primary response produced by the body when it encounters a pathogen for the first time?  
 (a) Medium  
 (b) Intermediate  
 (c) Low  
 (d) High
- Q10.** What is the number of light and heavy chains in an antibody?  
 (a) 2 long heavy chain and 2 small light chains  
 (b) 4 long heavy chain and 4 small light chains  
 (c) 4 long light chain and 4 small heavy chains  
 (d) 2 small light chains and 2 long heavy chains
- Q11.** Which of the following mediates the cell mediated immunity?  
 (a) B-lymphocytes  
 (b) IgG  
 (c) T- lymphocytes  
 (d) IgA
- Q12.** Which of the following is correct about Innate immunity?  
 (a) It is antibody specific  
 (b) It is a non-specific type of defense  
 (c) It is pathogen-specific  
 (d) It is antigen-specific
- Q13.** Haemozoin, a toxic substance is associated with which of the following disease?  
 (a) Elephantiasis  
 (b) Dysentery  
 (c) Malaria  
 (d) Chikungunya
- Q14.** Where does *W. bancrofti* responsible for filariasis lives in the human body?  
 (a) Lymphatic vessels of the upper limbs  
 (b) Lymphatic vessels of the lower limbs  
 (c) Blood vessels of the upper limbs  
 (d) Blood vessels of the lower limbs
- Q15.** Which of the following causes food poisoning?  
 (a) Salmonella typhi  
 (b) E. histolytica  
 (c) Wuchereria bancrofti  
 (d) Microsporum
- Q16.** Look at the below given diagram and identify A, B, C and D.

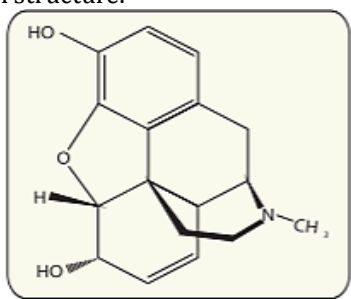


- (a) Antigen binding site, Light chain, Heavy chain, Antigen binding site  
 (b) Antigen binding site, Antigen binding site Light chain, Heavy chain  
 (c) Light chain, Heavy chain, Antigen binding site, antigen binding site  
 (d) Heavy chain, antigen binding site, Light chain, Antigen binding site



