Name: Faisal hayat

ID no: 16156

Department: Radiology 2nd

Section: A

Subject: physiology

Q1: (A) How stimulus of smell moves from nostril to brain? Make a Diagram as well

Ans:-stimulus of the smell move from nostrils to brain by the following process:-

- Like the sense of taste. It is chemical science.
- They are called chemical change because they detect chemical and the environment.

1.Vaporized order molecules and chemical plotting in the air rich the nostrils and dissolve and the mucus which is on the roof of each nostril.

2. Underneath the mucus, in the olfactory epithelium,

Specialised receptor cells called olfactory receptor neurons delect the door .

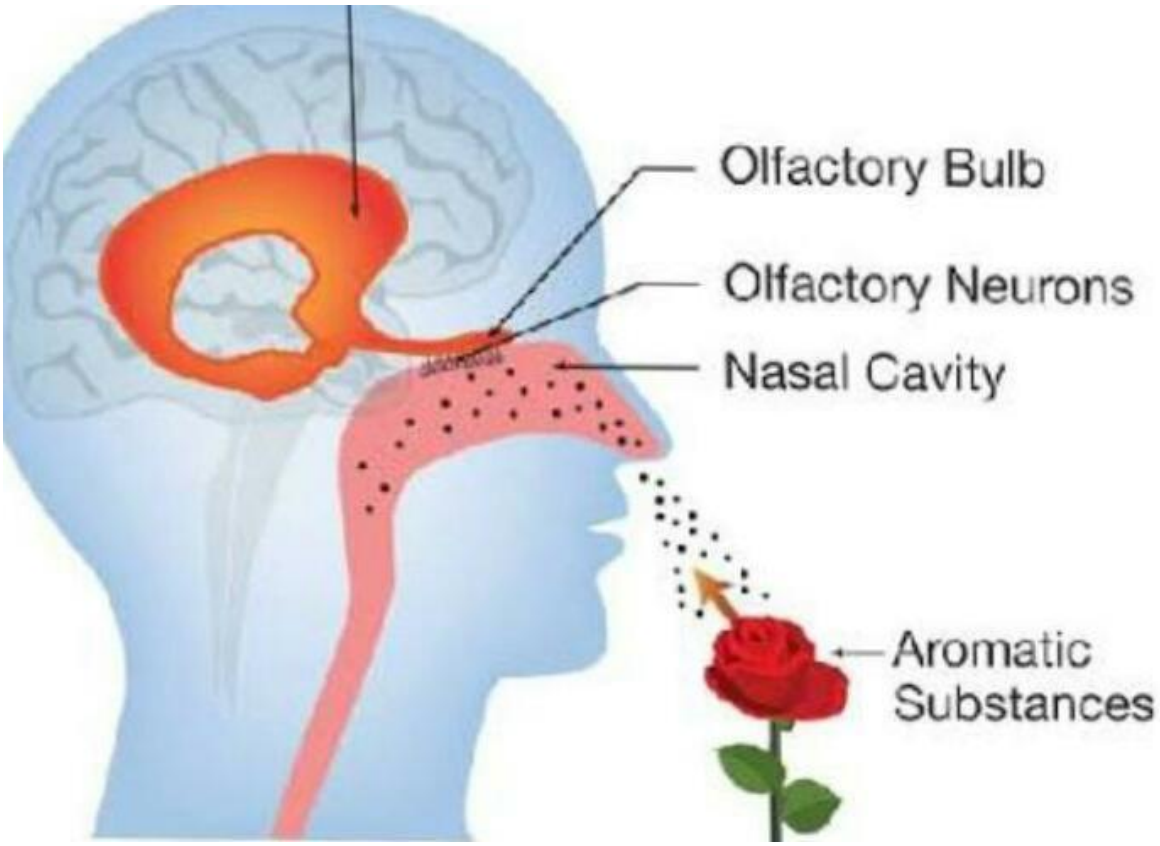
- These neurons are capable of detecting thousands of different odors.

