

## Human Health and Diseases

EXAM  
DRILL

## ANSWERS

1. (c) : Cancers of adipose tissue, glands and muscle tissue is called lipomas, adenocarcinoma and myoma, respectively.

OR

(d) : Wayson stain test, Dick test and Wassermann test are respectively used for diagnosis of bubonic plague, scarlet fever and syphilis respectively.

2. (c) : Sandfly acts as vector for kala-azar, not encephalitis.

3. (c) : Family of *Lophophora williamsii* is cactaceae.

4. (d)

5. (d) : Sexual stage (gametocytes) develop in red blood cells.

6. Mammography is a radiographic examination of breasts for possible cancer.

7. Tobacco contains cellular irritants like formaldehyde, ammonia and oxides of nitrogen, but the major component is nicotine, which has harmful effects on the neural system in humans.

8. DPT – Diphtheria Pertussis Tetanus  
MMR – Measles Mumps Rubella

9. An antigen is a foreign material which stimulates antibody formation.

10. Immunisation is the process by which body produces antibodies against vaccine preventable diseases through administration of specific vaccines.

11. (b)

12. (b)

13. (d) : Bone marrow and thymus are two primary lymphoid organs whereas spleen is the secondary lymphoid organ that is the site where proliferation and differentiation of B and T-cells takes place.

14. (c) : Caffeine is a stimulatory drug and is not a hallucinogen.

15. (i) (c)

(ii) Apart from macrophages, polymorphonuclear leucocytes (PMNL-neutrophils) is also an example of type 'C' barrier.

(iii) Cytokine barriers are responsible for preventing viral infection. The cells infected by virus secrete proteins called interferons. They protect non-infected cells from further viral infection.

(iv) Type 'B' barrier is physical barrier that helps in trapping microbes entering our body.

(v) (d)

16. (i) (c)

(ii) (b) : B cells or B-lymphocytes produce an army of proteins called antibodies in response to pathogens into our blood to fight against them.

(iii) The immune response generated specifically by B-lymphocytes is called humoral immune response. B-cells produce antibodies to fight against foreign bodies or antigens like bacteria, viruses, pollen, dust, mites, etc.

(iv) Immunoglobulin M (IgM), the largest antibody. It is the first antibody produced in primary response against a foreign antigen like bacteria.

17. Following are two diseases caused by flatworms:

(i) Schistosomiasis : Caused by *Schistosoma haematobium* which infects portal and mesenteric veins of man and causes urinogenital schistosomiasis.

(ii) Taeniasis : Caused by *Taenia solium* which infects small intestine of man and leads to taeniasis (intestinal disorder).

18. Malaria is transmitted by female *Anopheles* mosquito, which is an insect vector for *Plasmodium falciparum* parasite. The parasite need warm conditions with temperature above 20°C to complete its life cycle in mosquito. Therefore, mosquitoes breed in warm conditions of tropics and in areas of stagnant water.

OR

Physical barriers are mechanical barriers to many microbial pathogens. They are of two types :

(i) Skin : Its outer tough layer, the stratum corneum prevents the entry of bacteria and virus.

(ii) Mucous membrane : Mucus secreted by mucous membranes traps the microbes and immobilises them. Microorganisms and dust particles can enter the respiratory tract with air during breathing which is trapped in the mucus. The cilia sweep the mucus loaded with microorganisms and dust particles into the pharynx. From the pharynx it is thrown out or swallowed for elimination with faeces.

19. The patient shows symptoms of malaria fever after a period of 14 days from an infectious bite. Early restlessness, less appetite and slight sleeplessness are followed by muscular pain, headache and a feeling of chilliness. In response to chills

the body temperature starts rising and may reach 106°F. The patient sweats a lot and temperature steadily goes down to normal, till the next attack takes place after 48 hours.

**20.** Person recovered from an attack of smallpox, measles or mumps is an example of natural active immunity. IgG antibodies passively transferred from mother to fetus through placenta is an example of natural passive immunity.

**21.** Differences between gonorrhoea and syphilis are:

	Gonorrhoea	Syphilis
(i)	Its causing agent is <i>Neisseria gonorrhoea</i> .	Its causing agent is <i>Treponema pallidum</i> .
(ii)	Microscopic examination of urethral pus smear is by Gram stain.	Spirochaete can be demonstrated in the material collected from chancre (lesions on genital part) by dark ground microscope.
(iii)	Complement fixation test is done in this disease.	VDRL test is done in this disease.