- Q17.** Which of the following species of plasmodium causes malignant malaria?  
 (a) *P. vivax*  
 (b) *P. malaria*  
 (c) *P. falciparum*  
 (d) All of the above
- Q18.** Where does the infective stage of plasmodium the sporozoite resides inside the mosquito body?  
 (a) Lymph nodes  
 (b) Blood  
 (c) Salivary glands  
 (d) All of the above
- Q19.** Which of the following are primary lymphoid organs?  
 (a) Lymph nodes  
 (b) Bone marrow  
 (c) Peyer's patches  
 (d) Spleen
- Q20.** What is the function of secondary lymphoid organs?  
 (a) They are the sites for interaction of lymphocytes with the B-cells  
 (b) They are the sites for interaction of lymphocytes with the antibody  
 (c) They are the sites for interaction of lymphocytes with the antigen  
 (d) They are the sites for interaction of NK-cells with the antigen.
- Q21.** Where does the development and maturation of T Lymphocytes take place inside the body?  
 (a) Bone marrow and thymus  
 (b) Thymus and spleen  
 (c) Spleen and Bone marrow  
 (d) Bone marrow and Peyer's patches
- Q22.** Which of the following is correct about HIV?  
 (a) It is an Onco-virus  
 (b) It is a retro-virus  
 (c) It is Lenti-virus  
 (d) Spuma-virus
- Q23.** Which of the following genes causes Cancer?  
 (a) Regulatory genes  
 (b) Transposons  
 (c) Oncogenes  
 (d) Split genes
- Q24.** Which of the following biological response modifiers helps in destroying the tumor?  
 (a) Alpha interferon  
 (b) Beta interferon  
 (c) Gamma interferon  
 (d) None of the above
- Q25.** Which of the following is commonly called as smack?  
 (a) Opioid  
 (b) Heroin  
 (c) Ganja  
 (d) Charas
- Q26.** Which part of the plant *Cannabis sativa* is the source of natural cannabinoids?  
 (a) Leaf  
 (b) Inflorescence  
 (c) Stem  
 (d) Root
- Q27.** Which of the following is commonly called as coke or crack?  
 (a) Cocaine  
 (b) Opioids  
 (c) Amphetamines  
 (d) Barbiturates
- Q28.** Which of the following gland gets stimulated by the consumption of tobacco?  
 (a) Pituitary gland  
 (b) Adrenal gland  
 (c) Thyroid gland  
 (d) Pineal gland
- Q29.** Which of the following gland is quite large at the time of birth but keeps reducing in size with age and by the time of puberty it reduces to a very small size?  
 (a) Thyroid gland  
 (b) Adrenal gland  
 (c) Thymus gland  
 (d) Pituitary gland
- Q30.** Which of the following is the source of smack?  
 (a) Inflorescence of *Cannabis sativa*  
 (b) Latex of Poppy plant  
 (c) Coca plant  
 (d) None of the above
- Q31.** Which of the following cells trigger the immune system?  
 (a) Erythrocytes  
 (b) Lymphocytes  
 (c) Thrombocytes  
 (d) WBC
- Q32.** Which of the following is correct about the Widal test?  
 (a) It is used for diagnosis of AIDS  
 (b) It is used for identification food poisoning  
 (c) It is for diagnosis of typhoid  
 (d) It is used for identification of malaria
- Q33.** Which of the following are the symptoms of ringworm infection?  
 (a) Dry skin  
 (b) Scaly lesions on body  
 (c) Intense itching  
 (d) All of the above
- Q34.** Which of the following lymphocyte is invaded by HIV in AIDS infection?  
 (a) B-lymphocytes  
 (b) Thrombocytes  
 (c) Erythrocytes  
 (d) T-lymphocytes
- Q35.** Which of the following is correct about antigen binding site present in an antibody molecule?  
 (a) It is present between the heavy chains  
 (b) It is present on the light chain  
 (c) It is present between the heavy and the light chain  
 (d) It is present on the heavy chain

- Q36.** Which of the following are the symptoms of ascariasis?  
 (a) Internal bleeding (b) Muscular pain  
 (c) Anaemia (d) All of the above
- Q37.** Which of the following is an autoimmune disease?  
 (a) Cancer (b) Diabetes  
 (c) Rheumatoid arthritis (d) HIV
- Q38.** Which of the following is not a mode of transmission of HIV infection?  
 (a) Sexual contact  
 (b) Physical contact  
 (c) Body fluids  
 (d) Sharing of infected needles
- Q39.** Which among the following is the most feared property of malignant tumors?  
 (a) Contact inhibition (b) Metastasis  
 (c) Self-destruction (d) All of the above
- Q40.** Look at the diagram given below and identify the chemical structure.



- (a) Cocaine (b) Morphine  
 (c) Heroin (d) Smack
- Q41.** Which of the following is the age of adolescence?  
 (a) 10-12 (b) 12-15  
 (c) 12-16 (d) 12-18
- Q42.** What is meant by addiction?  
 (a) It is physiological attachment to certain effects  
 (b) It is temporary feeling of well being  
 (c) The feeling is associated with drugs and alcohol  
 (d) All of the above
- Q43.** Which of the following is the most serious impacts of continuous consumption of alcohol?  
 (a) Heart attack  
 (b) Damage to nervous system  
 (c) Cirrhosis  
 (d) Both (b) and (c)
- Q44.** Which of the following measures can be adopted for prevention and control of alcohol and drug abuse among adolescence?  
 (a) Education and counselling  
 (b) Avoid peer pressure  
 (c) Professional and medical help  
 (d) All of the above
- Q45.** What are the ill effects of smoking?  
 (a) Lung cancer

