Ministry of Higher Education
& scientific Research
Foundation of Technical Education
Technical Institute /Mosul
Nursing department

(Physiology)

Khalida Nayyef Mostapha
Lecturer
Article goals (theoretical): -
General objectives: -
   - The student can be able to see the benefit of physiological processes in the human Nursing.
Specific Objectives: -
   - The student should be able to find out:
     1 - the various organs of the body.
     2 - various body functions and physiological processes that take place inside the human body.

Article goals (practical): -
General objectives: -
   - Gain experience and skill in conducting experiments to check and physiology.
Specific Objectives: -
   - The student should be able to find out:
     1 - devices used to measure and physiology.
     2 - How to use in measuring devices and physiology.
<table>
<thead>
<tr>
<th>Week</th>
<th>Theory Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>blood - its components - blood smear - the volume of blood - red blood cells - the number of red blood cells - shape - counting method.</td>
</tr>
<tr>
<td>2</td>
<td>white blood cells - number - types – normal percentage of each type - the function of white blood cells.</td>
</tr>
<tr>
<td>3</td>
<td>blood clotting - Acidemia – platelets and it's function.</td>
</tr>
<tr>
<td>4</td>
<td>anemia - types of anemia</td>
</tr>
<tr>
<td>5</td>
<td>Jaundice - types – causes of jaundice - Analysis of red blood cells.</td>
</tr>
<tr>
<td>6</td>
<td>cardiovascular system - anatomy of the circulatory system - heart anatomy - heart valves.</td>
</tr>
<tr>
<td>7</td>
<td>Site of heart in the body - heart as a pump - cardiac out put.</td>
</tr>
<tr>
<td>8</td>
<td>ECG - heart sounds - heart valves areas - normal sounds</td>
</tr>
<tr>
<td>9</td>
<td>arterial blood pressure - blood flow silent - air pressure - blood pressure measurement</td>
</tr>
<tr>
<td>10</td>
<td>factors affecting blood pressure - systolic - diastolic - central control on the blood vessels – measurement of systolic blood pressure - diastolic</td>
</tr>
<tr>
<td>11</td>
<td>Respiratory system - respiratory muscles - the diaphragm - and function of the diaphragm for the lungs.</td>
</tr>
<tr>
<td>12</td>
<td>respiratory volumes – inspiration reserve volume – inspiration reserve volume - vital capacity - factors affecting the vital capacity.</td>
</tr>
<tr>
<td>13</td>
<td>diseases that affect on the respiratory volumes - and a nose functions</td>
</tr>
<tr>
<td>14</td>
<td>function alveoli – Acidemia</td>
</tr>
<tr>
<td>15</td>
<td>digestive system - mouth - pharynx</td>
</tr>
<tr>
<td>16</td>
<td>esophagus - stomach</td>
</tr>
<tr>
<td>17</td>
<td>Duodenum - small intestine – large intestine</td>
</tr>
<tr>
<td>18</td>
<td>enzymes secreted in the gastrointestinal tract - the pancreas – diabetes mellitus</td>
</tr>
<tr>
<td>19</td>
<td>liver – Bile secretion - digesting and metabolism of carbohydrates.</td>
</tr>
<tr>
<td>20</td>
<td>digest proteins metabolism - digest and metabolism fat.</td>
</tr>
<tr>
<td>Week</td>
<td>Theory Topics</td>
</tr>
<tr>
<td>------</td>
<td>---------------</td>
</tr>
<tr>
<td>21</td>
<td>Diseases of digestive system</td>
</tr>
<tr>
<td>23</td>
<td>nervous system - nerve anatomy - the central nervous system.</td>
</tr>
<tr>
<td>24</td>
<td>peripheral nervous system - cerebral nerves - the sympathetic nervous system.</td>
</tr>
<tr>
<td>25</td>
<td>muscles - structure of muscle - contraction and relaxation of muscle</td>
</tr>
<tr>
<td>26</td>
<td>Connection between nerves and muscles - relaxes nerves - stimulating muscles by nerves.</td>
</tr>
<tr>
<td>27</td>
<td>body temperature gained and lost - central control body temperature - high and low body temperature.</td>
</tr>
<tr>
<td>28</td>
<td>drugs affecting the body temperature (generally).</td>
</tr>
<tr>
<td>29</td>
<td>Endocrine glands - pituitary - thyroid - adrenal.</td>
</tr>
<tr>
<td>30</td>
<td>female reproductive system and the male (and ovarian function - Prostate - testicles) Ear function - the eye.</td>
</tr>
</tbody>
</table>
Title of lecturer(1): the blood

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject: Physiology.