**22.** Cholera is transmitted through faecal oral route. Rapid replacement of fluid and electrolytes is needed by oral rehydration therapy. Drugs tetracycline and chloramphenicol are used.

**23.** Typhoid Mary was a classic case in medicine. She was a cook by profession and was a typhoid carrier. She continued to spread typhoid for several years through the food she prepared.

**24.** Each antigen carries more than one epitope (antigenic determinants). Each Y-shaped antibody molecule has at least specific binding sites that can attach to specific epitope on an antigen. An antibody can also bind to identical epitope on two different cells at the same time which can cause neighbouring cells to aggregate. The antibodies can inactivate the invading agents in different ways.

**25.** Filariasis is caused by a number of worms, but in India only two types of worms are responsible and are called *Wuchereria bancrofti* and *W. malayi*.

The infestation is transmitted by female *Culex* mosquitoes from one individual to the others. The worms live in the lymphatic system. This disease is characterised by swelling of the legs and scrotum. The disease is therefore commonly known as elephantiasis due to its resemblance to a leg of an elephant. Albendazole with diethylcarbamazine drug is used to treat this disease.

**26.** Two autoimmune diseases are:

(i) Pernicious anaemia : There is low production of intrinsic factor required for absorption of vitamin B<sub>12</sub>, a substance needed for RBC production.

(ii) Systemic lupus erythematosus (SLE) : SLE is a chronic disease that can have phases of worsening symptoms that alternate with periods of mild symptoms. Common symptoms include severe fatigue, joint pain, slight fever, etc.

**27.** Anaphylaxis or anaphylactic shock is an allergic reaction involving all the tissues of the body and occurs in a few minutes after the injection of an antigen. Such a reaction is very serious. Histamine released from ruptured mast cells causes marked dilation of all arteries so that large amount of fluid is passed from the blood to the tissues and there is drastic fall in blood pressure. The affected person may become unconscious and individual may die within a short time.

OR

- (i) Histiocytes (ii) Mescaline  
(iii) *Haemophilus ducreyi* (iv) Haptens  
(v) Laveran (vi) Taxol

**28. (i)** Antigens can be complete or incomplete, self or auto antigens and foreign or non self antigens. A complete antigen is able to induce antibody formation and produce a specific and observable reaction with antibody produced. Incomplete antigens or haptens or partial antigens are incapable of inducing antibody formation by themselves, but can be capable of inducing antibodies on combining with larger molecules. Antigens which are present on the body's own cells are called autoantigens or self antigens. Foreign antigens are called non-self antigens.

**(ii)** Lancisi (1717) first suspected a relationship between swamp, malaria and mosquito. Laveran (1880) discovered that malaria is caused by protozoan parasite. He discovered *Plasmodium*. He got Nobel Prize in 1907. His topic of discovery was "Role of Protozoans in causing disease". Golgi (1885) confirmed Laveran's discovery by observing stages of *Plasmodium malariae* in human RBCs. In 1897, Sir Ronald Ross, a doctor who was born at Almora in India and he was in Indian Army, established that malarial parasite is transmitted by the bite of a female *Anopheles* mosquito. In 1902, he got Nobel prize for this discovery.

**29.** Differences between B-lymphocytes (B-cells) and T-lymphocytes (T-cells) are:

	B-Lymphocytes (B-cells)	T-Lymphocytes (T-cells)
(i)	They arise from bone marrow/Bursa of Fabricus (in fowl), gut associated lymphoid tissue (Peyer's patches).	They arise from bone marrow, thymus.
(ii)	B-cells form humoral or antibody-mediated immune system (AMIS).	T-cells form cell-mediated immune system (CMIS).

(iii)	They defend against viruses and bacteria that enter the blood and lymph.	They defend against pathogens including protists and fungi that enter the cells.
(iv)	They are formed by the division of plasma cells.	They are formed by the division of lymphoblasts of three types: killer, helper and suppressor cells.
(v)	Plasma cells do not move to the site of infection.	Lymphoblasts move to the site of infection.
(vi)	Plasma cells do not react against transplants and cancer cells.	Killer cells react against transplants and cancer cells.

**30.** When antibodies of B-cell surface bind antigens, the B-cell is activated and divides, producing a clone of daughter B-cells. These clones give rise to plasma B-cells and memory B-cells.