- (b) Throat bronchitis  
 (c) Coronary heart disease  
 (d) All of the above

- Q46.** Which of the following is the genetic material of the HIV virus?  
 (a) DNA  
 (b) Protein  
 (c) RNA  
 (d) Nucleotide
- Q47.** Which of the following enzyme, HIV virus uses to replicate its genome inside the host body?  
 (a) RNA polymerase  
 (b) Reverse transcriptase  
 (c) DNA polymerase  
 (d) DNA ligase
- Q48.** Which of the following is the correct full form of ELISA?  
 (a) Enzyme like immune-sorbent assay  
 (b) Enzyme linked immune-sorbent assay  
 (c) Enzyme liquid immune-sorbent assay  
 (d) Enzyme lost immune-sorbent assay
- Q49.** Which type of immunity a person acquires when he/she takes readymade antibodies inside the body to get protection against pathogens?  
 (a) Active immunity  
 (b) Passive immunity  
 (c) Cell mediated immunity  
 (d) All of the above
- Q50.** Which of the following antibody is present in the yellow fluid colostrum secreted by mother during the initial days of lactation.  
 (a) IgE (b) IgA  
 (c) IgM (d) IgD

### ASSERTION AND REASON

**Direction:** in the following questions, a statement of assertion (A) is followed by a statement of reason (R). Choose the correct option among a, b, c and d.

- Q1. Assertion (A):** Most parasites are therefore pathogens as they cause harm to the host by living in (or on) them.  
**Reason (R):** The pathogens can enter our body by various means, multiply and interfere with normal vital activities, resulting in morphological and functional damage.
- (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)  
 (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A)  
 (c) Assertion (A) is true but reason(R) is false  
 (d) Assertion (A) is false but reason(R) is true

- Q2. Assertion (A):** Typhoid fever is caused due to *Streptococcus*.  
**Reason (R):** Widal test is used for the detection of typhoid.  
 (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)  
 (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A)  
 (c) Assertion (A) is true but reason (R) is false  
 (d) Assertion (A) is false but reason (R) is true
- Q3. Assertion (A):** Dysentery, plague, diphtheria, etc., are some of the other bacterial diseases in man.  
**Reason (R):** Rhino viruses are a group of viruses which cause one of the most infectious human ailments - the common cold.  
 (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)  
 (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A)  
 (c) Assertion (A) is true but reason (R) is false  
 (d) Assertion (A) is false but reason (R) is true

- Q4. Assertion (A):** when our body encounters a pathogen for the first time it produces a response called primary response which is of low intensity.  
**Reason (R):** Subsequent encounter with the same pathogen elicits a highly intensified secondary or anamnestic response.  
 (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)  
 (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A)  
 (c) Assertion (A) is true but reason (R) is false  
 (d) Assertion (A) is false but reason (R) is true

### TRUE AND FALSE

- Q1.** Non-ionising radiations like X-rays and gamma rays and ionizing radiations like UV rays cause DNA damage leading to neoplastic transformation.
- Q2.** Antigens trapped in the lymph nodes are responsible for the activation of lymphocytes present there and cause the immune response.
- Q3.** Skin on our body is a physiological barrier which prevents entry of the micro-organisms.
- Q4.** Malaria is caused due to a protozoa..

