

Chapter-8

HUMAN HEALTH AND DISEASES

ONE MARK QUESTIONS

- 1. Who disproved the 'good humor' hypothesis of health?**
William Harvey
- 2. Define health.**
A state of complete physical, mental and social well-being is called health.
- 3. What is a pathogen?**
A disease causing organism is called pathogen.
- 4. Name the confirmation test for typhoid disease.**
Widal test
- 5. Name the antibody secreted through colostrum.**
IgA
- 6. What are genetic disorders?**
Disorders due to defective genetic material transferred from parents to offsprings.
- 7. What is vaccine?**
A suspension of killed or attenuated pathogen or an antigenic preparation of pathogen that provides artificial active immunity.
- 8. Define allergy.**
The exaggerated response of the immune system to certain antigens present in the environment is called allergy. **OR**
The hypersensitivity of immune system towards a generally harmless foreign substance or antigen present in the environment is called allergy.
- 9. Name the type of antibody responsible for allergy.**
IgE (Present only in Mammals)
- 10. Name the diagnostic test widely used for the detection of AIDS.**
ELISA (Enzyme linked immuno sorbent assay) – preliminary test. **Western Blotting** - confirmatory test.
- 11. What is cancer?**
A condition with uncontrolled cell division resulting in abnormal growth or excess tissue is called cancer.
- 12. What is metastasis?**
Spreading of tumour cells to different parts of the body through circulatory system or blood is called metastasis.
- 13. What is drug abuse?**
Drugs are taken for other than medical use or in amounts or frequency that impairs one's physical, physiological or psychological function is called drug abuse.
- 14. Define alcoholism.**
An addiction to excessive consumption of alcohol is called alcoholism. **OR**
The mental illness and compulsive behaviour resulting from alcohol dependence is called alcoholism.
- 15. What is adolescence?**
A "period" and a "process" during which a child becomes mature in terms of his or her attitudes and beliefs for effective participation in society is called adolescence. (The transitional age from childhood to adulthood)
- 16. Name the plant that gives cocaine.**
Erythroxylum coca
- 17. What is addiction?**
Psychological attachment to certain effects associated with drugs and alcohol is called addiction
- 18. What is an interferon?**
Antiviral protein produced from virus infected cells is called interferon.

19. What is contact inhibition?

Normal cells by contact with neighbouring cells inhibit or control their growth process called contact inhibition.

TWO MARKS QUESTIONS:

1. Mention any four factors helpful to maintain good health.

- Balanced diet.
- Personal hygiene and regular exercise
- Vaccination against infectious diseases
- Proper disposal of wastes.
- Controlling vectors.
- Life style including food and water we take, rest and exercise we give to our body, habits we have or lack, etc.

2. What is disease? Mention two broad groups of diseases.

The state where functioning of one or more organs or organ systems or the body is adversely affected, characterised by various signs and symptoms is called disease.

Groups: **1. Infectious diseases** **2. Non-infectious diseases**

3. What is infectious disease? Give an example.

Diseases which are easily transmitted from one person to another are called infectious diseases. **Ex: AIDS, Tuberculosis, influenza, etc.**

4. What is non-infectious disease? Give an example.

Diseases which are confined to a person and do not spread to others are called non infectious diseases. **Ex: Cancer.**

5. Define immunity. Mention two type of immunity.

The overall ability of the host to fight against disease causing organisms or agents is called immunity. Two types are

- 1. Innate immunity and**
- 2. Acquired immunity.**

6. Mention four types of innate immunity barriers with an example each.

- 1. Physical barriers:** **Skin, Mucus coating** of the epithelium lining the respiratory, gastrointestinal and uro-genital tracts.
- 2. Physiological barriers:** **HCl** in stomach, **Saliva** in mouth (Lysozyme), **tears, sweat** (sudorific glands), **Oil** (sebaceous glands), etc.
- 3. Cellular barriers:** **Leukocytes** like Polymorpho-nuclear leukocytes (**PMNL-Neutrophils**), **monocytes, natural killer cells** (lymphocytes), etc.
- 4. Cytokine barriers:** **Interferon's.**

7. What are allergens? Give two examples.

The substances that cause allergy are allergens. **OR** the substances to which allergic immune responses are produced are called allergens. **Ex: Pollen grains, mites, dust, animal dander, etc.**

8. Name any two drugs used to reduce symptoms of allergy.

Anti-histamines and steroids.

9. Name two allergic chemicals released from mast cells.

Histamine and serotonin.