**Plasma B-cell :** Some of the activated B cells enlarge, divide and differentiate into a clone of plasma cells. They live for only few days and secrete enormous amount of antibodies.

**Memory B-cell :** Some activated B-cells do not differentiate into plasma cells but rather remain as memory cells. They have a longer life span and remain dormant until activated once again by a new quantity of the same antigen.

**31.** Cancer is an abnormal and uncontrolled division of cells, that invade and destroy the surrounding tissues.

Cancer cells differ from normal cells in the following ways:

- (i) Cancer cells multiply in an uncontrolled manner.
- (ii) They do not exhibit property of contact inhibition.
- (iii) They have indefinite life span.
- (iv) They show metastasis.

**Types of cancer :** Cancers are classified on the basis of the original tissue from where they arise. Most of the cancers fall into one of the following categories :

**Carcinomas :** Cancers of this type arise from epithelial tissues, such as skin or the epithelial lining of internal organs or glands (about 85 percent of all tumours).

**Melanomas :** These are cancerous growths of melanocytes (a type of skin cells).

**Sarcomas :** These are cancers of tissues of mesodermal origin, e.g., bone, fat and cartilage. They are rare in humans (about 1 percent of all tumours).

**Leukemias and lymphomas :** These are tumours of the haematopoietic cells.

**OR**

There are many factors that motivate youngsters to take alcohol or drug. These include:

- Curiosity
- Experimentation
- Adventure and excitement
- Peer pressure
- Family history, *i.e.*, unstable or unsupportive family structure
- Frustration and depression
- Relief from pain
- Feeling of independence
- Television, movies, newspapers and internet also help to promote this perception.

This can be avoided by the following measures:

(i) **Education and counselling :** Educating and counselling people to face problems and stresses, and to accept disappointments and failures as a part of life.

(ii) **Seeking help from parents and peers:** Help from parents and peers should be taken immediately so that they can guide appropriately. Help may even be taken from close and trusted friends.

(iii) **Looking for danger signs :** Alert parents and teachers to look for and identify the danger signs. Even friends, if they find someone using drugs or alcohol, should not hesitate to bring this to the notice of parents or teachers in the best interests of the person concerned.

(iv) **Seeking professional and medical help :** Lots of help is available in the form of highly qualified psychologists, psychiatrists, and deaddiction and rehabilitation programmes to help individuals who have unfortunately got in the quagmire of drug/alcohol abuse.

(v) **Cross-checking before prescribing and selling drugs :** The physicians should prescribe the habituating drugs only to the genuine persons and only for the essential duration. Pharmacists should not sell these drugs without the physician's prescription.

(vi) **Discipline :** Good nurturance with consistent discipline but without suffocating strictness reduces the risk of addictions.

(vii) **Communication :** The child must be able to communicate with the parents seeking clarification of all doubts and discussing problems that arise in studies or develop in the class, with friends, siblings and others.

(viii) **Appreciation :** For even the smallest achievement, good behaviour and other activities, the child should be appreciated.

(ix) **Independent working :** Giving responsibility to the child for small tasks and allowing him/her to perform independently. However, guidance should be provided where required.

(x) **Avoid undue pressure :** Every child has a specific personality with certain preferences and choices. They should be taken care of and respected. No child should be asked to perform beyond threshold limits whether in studies, sports or extracurricular activities.

32. Bacterial diseases are as follows:

Disease	Pathogen	Transmission	Symptoms	Treatment
Typhoid	<i>Salmonella typhi</i>	Faecal oral route	High fever, weakness, abdominal pain, constipation and loss of appetite.	Antibiotics such as terramycin and chloromycetin are effective against the bacteria.
Pneumonia	<i>Streptococcus pneumoniae</i> or <i>Diplococcus pneumoniae</i> and <i>Haemophilus influenzae</i>	The disease spreads through sputum of the patient.	Single shaking chill, followed by fever, pain with breathing on the side of lung, increased pulse and respiratory rates and cough.	Drugs against pneumonia are penicillin streptomycin and ampicillin.
Dysentery	<i>Shigella dysenteriae</i>	Faecal oral route	An infection of the intestinal tract causing severe diarrhoea with blood and mucus.	—
Bubonic plague (Black death)	<i>Yersinia pestis</i>	Transmitted by the bite of infected rat flea <i>Xenopsylla cheopis</i> .	High fever, bubo in groin or armpit	Anti plague vaccine available
Diphtheria	<i>Corynebacterium diphtheriae</i>	Droplet infection	Development of a grey adherent false membrane over the upper respiratory tract or throat.	DPT vaccine available

OR

(a) Organ transplantation is the implantation of an organ or tissue from one part of the body to another or from one person (donor) to another (recipient). Tissue matching, blood group matching are essential before undertaking any graft/transplant and even after this the patient has to take immunosuppressants all his/her life. This is because the body is able to differentiate 'self' and 'non-self' and the cell-mediated immune response is responsible for the graft rejection.