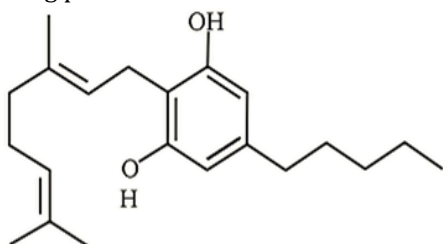
## PRACTICE QUESTIONS

- Q1.** AIDS does not spread due to.  
 (a) Mere touch (b) Physical touch  
 (c) Body fluids (d) Both (a) and (b)
- Q2.** Find out the incorrect matching.  
 (a) Physical barriers - Skin, mucosa  
 (b) Cytokine barriers - Interferons  
 (c) Cellular barriers - PMNL, neutrophils  
 (d) Physiological barriers - Epithelial lining
- Q3.** • *Salmonella* is pathogenic bacterium  
 • Sustained high fever (39°C to 40°C)  
 • intestinal perforation in severe cases  
 • Confirmed by "widal test", "Marry Mallon" was a carrier.  
 Above statements are true for.  
 (a) Plague (b) Diphtheria  
 (c) Typhoid (d) Dysentery
- Q4.** Mark the correct statement.  
 (i) Health is state of complete physical, mental and social well being  
 (ii) Common cold is infection of nose and upper respiratory tract  
 (iii) Hepatitis is infectious diseases  
 (iv) Cancer is non-infectious disease  
 (v) Healthy persons bring economic prosperity  
 (a) (i), (ii) and (iii)  
 (b) (ii), (iii), (iv) and (v)  
 (c) (iii) and (iv)  
 (d) (i), (ii), (iii), (iv) and (v)
- Q5.** Which of the following is correct about a healthy person?  
 (i) More efficient  
 (ii) High productivity  
 (iii) Longevity of people  
 (iv) Brings economic prosperity  
 (a) Both (i) and (ii) only (b) Only (iv)  
 (c) Both (iii) and (iv) only (d) All are correct
- Q6.** Which radiations cause DNA damage leading to neoplastic transformation?  
 (i) Ionising radiations  
 (ii) X-rays  
 (iii) Non-ionising radiations  
 (iv) UV-rays  
 (a) a and c only (b) b and d only  
 (c) a and b only (d) a, b, c and d
- Q7.** Most cancers are treated by combination of.  
 (i) Surgery  
 (ii) Radiotherapy  
 (iii) Chemotherapy  
 (a) (i) and (ii) only (b) (i) and (iii) only  
 (c) (ii) and (iii) only (d) (i), (ii) and (iii)

- Q8.** Below are some statements related to life cycle of plasmodium. Which of the following is correct?  
 (a) Gametocyte stage infects human body  
 (b) It multiplies by sexual method of reproduction in human liver  
 (c) human RBC are ruptured and releases a toxin hemozoin  
 (d) development of gametocyte possible only in female *Culex* mosquito

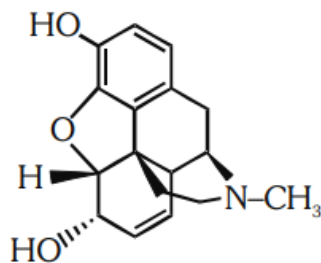
- Q9.** Nicotine.  
 (a) stimulates adrenal gland (b) is an alkaloid  
 (c) is present in tobacco (d) All of these

- Q10.** The given diagram is showing skeletal structure of cannabinoid molecule. Cannabinoids interact with cannabinoid receptors present principally in the brain. Natural cannabinoids are obtained from which of the following part of *Cannabis sativa*?



- (a) Bud (b) Root  
 (c) Inflorescence (d) Stem

- Q11.** Diagram is showing chemical structure of Morphine, which is a natural opiate like codeine. Morphine is a strong analgesic, also has sedative & calming effect. It depresses respiratory centre, BP, heart beat. It is obtained from.



- (a) *Cannabis sativa* (b) *Datura*  
 (c) *Erythroxylum coca* (d) *Papaver somniferum*

- Q12.** Drug called 'Heroin' is synthesized by.  
 (a) methylation of morphine  
 (b) acetylation of morphine  
 (c) glycosylation of morphine  
 (d) nitration of morphine

- Q13.** Which of the following diseases is an autoimmune disorder?  
 (a) Myasthenia gravis (b) Arthritis  
 (c) Osteoporosis (d) Gout

- Q14.** In which disease does mosquito transmitted pathogen cause chronic inflammation of lymphatic vessels?  
 (a) Elephantiasis (b) Ascariasis

- (c) Ringworm disease (d) Amoebiasis

- Q15.** Anti-venom injection contains preformed antibodies while polio drops that are administered into the body contain.  
 (a) Activated pathogens (b) Harvested antibodies  
 (c) Gamma globulin (d) Attenuated pathogen

- Q16.** Which of the following is correct regarding AIDS causative agent HIV?  
 (a) HIV is un-enveloped retrovirus.  
 (b) HIV does not escape but attacks the acquired immune response.  
 (c) HIV is enveloped virus containing one molecule of single-stranded RNA and one molecule of reverse transcriptase.  
 (d) HIV is enveloped virus that contains two identical molecules of single-stranded RNA and two molecules of reverse transcriptase.