10. What is auto immune disease? Give an example.

The misdirected immune response of the body against the healthy self cells is called auto immune disease.

Ex: Rheumatoid arthritis

11. Differentiate cell mediated and antibody mediated immunity.

Cell mediated immunity	Antibody mediated immunity (Humoral)
1.the immunity produced by T-lymphocytes is called cell mediated immunity	1. The immunity produced by antibodies in the body fluid or humor derived from B-lymphocytes is called antibody mediated immunity.
2. It reacts against transplants	2. It does not react against transplants

12. What is tumour? Mention two types of tumours.

The extra mass of tissues produced due to cancer is called tumour.

1. **Benign tumours** (remain at their original location and do not spread to other parts of the body)

2. **Malignant tumours** (the tumour cells which damage, invade or migrate to surrounding tissues)

13. Write a note on different approaches of cancer treatment.

Following are the common treatment approaches of cancer

1. **Surgery**

2. **Radiation therapy** (tumour cells are irradiated lethally by taking proper care of surrounding normal tissue).

3. **Immunotherapy** (patients are given substances called biological response modifiers such as α -interferon which activates their immune system and helps in destroying the tumour).

4. **Chemotherapy** (drugs used to kill certain tumour cells, mostly cause side effects like anaemia, hair loss, etc.) Ex: **Vincristin & Vinblastin** from **Vinca rosea**, **Taxol**, etc.

5. **Gene therapy** (transformation of certain cells to produce anti tumour substance called Tumour necrosis factor-TNF)

Most cancers are treated by combination of surgery, radiotherapy and chemotherapy.

14. What are opioids? Give an example.

Drugs bind to specific opioids receptors present in our nervous system and gastro-intestinal tract, extracted from **Papaver somniferum** (Opium) plant are called opioids.

Ex: **Opium, Morphine, Heroin**, etc

15. What are cannabinoids? Give an example.

The group of chemicals interacts with cannabinoid receptors in the brain, extracted from **Cannabis sativa** (Indian hemp) plant are called cannabinoids.

Ex: **Marijuana, hashish, Charas, ganja**, etc.

16. List the causes of drug abuse in adolescence.

- a) Curiosity
- b) need for adventure and excitement
- c) Experimentation
- d) Peer pressure from friends
- e) Unstable or unsupportive family structures

17. Why sports persons often fall victims to drug addiction?

Sportspersons misuse narcotic analgesics, anabolic steroids, diuretics and certain hormones. Drugs are used to **increase muscle strength**, to **promote aggressiveness** and to **increase overall athletic performance**.

18. Mention the withdrawal symptoms of drug addicts.

If the regular dose of drugs or alcohol is suddenly discontinued, it leads some withdrawal symptoms or syndrome like

- **anxiety,**
- **shakiness,**
- **nausea,**
- **sweating,**
- **muscle cramps,**
- **abdominal pain,**
- **Vomiting, etc.**

The withdrawal symptoms are severe and need medical supervision.

19. Mention the measures practiced to prevent drug and alcohol by adolescent.

- Avoiding undue peer pressure in studies, sports and other activities.
- Educating and counselling the child to face problems, stress, disappointments and failures as a part of life. Promoting healthy habits like sports, reading, music, yoga, etc.
- Seeking the help of parents, peers and friends to solve their problems.
- Alert parents, teachers and friends should identify the danger signs of drug abuse. This would help in initiating proper remedial steps or treatment.
- Seeking professional and medical help from qualified persons for de-addiction and rehabilitation programmes.

20. Using tobacco in any form is injurious to health. Give reasons?

Tobacco is smoked, chewed or used as snuff. It contains large number of toxic chemicals including **nicotine**. Use of tobacco causes following health problems:

- Cancer of lung, urinary bladder and throat.
- Bronchitis
- Emphysema
- Coronary heart diseases
- Gastric ulcer
- Increases BP and rate of heart beat.
- Carbon monoxide content in blood reduces the concentration of haem-bound oxygen leads oxygen deficiency in the body.

21. From which plant opium is obtained? Name any two derivatives of opium

Opium is extracted from *Papaver somniferum*. The two derivatives of opium are **Morphine** and **Heroin**.