Central Idea:
1. Nature of blood.
2. Components of blood.
3. Functions.

Aims:
Student will be able to:
1. Know an important part of human body.
2. Main difference between normal & abnormal components of blood.
3. Recognize some blood tests.

Pre-Exam:
1. What do you know about blood.
2. How many functions blood has as you think.

Blood

Blood: It is the vital alkaline liquid which circulates in a closed system of blood vessels.

Blood is very important for life because it supply the body tissues and cells with oxygen (O₂) and nutrients and remove their waste products.

Blood characters
1. Red colour.
2. Viscous.
3. Slightly alkaline (pH of blood 7.4)
4. Volume: In adult 5-6 Liters, In newborn infant 300 cc.
**Consistency of blood**: Blood consist of 2 parts

1- Blood cells 45%.
2- Liquid (plasma) part 55%.

---

55% plasma consists of:

1- Water 91.5%
2- Proteins 7%
   a- Albumin 4.2 %
   b- Globulin 2.5%
   c- Fibrinogen 0.3%
3- Solutes 1.5%
   a- Respiratory gasses\((O_2, CO_2)\)
   b- Nutrient
      e.g. glucose, Fatty acids, Amino acids.
   c- Hormones.

---

Blood cells

1- Red blood cells R.B.C.
   (Erythrocytes)
2- White blood cells W.B.C.
   (Leucocytes)
3- Platelets (Thrombocytes)
d- Electrolytes.
e- Non protein nitrogenous substances, like (Urea, Uric acid).

**Plasma**: It is the straw colour (slight yellow) alkaline fluid in which the blood cells float. It forms 55% of whole blood.

**Function of blood**: 

1- **Transport**: 
   a- Nutrient as glucose, Amino acid, Vitamins and minerals from small intestine to all body.
   b- Waste products like urea, uric acid and creatinine and also excess of water to the kidney to be excreted in urine.
   c- Respiratory gasses like oxygen (O₂) from lungs to the body cells and (CO₂) from cells to the lungs.
   d- Hormones from the endocrine glands to the site of their functions.
   e- Antibodies in disease condition.

2- **Regulation**: 
   a- Keeps the body temperature constant.
   b- Keeps the fluid and electrolytes contents inside and outside the cells constant.
   c- Keeps the pH of body fluids constant.

3- **Defence**: 
   a- By phagocytic action of white blood cells against bacteria, toxins and foreign bodies.
   b- By antibodies formation.
   c- Prevents blood loss from the body by clotting formation.
**Blood cells**

<table>
<thead>
<tr>
<th>Red blood cells R.B.C.</th>
<th>White blood cells W.B.C.</th>
<th>Platelets</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Erythrocytes)</td>
<td>(Leucocytes)</td>
<td>(Thrombocytes)</td>
</tr>
<tr>
<td>Function: Transport</td>
<td>Defence</td>
<td>Clotting</td>
</tr>
</tbody>
</table>

**Origin of blood cells:**

**Haemopoiesis:** formation of blood cells in the red bone marrow from the haemocytoblast (stem cell). It is a continuous process but diminish with aging (old person suffer from anaemia).

In Infant: Red bone marrow of all the bones.
In Adult: Red bone marrow of the membranous bones e.g sternum, ribs, vertebrae.

**Red blood cells R.B.C.**

Also called erythrocyte, these are circular biconcave non-nucleated discs in colour due to the presence of haemoglobin in it, very small in size having a diameters of 7.5 μ.

Thickness 2 μ. at periphery

1 μ. at center

So that the R.B.C. are able to pass through the capillaries wall.