3.the olfactory receptor neurons transmit the information to the olfactory bulbs, which are located at the back of the nose

4. From the olfactory bulbs the sensation are carried through olfactory tract to olfactory area in the teporal lobe of cerebral cortex.

5. These brain canters perceive odors and access memories to remind us about people place or events associated with these olfactory sensation.

Diagram:



Q 2: (A) What is difference between Haemostasis, Haematopoiesis and Homeostasis?

Ans:

- ***HAEMOSTASIS*:-**

  Haemostasis refers to the arrest of the escape of blood from the circulation system in animals. The blood can escape from the circulation system either naturally by clot formation or vessel spasm or artificially by compression or ligation. During haemostasis, the blood flow is slowed down and a clot is formed to prevent the blood loss. The haemostasis changes blood from a liquid to a gelatinous state.

- Haemostasis is the stopping of a flow of blood from the circulation system in animals.
- Haemostasis helps the circulatory system to perfuse the right organs.
- Haemostasis prevents blood loss from the circulation when a blood vessel is ruptured.
- Wound healing and blood clotting occur in haemostasis.

❖ ***Homeostasis*:-** Homeostasis refers to the tendency to maintain a relatively stable internal condition by a system of feedback controls. The endocrine system of the body plays a vital role in homeostasis, regulating the activity of the body via the action of hormones. The hormones are released into the circulation by the stimulation of the endocrine organs by a stimulus. The amount of hormone released is determined depending on the stimulus. Homeostasis is maintained by the feedback mechanisms. The negative feedback loops are involved in the majority of the homeostasis, maintaining the system at the set point. The positive feedback loops move the system away from its initial state.

- Homeostasis is the tendency to maintain a relatively stable internal condition by a system of feedback controls.
- Homeostasis is the mechanism by which the biological system maintains an equilibrium state.
- Homeostasis maintains stable internal conditions.
- Regulation of the body temperature, acidity, and alkalinity occurs in homeostasis.

❖ ***HAEMATOPOIESIS:-***

The process of formation of blood cells i.e. RBC'S, WBC'S and platelets is called as haematopoiesis and the sites where it occurs are known as hemopoietic tissues or organs (bone marrow, liver, spleen)
Cells responsible to do function of hemopoiesis are first seen in yolk sac of embryo in third week of embryonic development and these cells are known as hematopoietic stem cells

- After birth, liver stops its hematopoietic activity because around 4th month of foetal life migration of stem cells from liver, lymph nodes and spleen takes place to bone marrow
- So at time of fourth month of foetal life, hemopoiesis takes place in bone marrow
- Bone marrow is permanent residence for hematopoietic stem cells
- At time of birth, all hematopoietic stem cells are limited to bone marrow and bone marrow will be active

- Bone marrow found in the spongy gelatinous tissue found in hollow spaces in the interior of bones.

(B) what is Erythroblastosis fetalis?

ANS: Erythroblastosis fetalis:-

A haemolytic disease of the fetus and new born that occurs when the immune system of an Rh-negative mother produces antibodies to an antigen in the blood of an Rh-positive fetus which cross the placenta and destroy fetal erythrocytes and that is characterized by an increase in circulating erythroblasts and by jaundice

- Erythroblastosis fetalis classically results from Rho(D) incompatibility, which may develop when a woman with Rh-negative blood is impregnated by a man with Rh-positive blood and conceives a fetus with Rh-positive blood, sometimes resulting in hemolysis.
- Other fetomaternal incompatibilities that can cause Erythroblastosis fetalis involve the Kell, Duffy, Kidd, MNSs, Lutheran, Diego, Xg, P, Ee, and Cc antigen systems, as well as other antigens.

Incompatibilities of ABO blood types do not cause Erythroblastosis fetalis.

Q3: (A) What is Immunity? Explain different types of immunity?