22. Differentiate a cancer cell from a normal cell.

Cancer cell	Normal cell
1. exhibit immortality	1. do not exhibit immortality
2. Undifferentiated cells	2. cells undergo differentiation
3. lead parasitic life on other normal cells	3. they are not parasitic cells
4. divide without control	4. division is controlled phenomenon
5. Lost the property of contact inhibition due to absence of surface glycoprotein- Fibronectin .	5. exhibit contact inhibition due to presence of fibronectin

THREE MARKS QUESTIONS:

1. Write the pathogen/causative organism, mode of infection and symptoms of typhoid/ Pneumonia/ common cold / ascariasis / Filariasis / ringworms / amoebiasis / malaria.

(NOTE: some extra points were given, with respect to symptoms and control measures)

A) Typhoid (enteric fever):-

Causative organism/pathogen: *Salmonella typhi* (bacterium)

Mode of infection: Enter the small intestine through contaminated **food** and **water** and migrate to other organs through **blood**.

Symptoms:-

1. High fever (39° to 40°C or 104°F)
2. Weakness
3. Stomach pain
4. Constipation
5. Headache and
6. Loss of appetite
7. Intestinal perforation and death may occur in severe cases.

Typhoid fever could be confirmed by **Widal test**. (**Mary Mallon** known as **Typhoid Mary**, was a cook by profession and a typhoid carrier, who continued to spread typhoid for several years through the food she prepared.)

Preventive measures:-

1. Providing proper community sanitation
2. Supplying screened pure drinking water
3. Providing hygienic food free from flies
4. Taking typhoid vaccine
5. Treating with antibiotics

B) Pneumonia:-

Bacteria like *Streptococcus pneumoniae*, *Diplococcus pneumoniae* and *Haemophilus influenzae* cause disease pneumonia in humans. [There are different types of pneumonia according to causative organism such as bacterial pneumonia, viral pneumonia (**Adeno virus**), amoebic pneumonia (*Entamoeba histolytica*), etc.]

Mode of infection: occurs through **sputum** (Phlegm) of patient. Enter the lungs by inhaling contaminated air or **aerosols** or **droplets**.

Symptoms:-

1. Alveoli get filled with fluid leading to severe problems in respiration.
2. Fever & chills
3. Cough and headache

4. In severe cases, the lips and finger nails may turn gray to bluish in colour.

C) Common cold: The most common infectious human disease

Causative organism/pathogen: *Rhino* viruses.

Mode of infection: cough or sneezes of infected persons through inhalation. It may be also transmitted through contaminated objects like books, pens, cups, doorknobs, computer mouse & key board, etc. (They infect the nose and respiratory passage but not the lungs.)

Symptoms:

1. Nasal congestion and discharge
2. Sore throat, hoarseness & cough
3. Headache,
4. Tiredness, etc., which usually last for 3-7 days.

D) Amoebiasis (amoebic dysentery):-

Causative organism: *Entamoeba histolytica*. (Protozoa) That inhabits in the large intestine of human beings.

Mode of infection: The infection occurs by house flies through faecal contaminated food and water.

Symptoms:-

1. Constipation
2. Abdominal pain and cramps
3. Stools with excess mucous and blood clots

It can be controlled by hygienic condition, preventing the contamination of water, food, fruits, vegetables, etc.

E) Ascariasis:-

Causative pathogen: *Ascaris lumbricoides*. (Ascaris is an intestinal parasite)

Mode of infection: contaminated water, vegetables, fruits, etc.

Symptoms: 1. internal bleeding 2. muscular pain, 3. fever,
4. Anaemia 5. blockage of the intestinal passage.

The eggs (about 15000/day) of the parasite are excreted along with the faeces of infected persons which contaminate soil, water, plants, etc.

F) Filariasis (Elephantiasis):-

Causative pathogen: *Wuchereria bancrofti* and *W. malayi*.

Mode of infection: The pathogens are transmitted to a healthy person through the bite by the female mosquito vectors (Culex and Aedes species).

Symptoms: 1. head ache 2. Mental depression 3. Fever (in mild cases).
4. Inflammation of the organs in which they live for many years.

5. The blockage of lymphatic vessels resulting in gross enlargement of lower limbs called elephantiasis or Filariasis.

6. The genital organs are also often affected leads to deformation.

G) Ring worm (Tinea):-

The ring shaped or circular scaly patches of the skin by the infection of some fungi is called ring worm (tinea). It is one of the most common infectious diseases in man.

Causative pathogen: The common fungal genera that produce ring worm are *Microsporum*, *Trichophyton* and *Epidermophyton*.