- Q17.** In higher vertebrates the immune system can distinguish self-cells and non-self. If this property is lost due to genetic abnormality and it attacks self-cells, then it leads to.  
 (a) Allergic response (b) Graft rejection  
 (c) Auto-immune disease (d) Active immunity

- Q18.** Asthma may be attributed to.  
 (a) bacterial infection of the lungs  
 (b) allergic reaction of the mast cells in the lungs  
 (c) inflammation of the trachea  
 (d) accumulation of fluid in the lungs

- Q19.** Which of the following immunoglobulins does constitute the largest percentage in human milk?  
 (a) IgG (b) IgD  
 (c) IgM (d) IgA

- Q20.** Which is the particular type of drug that is obtained from the plant whose one flowering branch is shown below?



- (a) Hallucinogen (b) Depressant  
 (c) Stimulant (d) Pain-killer

- Q21.** The cell-mediated immunity inside the human body is carried out by.  
 (a) Erythrocytes (b) T-lymphocytes  
 (c) B-lymphocytes (d) Thrombocytes

- Q22.** Widal Test is carried out to test.  
 (a) HIV/AIDS (b) Typhoid fever  
 (c) Malaria (d) Diabetes mellitus



- Q23.** Ringworm in humans is caused by.  
 (a) Viruses (b) Bacteria  
 (c) Fungi (d) Nematodes
- Q24.** Use of anti-histamines and steroids give a quick relief from.  
 (a) headache (b) Allergy  
 (c) Nausea (d) Cough
- Q25.** To which type of barriers under innate immunity, do the saliva in the mouth and the tears from the eyes, belong?  
 (a) Physiological barriers (b) Physical barriers  
 (c) Cytokine barriers (d) Cellular barriers
- Q26.** HIV that causes AIDS, first starts destroying.  
 (a) B-lymphocytes (b) Leucocytes  
 (c) Thrombocytes (d) Helper T-lymphocytes
- Q27.** Cancer cells are characterized by.  
 (a) Uncontrolled growth  
 (b) Invasion of local tissue  
 (c) Spreading to other body parts  
 (d) All the above
- Q28.** House flies are mechanical carriers of.  
 (a) Amoebiasis (b) Malaria  
 (c) Common cold (d) Plague
- Q29.** Plasmodium enters the human body as.  
 (a) Female Anopheles mosquito  
 (b) Sporozoite  
 (c) Trophozoite  
 (d) Haemozoin
- Q30.** Dengue fever is transmitted by.  
 (a) *Aedes aegypti* (b) *Culex fatigauss*  
 (c) *Anopheles* (d) *Ascaris*

### ASSERTION AND REASON

- Q1.** **Assertion (A):** The exaggerated response of the immune system to certain antigens present in the environment is called allergy.  
**Reason (R):** The antibodies produced during allergy is of IgA type.  
 (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)

- (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A)  
 (c) Assertion (A) is true but reason(R) is false  
 (d) Assertion (A) is false but reason(R) is true

- Q2.** **Assertion (A):** The bone marrow is the main lymphoid organ where all blood cells including lymphocytes are produced.  
**Reason (R):** Peyer's patches and lymph nodes provide micro-environments for the development and maturation of T-lymphocytes.  
 (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)  
 (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A)  
 (c) Assertion (A) is true but reason(R) is false  
 (d) Assertion (A) is false but reason(R) is true
- Q3.** **Assertion (A):** AIDS is caused by the Human Immuno deficiency Virus (HIV), a member of a group of viruses called rhino virus.  
**Reason (R):** The group of virus directly attacks the T-lymphocytes ( $T_H$ ), replicates and produce progeny viruses.  
 (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)  
 (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A)  
 (c) Assertion (A) is true but reason(R) is false  
 (d) Assertion (A) is false but reason(R) is true
- Q4.** **Assertion (A):** Adolescence means both 'a period' and 'a process' during which a child becomes mature in terms of his/her attitudes and beliefs for effective participation in society.  
**Reason (R):** The period between 12-18 years of age may be thought of as adolescence period.  
 (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)  
 (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A)  
 (c) Assertion (A) is true but reason(R) is false  
 (d) Assertion (A) is false but reason(R) is true

### SOLUTIONS MULTIPLE CHOICE

- S1.** (d) balanced diet helps maintain adequate nutrition in our body, hygiene keeps away infections and exercise keeps the body muscles calm and relaxed.
- S2.** (b) *Salmonella typhi* causes typhoid. The pathogen enters the small intestine through food and water.