Ans: immunity:-

The ability of the body to resist all type of organism or toxins that tend to damage the tissue and organs.

- the first line of Defence against microorganism is the skin and mucous membrane
- when the microorganism cross the skin then second line of Defence innate arm is available to destroy them.
- highly specific protection to provided by the adaptive (acquired) arm of immunity system third line of defense.

There are two type

1.innate immunity.

2.Acquired immunity.

❖***Innate immunity:***-it is inbron or natural resistance of the body to invading bacteria. Toxins and foreign agents.

❖***Example:-***

- resistance of skin to invasion by bacteria.
- Destruction of germ and stomach by its acid secretion and enzyme.

❖***Acquired immunity:-*** This type of immunity is built by the body against specific organism that can cause damage.

Type of Acquired immunity:

Cell mediated immunity:- it this type of acquired immunity is achieved through formation of activated lymphocytes against specific germs.

❖T. Lymphocytes is responsible for cell mediated immunity.

❖ once attached to their antigen t Lymphocytes divided from a clone .the cells of which them differentiate into different cell types.

❖***Helper T cells:***

these produce chemical which activate other WBCs such as phagocytes to engulf harmful materials

Cytotoxic T cells:

- these are also killer cells.
- These kills body cells which have become invaded by viruses.
- These are also destroyed cancer cells.

Suppressor T cells:- once an infection has been eliminated these cells suppress the function of both cytotoxic T cells and helper T cells and so maintain control of the immunity system.

Humoral immunity:-

It is the type of acquired immunity and which body from antibodies against specific germs.

- B lymphocyte is responsible for humaoral immunity.
- It is named so because they are produced and mature in bone marrow.
- when B Lymphocytes recognizes an antigen and divide it and from a clone

(B) What is difference between Antigen and Antibody?

Ans:-Antigen:- any foreign practical which can activate our system to release antibody called antigen.

- Antigens are any substance that stimulates the immune system to produce antibodies.
- Antigens can be bacteria, viruses, or fungi that cause infection and disease. Following are some of the differences between Antigen and Antibody:
- Generally proteins but can be lipids, carbohydrates or nucleic acids.
- Triggers the formation of antibodies.
- There are three basic kinds of antigens. (Exogenous, Endogenous and Autoantigens)
- The region of the antigen that interacts with the antibodies is called epitopes.
- Cause disease or allergic reactions.

❖***Antibody:-*** Antibodies, also called immunoglobulins, Y-shaped molecules are proteins manufactured by the body that help fight against foreign substances called antigens.

- Antibodies are proteins.
- Variable sites has the antigen binding domain.
- There are five basic kinds of antibodies. (Immunoglobulins M, G, E, D and A)

- The variable region of the antibody that specially binds to an epitope is called paratope.
- Protects the body by immobilization or lysis of antigenic material.

Q4: (A) Write down different functions of Antibody?

Ans:- Antibodies have three main functions:

1) Antibodies are secreted into the blood and mucosa, where they bind to and inactivate foreign substances such as pathogens and toxins (neutralization).

2) Antibodies activate the complement system to destroy bacterial cells by lysis (punching holes in the cell wall).

3) Antibodies facilitate phagocytosis of foreign substances by phagocytic cells (opsonization).

- Each antibody recognizes one specific antigen.
- For example, an antibody that recognizes the mumps virus cannot recognize the measles virus. Conversely, an antibody that recognizes the measles virus cannot recognize the mumps virus. This feature is called “antibody specificity.

Antibody action

Antibodies and the four key features of the immune system

1. Specificity of antibodies: Antibodies precisely recognize toxins and pathogens.

2. Diversity of antibodies: Antibodies against a variety of antigens preexist in the body.

3. Immunological memory: We don't don't develop symptoms of measles

4. Immune tolerance: Self cells and tissues are not normally attacked.

(B) Write difference between Primary and secondary response to an antigen?