R.B.C. have a cell membrane which is selectively.

The life span is 120 days.

**Number:** R.B.C. are the most numerous cells in the blood.

In males = $4.9 \times 10^6 - 5.4 \times 10^6 / \text{mm}^3$

In females = $3.9 \times 10^6 - 4.5 \times 10^6 / \text{mm}^3$

R.B.C. ..... Anaemia
R.B.C..... Polycythemia a- physiologically (1- In infants 2- people living in high placer)
b- pathologically (cancer in red bone marrow)

**Function of R.B.C.**

R.B.C. carry the respiratory gasses of the (O₂ and CO₂) by the haemoglobin which it contains.

**Important factors in formation of R.B.C.**

1. Protein in diet.
2. Iron (Fe) in diet ♂: needs 5 mg/day ♂: needs 10 mg/day
4. Folic acid in green vegetables, liver and spleen.
5. Intrinsic factor: It is a substance secreated from the gastric mucosa which helps in the absorption of vit B12 from small intestine.

The decrease of any of the above substance will lead to anemia.

Iron → Iron deficiency anaemia.
Vit B12 → Megaloblastic anaemia.
Folic acid
Intrinsic factor → pernicious anaemia

**Origin of R.B.C.**: Red bone marrow.

Haemocytoblast → proerythroblast (with nucleus) → normoblast (smaller and loose it’s nucleus) → mature erythrocyte (In circulation).

**Erythropoietin**: It is a hormone secreated from the kidney in case of hypoxia as in case of anaemia. This hormone will stimulate the bone marrow to produce more R.B.C. in chronic renal disease → Anaemia.
**Haemoglobin (Hb)**

A complex protein which gives the red colour to the erythrocytes. Hb consists of protein (globin) combined with an iron containing pigment (Haem).

The normal R.B.C. contains 100% of Hb.

**Normal range of Hb :**

Males : 13-18 gm/dL.

Females : 11-16 gm/dL.

**Functions of Hb:**

1- Hb has a strong affinity to combine with O2 forming the unstable oxyhaemoglobin .(bright red in colour).

\[ \text{Hb} + \text{O}_2 \rightarrow \text{Oxyhaemoglobin (In the lungs).} \]

2- Hb combine with CO2 forming dark red unstable carbominhaemoglobin.

\[ \text{Hb} + \text{CO}_2 \rightarrow \text{Carbominhaemoglobin (at body tissue).} \]

3- Hb has also a strong affinity to combine with the poisonous gas CO forming carboxy haemoglobin which is stable and person may die of Anoxia.

\[ \text{Hb} + \text{CO} \rightarrow \text{Carboxy haemoglobin.} \]

**Fate of R.B.C. (haemolysis of R.B.C.):**

Life span of R.B.C. is 120 days after that the R.B.C. are destroyed and haemolysed.

R.B.C. → Destroyed and haemolysed → Hb → Globin (protein)

Haem → 4 (Fe) atoms

Bilivirdin (pigment) → Biliribin pigment (unconjugated)

Liver cells → Conjugated bilirubin (bilirubin + glucoronic acid)

Common bile duct → Small intestine (duodenum) → Large intestine

Stericobiliogen → Stericobilin (in stool brown colour).
Auto –Exam :-
Enumerate components of blood.

Post – Exam :-
1- Define the blood.
2- Enumerate three functions of blood.

<table>
<thead>
<tr>
<th>Pre- Exam</th>
<th>Auto- Exam</th>
<th>Post -Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Blood</strong> : It is the vital alkaline liquid which circulates in a closed system of blood vessel. Blood is very important for life because it supply the body tissues and cells with oxygen (O₂) and nutrients and remove their waste products.</td>
<td>Blood consist of blood cells and plasma.</td>
<td><strong>Blood</strong> : It is the vital alkaline liquid which circulates in a closed system of blood vessel.</td>
</tr>
<tr>
<td>1- Transport.</td>
<td></td>
<td>a- Nutrient as glucose, Amino acid, Vitamins and minerals from small intestine to all body.</td>
</tr>
<tr>
<td>2- Regulation.</td>
<td></td>
<td>b- Waste products like urea, uric acid and creatinine and also excess of water to the kidney to be excreted in urine.</td>
</tr>
<tr>
<td>3- Defence.</td>
<td></td>
<td>c- Respiratory gasses like oxygen (O₂) from lungs to the body cells and (CO₂)</td>
</tr>
</tbody>
</table>
المصادر:

1 - د. د.ظافر الياسين – الفصلجة السريرية – وزارة الصحة 1983

2 - د. رشدي فتحي عبد الفتاح – أساسياث عامة في علم الفسيولوجيا – 1988

3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974

Title of lecturer (2): white blood corpuscles.

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject: Physiology.

Central Idea: -
1- Number of W.B.C.
2- Types of W.B.C.
3- Their functions.

Aims: -
Student will be able to:
1- Know an important components of blood.
2- Normal percentage of each type.

Pre-Exam: -
1- Mention total number of W.B.C.
2- What type is the most numerous.

White Blood cells W.B.C. (Leucocytes)

W.B.C. are colourless nucleated cells of different types shape and size. All of them larger than R.B.C. but much less in number.

Normal range of W.B.C. = 4000-11000 cells /mm$^3$ (In Both ♂ and ♀)

Normal average = 8000 cells /mm$^3$

Decrease of Leucocyte count → Leucocytopenia

e.g: - In Typhoid fever
       - Long Analgesic therapy.

Increase of Leucocyte count → Leucocytosis

Slight increase occurs in simple infection (Tonsillitis).

More increase occurs in appendicitis.

Large increase of Leucocyte count → Leukemia.

Life span: different according to type, but not more than 7-10 days.
**Origin:** spleen ,lymph nodes .

**Function:** Protection of body from disease .

<table>
<thead>
<tr>
<th>Types of W.B.C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Granulocytes 70%</td>
</tr>
<tr>
<td>- Neutrophils 60-65%</td>
</tr>
<tr>
<td>- Eosinophils 1-5%</td>
</tr>
<tr>
<td>- Basophils 0-1%</td>
</tr>
</tbody>
</table>

- **Granulocytes :**
  Called also polymorphonuclear cells multiple nucles and different shape. Also called phagocytes .
  The granulocytes are characterized by presence of granules in the cytoplasm, the function of this cells are phagocytosis of bacteria and foreign bodies in acute infection. The granules release enzyme which lyse the bacteria.

**Types of granulocytes**

1- **Neutrophils (60-65%)**
  The granules in cytoplasm coloured with natural dye, the nucleus is irregular in shape and lobulated 2-5 lobes.
  Function: Nutrophils form the first line of defence mechanism of the body against disease by phagocytosis.
  Increase of Neutrophils → Neutrophilia

2- **Eosinophils (1-5%)**
  The granules coloured with acidic dye (eosin), nucleus of 2 lobes.
  Function: Anti–Allergic cells
  Increase of eosinophils → Eosinophils (in parasitic infection)
3- Basophils (0-1%)
The granules are big in size coloured with basic dye, the nucleus of 2 lobes.
Function: product of heparin (anticoagulant)
Increase of Basophils → Basophilia (in tumours)

● Agranulocytes: No granules in the cytoplasm.

1- Lymphocytes (25%)
Function: Formation of antibodies, increase of lymphocyte in viral disease.

2- Monocyte (5%): The biggest W.B.C., longer life span, kidney shape nucleus
Function: phagocytosis (2nd line of defence mechanism).
Increase of monocyte occurs in chronic infection (in Tuberculosis & Burcillosis)

Auto- Exam:-
Are there any difference in leukocytes number between males and females? why?