- S3.** (c) Malaria is caused by plasmodium that completes its life cycle in mosquito and humans.
- S4.** (b) AIDS is caused due to HIV Human Immuno Deficiency Virus
- S5.** (c) Female Anopheles is the transmitting agent for malarial parasite, it also has two hosts.

- S6. (b)** *Wuchereria* causes elephantiasis or filariasis in humans that generally affect genital organs.
- S7. (b)** Aedes mosquito causes dengue and chikungunya.
- S8. (d)** Physical barrier helps in trapping microbes entering inside our body
- S9. (c)** The primary response is of low intensity because when an organism enters the body, it encounters with a particular antigen and produce effector T and B cells that defend the body against the organism.
- S10. (d)** Each antibody molecule has 4 peptide chain to small called light chains and to long called heavy chains
- S11. (c)** CMI is very important type of immunity that does not involve antibodies but uses macrophages and natural killer cells to destroy the pathogen. It is mediated by T-lymphocytes.
- S12. (b)** Innate immunity is present at the time of birth and consists of barriers that guard the body against pathogens.
- S13. (c)** Release of hemozoin a toxic substance is associated with the rupture of RBCs and is responsible for chills and high fever during malaria.
- S14. (b)** *W. bancrofti* is a filarial worm that causes filariasis and affects the genital organs.
- S15. (b)** *E. histolytica* is a protozoan parasite and causes food poisonings. It resides in the large intestine of humans.
- S16. (b)** an antibody has a Y-shaped structure made up of polypeptide each sub-unit has two identical light and heavy chain.
- S17. (c)** Plasmodium is a tiny protozoan and is responsible for Malaria. Malignant malaria is the most serious and can be even fatal. It is caused due to plasmodium falciparum.
- S18. (c)** sporozoite the infective stage of plasmodium enters the human body when an infected female Anopheles bites any human.
- S19. (b)** Primary lymphoid organs like bone marrow and thymus are the sites where immature lymphocytes differentiate into antigen sensitive lymphocytes.
- S20. (c)** Lymphocytes after interaction with the antigen in the secondary lymphoid organs proliferate to become effector cells
- S21. (a)** Both bone marrow and thymus provide micro-environment for the development and maturation of T- lymphocytes.
- S22. (b)** HIV is a retrovirus which has an envelope and closing the RNA genome.
- S23. (c)** Oncogenes have been identified in normal cells which when activated under certain conditions lead to oncogenic transformation of cells.
- S24. (a)** Alpha interferon activates the immune system and helps in destroying the tumor.
- S25. (b)** Smack is chemically diacetylmorphine which is a white, odourless, bitter crystalline compound and is obtained by acetylation of morphine.
- S26. (b)** Cannabinoids are group of chemicals which interact with cannabinoid receptors present in brain and are obtained from the inflorescence of the plant *Cannabis sativa*
- S27. (a)** cocaine, coke or crack is usually snorted. It has a potent stimulating action on central nervous system and produces a sense of euphoria and increased energy.
- S28. (b)** Nicotine in tobacco stimulates the adrenal gland to release adrenaline and noradrenaline into the blood circulation both of which raise blood pressure and increase the heart rate.
- S29. (c)** Thymus is a lobed organ located near the heart and beneath the breast bone. It is a primary lymphoid organ where immature lymphocytes differentiate into antigen sensitive lymphocytes.
- S30. (b)** Smack is also called as heroine is a white odourless, bitter, crystalline compound and is extracted from the latex of *Papaver somniferum*
- S31. (b)** Lymphocytes, the B-lymphocytes and T-lymphocytes elicit the primary and secondary immune response.
- S32. (c)** Widal test is a vital test for the diagnosis of typhoid.
- S33. (d)** Ringworm infection is caused due to *Microsporum* or *Trichophyton* fungi. They are generally acquired from soil or by using towels, clothes or even the comb of infected individuals.
- S34. (d)** HIV enters into helper T Lymphocytes replicates and produces progeny virus. The progeny viruses released in the blood attack other helper T-lymphocyte and this is repeated leading to a progressive decrease in the number of helper T-lymphocyte in the body of the infected person.
- S35. (c)** Antigen binding site on the antibody molecule is present between the light chain and the heavy chain
- S36. (d)** ascariasis caused due to roundworm *Ascaris* the eggs of this parasite are excreted along with the features of the infected person which contaminate soil water and plants and healthy person acquire this infection to contaminated water vegetables and fruits.