Mode of infection: Ringworms are generally acquired from contact with soil or by using towels, clothes or even the comb of infected individuals

Symptoms:-

1. Appearance of dry, scaly lesions on various parts of the body such as face and neck (tinea barbae/barber's itch), foot (tinea pedis or athlete's foot), groin (tinea cruris) scalp (tinea capitis) and nails.
2. These lesions are accompanied by intense itching.
3. Heat and moisture helps to thrive in skin folds such as those in the groin or between the toes.

H) Malaria:-

Causative pathogen: a protozoan parasite *Plasmodium*

There are four species of plasmodium such as **Plasmodium vivax**, **P. malaria**, **P. falciparum** and **P. ovale** are responsible for different types of malaria. Of these, most serious and fatal **malignant** malaria caused by **Plasmodium falciparum**.

Mode of infection: bite of vector - **Female Anopheles mosquitoes**.

Symptoms: -

1. Loss of appetite and nausea
2. Head ache
3. Muscular pain and joint pain
4. Chill and high fever
5. Alternate high and low body temperature
6. Weakness and anaemia
7. Enlargement of liver and spleen

2. What is acquired immunity? Differentiate primary and secondary immune responses.

The ability of the body to resist any specific living or non-living agent that can cause disease is called **specific body defence**. It is acquired by an individual after the birth & it forms the third line of body defence.

The response produced by the body when it encounters a pathogen for the first time is called **primary response**.

The response of the body against the same pathogen during subsequent encounter is called **secondary or anamnestic response**. The secondary response is highly **intensified** and **faster** as our body has memory of the first encounter.

3. Write a note on mode of infection and prevention of AIDS.

Mode of HIV infection:

- (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
- (d) From infected mother to her child through placenta.

Prevention of AIDS:

- Making transfusing blood (from blood banks) safe from HIV
- ensuring the use of only disposable needles and syringes in public and private hospitals and clinics
- Free distribution of condoms & advocating safe sex
- Controlling drug abuse, and
- promoting regular check-ups for HIV in susceptible populations

4. Write a note on cancer detection and diagnosis.

The early detection of cancer by following diagnostic methods is essential for successful treatment.

- **biopsy** and **histo-pathological studies of tissues** (A piece of the suspected tissue cut into thin sections, stained and examined under microscope by a pathologist).
- **Blood** and **bone marrow test** helpful to identify increased cell counts in case of **leukemia**.
- Techniques like **radiography** (use of X-rays), **CT (Computed tomography)** and **MRI (magnetic resonance imaging)** scanning are used to detect cancers of internal organs.
- CT uses X-rays to generate a three dimensional image of the internal structure. MRI uses strong magnetic fields and non-ionizing radiations to accurately detect pathological and physiological changes in the living tissue.
- **Antibodies** against specific cancer antigens are also used for the detection of certain cancers.
- Some techniques of molecular biology can be applied to detect genes in individuals with inherited susceptibility to certain cancers. Ex: tobacco smoke in case of lung cancer.

5. What are carcinogens? Mention any two types of carcinogens.

The agents causing cancer are called **carcinogens**. There are **three** groups of carcinogens as physical, chemical and biological carcinogens.

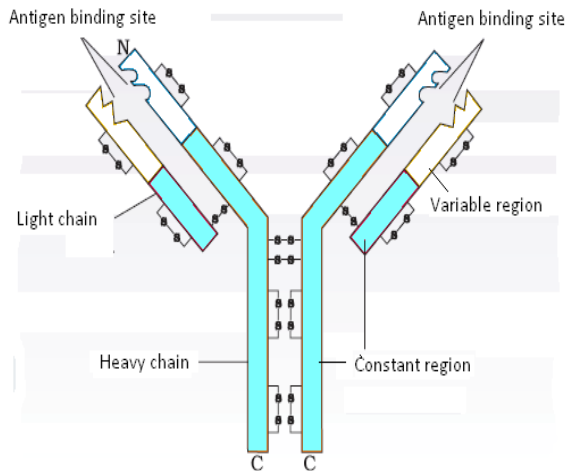
- **Physical carcinogens:** - Ionising radiations like X-rays and gamma rays and non-ionizing radiations like UV radiations.
- **Chemical carcinogens:** - Tobacco smoke, industrial chemicals like vinyl chloride, arsenic, nickel compounds, Azo dyes, etc.
- **Biological carcinogens:** - The viruses causing cancer called **oncogenic viruses** with **oncogenes**. Ex:- Rous sarcoma viruses(**RSV**) cause fowl cancer.(**Peyton Rous** got noble prize in 1966), Human Papilloma virus(**HPV**) cause cervical cancer, etc.