Ans:- Differences between Primary and Secondary Immune Response:

The primary immune response occurs when an antigen comes in contact to the immune system for the first time. During this time the immune system has to learn to recognize antigen and how to make antibody against it and eventually produce memory lymphocytes.

The secondary immune response occurs when the second time (3rd, 4th, etc.) the person is exposed to the same antigen. At this point immunological memory has been established and the immune system can start making antibodies immediately.

- **This occurs as a result of primary contact with an antigen. This occurs as a result of second and subsequent exposure of the same antigen**
- **Responding cell is naïve B-cell and T-cell. Responding cell is memory cell.**
- **Lag phase is often longer (4-7 days), sometimes as long as weeks or months. Lag phase is shorter (1-4 days) due to the presence of memory cell.**
- **Level of antibody reaches peak in 7 to 10 days. Level of antibody reaches peak in 3 to 5 days.**
- **It takes longer time to establish immunity. Takes shorter time to establish immunity.**
- **First antibody produced is mainly IgM. Although small amount of IgG are also produced. Mainly IgG antibody is produced. Although sometimes small amount of IgM are produced.**

Other immunoglobulins such as IgA and in the case of allergy IgE are produced.

- **Amount of antibody produced depends on nature of antigen. Usually produced in low amount. Usually 100-1000 times more antibodies are produced.**
- **Antibody level declines rapidly. Antibody level remain high for longer period.**
- **Affinity of antibody is lower for its antigen. Antibodies have greater affinity for antigen.**
- **Primary response appears mainly in the lymph nodes and spleens Secondary response appears mainly in the bone marrow, followed by the spleen and lymph nodes.**
- **Both Thymus dependent and Thymus independent antigen gives primary immune response.**

Q5: Write difference between cell mediated and Antibody Mediated Immunity?

Ans:-The cell mediated immune system consist of T cells which originate in the bone marrow but moves to the thymous where their development is completed T cells are highly specialised cells in the blood and lymph. They fight bacteria viruses fungi

protozoans cancer etc within host cell and react against foreign matter such as ogran transplants.

- ❖The humoral immune system consist of B cell which in the bone marrow And stay their to develop B cells can produce antibodies but need exposure to foreign antigen to do so these antigens are cell surface oligosaccharide and proteins in which the cell use.
  - The humoral immunity is associated with the B-lymphocytes and is responsible for destroying the pathogens by producing antibodies against it, whereas the cell-mediated immunity is associated with the T-lymphocytes and is responsible for the destroying the pathogens or microorganism which have invaded the cells without producing antibodies.
  - Humoral immunity is intimately associated with B-lymphocytes, T-lymphocytes, and macrophages, on the contrary, the cell-mediated immunity is associated with T-lymphocytes, helper T cells, natural killer cells, and macrophages.
  - Humoral immunity plays a major role in recognizing antigen or any foreign particle and

in producing antibodies against it. It is known for working against extracellular pathogens.

- Humoral immunity plays a major role in recognizing antigen or any foreign particle and in producing antibodies against it. It is known for working against extracellular pathogens.
- Cell-mediated immunity is related to T-lymphocytes, which work by identifying viruses and microorganisms, thus destroying them by the cell lysis or phagocytosis or pinocytosis. It is known for working against intracellular pathogens. Cell-mediated immunity is related to T-lymphocytes, which work by identifying viruses and microorganisms, thus destroying them by the cell lysis or phagocytosis or pinocytosis. It is known for working against intracellular pathogens.
- Humoral immunity secretes antibodies to fight against antigens, whereas cell-mediated immunity secretes cytokines and no antibodies to attack the pathogens.
- The Humoral immunity is rapid or quick in their action against antigens, while the Cell-mediated immunity show delay though permanent action against any pathogens.

- Humoral immunity is involved in an early stage of graft rejections due to the formation of antibodies against any foreign particle, while Cell-mediated immunity is involved in the rejection of organ transplants after a certain time as they show delayed response.