- S37. (c)** Sometimes due to genetic and other unknown reason the body attacks self-cells this results in damage to the body and is called autoimmune disease Rheumatoid Arthritis is an example of this.
- S38. (b)** HIV/AIDS does not spread by touch or physical contact. It only spreads by sexual contact with an infected person, transfusion of contaminated blood or by sharing of infected needles.
- S39. (b)** Tumor cells grow very rapidly invading and damaging the surrounding normal tissues. Such tumors reach distant sites via blood and wherever they get lodged in the body they start a new tumor there. This property is called metastasis.
- S40. (b)** Morphine is extracted from the latex of poppy plant *Papaver somniferum*.
- S41. (d)** Adolescence is a period and a process during which a child becomes mature in terms of his/her attitudes and beliefs for effective participation in the society.
- S42. (d)** addiction is a physiological attachment to certain effects that are related to the consumption of drugs and alcohol
- S43. (d)** Continuous consumption of alcohol during adolescence and in adulthood has long term effects. It leads to liver cirrhosis and may also damage the nervous system.
- S44. (d)** Habits such as smoking and taking drugs or alcohol are more likely to be taken up at young age mostly during the adolescence age. It is best to identify the situation that push an adolescent towards the use of drugs or alcohol and adopt remedies to prevent them from moving towards addiction of such things.
- S45. (d)** Smoking increases carbon monoxide content in the blood and reduces the concentration of

oxygen, this causes oxygen deficiency in the body and other ill effects.

- S46. (c)** HIV is a member of a group of viruses called retrovirus. The genetic material is RNA, after getting into the body of the person the virus enters the macrophages, the RNA genome of the virus replicates to form viral DNA with the help of enzymes.
- S47. (b)** The genome of HIV virus is RNA hence inside the host body that is the humans, it uses RNA transcriptase enzyme for replication.
- S48. (b)** Enzyme linked immunosorbent assay is a widely used diagnostic test for AIDS.
- S49. (b)** The developing foetus inside a mother's body receives preformed antibodies its mother, this is a very good example of passive immunity.
- S50. (b)** IgA acts as first line of defence for the breast feeding baby. The immunity that the baby get is passive immunity.

#### ASSERTION AND REASON

- S1. (a)**  
**S2. (d)** Typhoid fever is caused due to *Salmonella typhi*.  
**S3. (b)**  
**S4. (a)**

#### TRUE AND FALSE

- S1. (False)** ionising radiations like X-rays and gamma rays and non-ionizing radiations like UV cause DNA damage leading to neoplastic transformation.
- S2. (True)**
- S3. (False)** Skin on our body is a physical barrier which prevents entry of the micro-organisms.
- S4. (True)**

### PRACTICE SOLUTIONS

- S1. (d)** AIDS has no cure, prevention is the best option. Moreover, HIV infection, more often, spreads due to conscious behaviour patterns and is not something that happens inadvertently, like pneumonia or typhoid.
- S2. (d)** Physiological barriers are acid in the stomach, saliva in the mouth, tears from eyes—all prevent microbial growth.
- S3. (c)** *Salmonella typhi* is a pathogenic bacterium which causes typhoid fever in human beings. These pathogens generally enter the small intestine

through food and water contaminated with them and migrate to other organs through blood. Sustained high fever (39° to 40°C), weakness, stomach pain, constipation, headache and loss of appetite are some of the common symptoms of this disease. Intestinal perforation and death may occur in severe cases.

- S4. (d)**  
**S5. (d)**  
**S6.** Ionising radiations like X-rays and gamma rays and non-ionizing radiations like UV cause DNA damage leading to neoplastic transformation.