(b) The World Health Organisation (WHO) defined health as a state of complete physical, mental and social well being and not merely the absence of disease or infirmity. The WHO definition of health recognises three dimensions (physical, mental and social) of health. In 1978, This definition was updated by including the ability to lead a social and economically productive life.

Benefits of good health:

- (i) A healthy person is more efficient at work.
- (ii) Good health increases productivity and brings economic prosperity thus, enhances quality of life.
- (iii) Good health also increases longevity of people and reduces infant and maternal mortality.
- (iv) "Sound mind is a sound body", is the old saying and expresses the importance of good health.

Conditions necessary for good health:

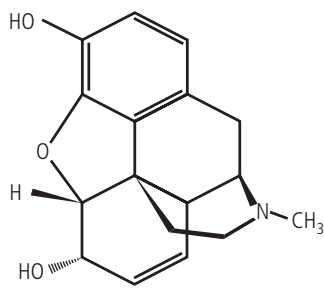
- (i) Balanced diet
- (ii) Personal hygiene
- (iii) Yoga, meditation, regular exercise and proper rest
- (iv) Awareness about diseases and their effect on different body functions
- (v) Clean surroundings and clean air
- (vi) No addiction
- (vii) Good economic conditions
- (viii) Vaccination (immunisation) against infectious diseases
- (ix) Proper disposal of wastes
- (x) Control of vectors
- (xi) Maintenance of hygienic food and water resources.

33. (a) CT scan (Computed Tomography) and MRI (Magnetic Resonance Imaging) are useful techniques to detect cancer of internal organs. CT (Computed Tomography) is reconstruction of three dimensional image made by X-rays directly on a computer instead of a photographic film. It is radiological invasive technique. It is used to diagnose diseases of brain, spinal cord, chest and abdomen and detection of tumors. MRI (Magnetic Resonance Imaging) is a non invasive, non radiological technique in which the image is reconstructed on computer by detecting MRI signals generated by nuclei

of hydrogen atoms in a magnetic field using non-ionising radiations. It is used to obtain multiplanar imaging of soft living tissues like in case of tumors, muscular disorders, cardiovascular disorders, haemorrhage with superior resolution.

**(b)** Morphine is a pain medication of the opiate family, *i.e.*, found naturally in a dark brown, resins from poppy plant. It acts directly on the central nervous system to decrease the feeling of pain. It is very useful in patients who have undergone surgery. It is a strong analgesic, however its continued use causes addiction. Constipation is a prominent feature of morphine action.

Chemical structure of morphine is as follows:



OR

Lymphoid organs are those organs where the maturation and proliferation of lymphocytes takes place. There are two types of lymphoid organs :primary lymphoid organs and

secondary lymphoid organs. The primary lymphoid organs are bone marrow and thymus where B-lymphocytes and T-lymphocytes, mature and acquire their antigen-specific receptors. After maturation, the lymphocytes migrate to secondary lymphoid organs, *e.g.*, spleen and lymph nodes where they undergo proliferation and differentiation. The acquired immune response to antigens usually develops in these organs and become effector cells.

(a) Primary lymphoid organs

(i) Bone marrow : It is the main lymphoid organ where all blood cells including B- and T- lymphocytes are formed. Maturation of B-lymphocytes occurs here.

(ii) Thymus : It is the site of T- lymphocyte maturation. Thymus is situated near the heart and is quite large in size at the time of birth but keeps on reducing with age.

(b) Secondary lymphoid organs

(i) Lymph nodes: These are small solid structures found at intervals along the lymphatic system. They are composed of lymphoid tissue and act as filters for the lymph, preventing foreign particles from entering the bloodstream. Lymph nodes also produce lymphocytes and plasma cells.

(ii) Spleen: It is a bean shaped organ which is the largest single mass of lymphoid tissue in the body. In fetus, the spleen produces all types of blood cells but in adult it only produces lymphocytes. Macrophages of spleen are phagocytic.