Cellular oncogenes (c-onc) or **proto oncogenes** have been identified in normal cells, activated under certain conditions leads to oncogenic transformation of the cells.

FIVE MARKS QUESTIONS:

1. Describe the structure of antibody with neat labelled diagram.

Structure of antibody (Immunoglobulin or Ig): Each antibody molecule is "Y" shaped with four peptide chains, two small chains called **light chains** and two longer called **heavy chains**. Hence, an antibody is represented as H_2L_2 .



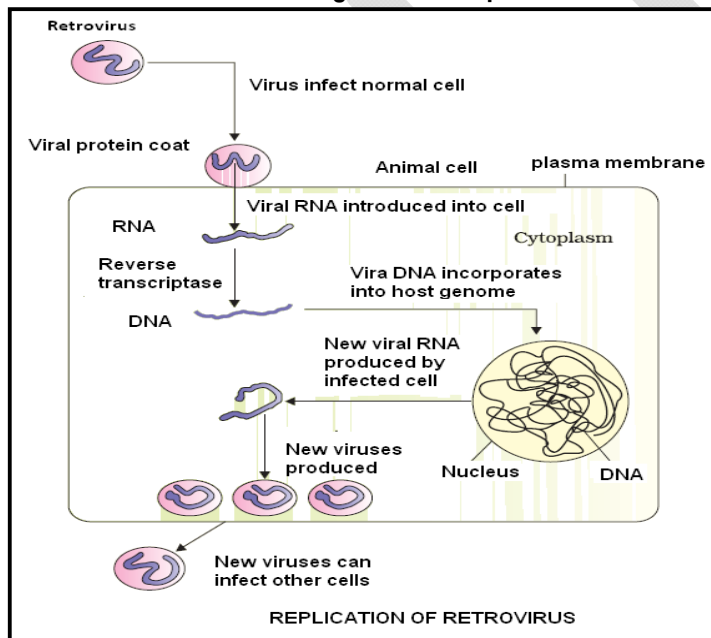
The peptide chains are held together by **disulphide bonds**. Each peptide chain consists of one **constant region (C)** and one **variable region (V)**. There are two antigen binding sites or prongs in each antibody.

There are **five** different types of antibodies as **IgA, IgD, IgM, IgE and IgG (most abundant antibody that can pass through placenta)**. These antibodies are responsible for humoral immune response.

(Only diagram for 2 or 3 marks)

2. Describe replication of HIV or retrovirus

with schematic/diagrammatic representation.



Multiplication or replication of retrovirus (HIV):-

- After entering 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.

- 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, diarrhea** and **weight loss**.
- The person starts suffering from infectious diseases by bacteria especially **Mycobacterium** or **viruses, fungi** and even parasites like **Toxoplasma**.
- The patient becomes so immuno-deficient that he is unable to protect himself against these infections.
- Widely used diagnostic tests for AIDS are **enzyme linked immuno-sorbent assay (ELISA)** or **Western Blotting**. Treatment of AIDS with anti-retroviral drugs is only partially effective. They can only prolong the life of the patient but cannot prevent death, which is inevitable.

3. List the effects of drug / alcohol abuse. (May be for 3 marks)

- reckless behavior, vandalism and violence
- Excessive doses of drugs may lead to coma and death due to respiratory failure, heart failure or cerebral hemorrhage
- Depression, hangover, dry cough, etc
- Drowsiness, mental confusion, trembling, etc.
- Lack of personal hygiene and withdrawal isolation.
- Loss of interest in hobbies, change of sleeping and eating habits
- Fluctuations in weight, appetite etc.
- Cause mental and financial distress to family and friends
- Intra-venous injection of drugs leads serious infections like AIDS and hepatitis B.
- Steroid drugs in females induce masculinisation (features like males), increased aggressiveness, mood swings, depression, abnormal menstrual cycles, excessive hair growth on the face and body, enlargement of clitoris, deepening of voice.
- In males it includes acne, increased aggressiveness, mood swings, depression, and reduction of size of the testicles, decreased sperm production, potential for kidney and liver dysfunction, breast enlargement, premature baldness, enlargement of the prostate gland.
- The premature closure of the growth centers of the long bones may result in stunted growth.
- Overdosing may leads to death
- Chronic alcoholism damages nervous system and liver (Cirrhosis)
- Use during pregnancy affect foetus
- Loss of consciousness and body balance
- Gastritis
- Pancreatitis