- S7. (d)** The common approaches for treatment of cancer are surgery, radiation therapy and immunotherapy. In radiotherapy, tumor cells are irradiated lethally, taking proper care of the normal tissues surrounding the tumor mass. Several chemotherapeutic drugs are used to kill cancerous cells.
- S8. (c)** sporozoite is the infective stage of plasmodium, it multiplies by asexual method in human liver.
- S9. (d)** Nicotine stimulates adrenal gland to release adrenaline and nor-adrenaline into blood circulation, both of which raise blood pressure and increase heart rate.
- S10. (c)** Cannabinoids are a group of chemicals, which interact with cannabinoid receptors present principally in the brain. Natural cannabinoids are obtained from the inflorescences of the plant *Cannabis sativa*.
- S11. (d)** it is obtained from poppy plant, *Papaver somniferum*.
- S12. (b)** is obtained by acetylation of morphine.
- S13. (b)** sometimes, due to genetic and other unknown reasons, the body attacks self-cells. This results in damage to the body and is called auto-immune disease. Rheumatoid arthritis which affects many people in our society is an auto-immune disease.
- S14. (a)** *Wuchereria* (*W. bancrofti* and *W. malayi*), the filarial worms cause a slowly developing chronic inflammation of the organs in which they live for many years, usually the lymphatic vessels of the lower limbs and the disease is called elephantiasis or filariasis.
- S15. (d)** polio vaccines are vaccines that are used to prevent polio. Two types are used—an activated and an inactivated poliovirus (antigen) given by injection and an attenuated poliovirus (antigen) given by mouth.
- S16. (d)** 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.
- S17. (c)** due to genetic and other unknown reasons, the body attacks self-cells. This results in damage to the body and is called auto-immune disease (auto-immunity).
- S18. (b)** Asthma may be attributed to allergic reaction of the mast cells in the lungs. Asthma symptoms, which include coughing, wheezing, and chest tightness, are common in an asthma attack. Sometimes asthma is called bronchial asthma or reactive airway disease.
- S19. (d)** IgG, IgA, IgM, IgD and IgE are found in human milk but IgA is the most abundant type.
- S20. (a)** plants with hallucinogenic properties are *Atropa belladonna* and *Datura*.
- S21. (b)** cell mediated immunity is an immune response that does not involve the antibodies, but rather than involves the activation of the antigen specific T-lymphocytes.
- S22. (b)** widal test is used to confirm Typhoid fever.
- S23. (c)** Ringworm is a common fungal infection that can cause a red or silvery ring-like rash on the skin.
- S24. (b)** Anti-histamines and Steroids are good vasoconstrictor.  
The function of Vasoconstrictor is that it gives instant relief from any allergic reactions.
- S25. (a)** Innate immunity occurs naturally due to genetic factors or physiology. It is a native immune response that is present by birth. It provides physical barriers such as skin, physiological barriers such as pH of the stomach, bile juice, saliva, and tears, cellular barriers such as leucocytes, macrophage cells, and cytokine barrier.
- S26. (d)** the viral DNA gets incorporated into the cellular DNA and starts replicating. It is characterized by the reduction in the numbers of CD4-bearing helper T-cells to 20% or less of normal ones. T lymphocytes play an important role in immune response and cell signaling.
- S27. (d)**
- S28. (a)** Houseflies act as mechanical carriers and transmit the parasite from infected faeces of person to food.
- S29. (b)** Sporozoite is the infective form of plasmodium.
- S30. (a)** Dengue spreads by the bite of female mosquitoes of *Aedes* genus. These mosquitoes can spread infection at any time of day but they usually bite in the evening and early morning.

#### ASSERTION AND REASON

- S1. (b)** The exaggerated response of the immune system to certain antigens present in the environment is called allergy and the antibodies produced during allergy is of IgE type.
- S2. (c)** it is the bone-marrow and thymus provide micro-environments for the development and maturation of T-lymphocytes.
- S3. (d)** AIDS is caused by the Human Immuno deficiency Virus (HIV), a member of a group of viruses called Retro virus.
- S4. (a)**