Post – Exam: -
1- Enumerate types of leukocytes.
2- Mention function of each one.
<table>
<thead>
<tr>
<th>Pre-Exam</th>
<th>Auto-Exam</th>
<th>Post-Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal range of W.B.C. = 4000-11000 cells /mm$^3$ (In Both ♂ and ♀) Normal average = 8000 cells /mm$^3$</td>
<td>There are no deference in leukocyte number between males and females because the function is define</td>
<td>Granulocytes 70%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Neutrophils 60-65%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Eosinophils 1-5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Basophils 0-1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Agranulocytes 30%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lymphocytes 25%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Monocyte 5%</td>
</tr>
<tr>
<td></td>
<td>Neutrophils: phagocytosis</td>
<td>Neutrophils:</td>
</tr>
<tr>
<td></td>
<td>Eosinophils: Anti-Allergic cells</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Basophils: product of heparin (anticoagulant)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lymphocytes: Formation of antibodies</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Monocyte: phagocytosis</td>
<td></td>
</tr>
<tr>
<td>type is the most numerous is Neutrophils</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

المصادر:
1- د.ظافر الياسين – الفسلجة السريرية – وزارة الصحة 1983
2- د.رشدي فتحي عبد الفتاح – أساسيات عامة في علم الفسيولوجيا – 1988
3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974
Title of lecturer(3) : Blood clotting

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject : Physiology.

Central Idea :-
1- How is blood clott.
2- Mechanism of blood clott and their causes.

Aims:-
Student will be able to :
1- Know causes of clotting outside the body.
2- Diagnosis of long clotting time.

Pre – Exam :-
1- Dose blood remain as a liquid outside the body.
2- What factors keeping blood as a liquid inside the body;

**Blood clotting (Coagulation)**

Blood coagulation is protective device that prevent blood loss from an injured blood vessel.

**Haemostasis** : process of stoppage of bleeding. It is of 3 steps
1- Step I : Vascular spasm.
2- Step II : Formation of platelets plug (Temporary).
3- Step III : Formation of blood clot (Permanent).
Damaged tissues → Thromboplastin

Broken platelets → Ca^{+2} → Prothrombin → Thrombin

Fibrinogen → Fibrin (Insoluble)

serum + Fibrin ((Tight))

Serum = plasma – fibrinogen

**Haemophilia:** It is a hereditary disease due to deficiency of clotting factors (8 and 9). This disease occurs in male only, the female carry the disease. In this disease the blood clot formation is delayed and increase of clotting time (more than 15 minutes).

**Bleeding time** = 2-7 minutes

**Coagulation time** = 5-15 minutes

**Factors which affect coagulation:**
1. Increase of temperature.
2. (Ca) salts.
3. Injury of blood vessels.
5. Foreign body.
6. Vit. K.

**Anticoagulants:** Factors which slow the blood clot formation.

**Inside the body:**
1. Intact blood vessel.
2. Good blood circulation.
3. Removal of the activated clotting factors by the liver.
4. Antithrombin.
5. Plasmin.
6. Heparin: natural substance present in liver, lungs, heart, muscles and basophiles.

**Outside the body**
1. Decrease of temperature (blood stored 4 c°)
2. Sodium salts and potassium salts.
3. Heparin.
4. Oral anticoagulant, e.g.: Dicumoral

**Platelets (Thrombocytes)**

They are minute spherical structures (fragments of cells) found in the blood.

**Characters:**
- Size: very small, the diameter 2-4 μ.
- Normal range: 150000-400000/mm³.

Decrease thrombocytes ➔ Thrombocytopenia

- Origin: Red bone marrow (Megakaryoblast).

**Function of platelets:**
1. Stopping of bleeding in small injury (as pin prick) by aggregation of platelets and formation of platelets plug (Temporary plug).
2. Clotting mechanism in big wound by permanent clot formation.

**Acid – Base balance**

Normal blood is slightly alkaline, normal blood pH is 7.4

When the amount of CO₂ carried in plasma as sodium bicarbonate is 20 times the CO₂ in solution as acid (H₂CO₃), then blood pH will be 7.4

\[
\text{NaHCO}_3 \quad 20
\]
Acidaemia (Acidosis):
This is the fall of blood pH below 7.4 caused by either:
1- Reduction in the sodium bicarbonate level (metabolic acidaemia).
2- Increase in CO2 in solution (Respiratory acidaemia).

Metabolic acidaemia: occurs when acids enter the blood as phosphoric acid from soft drinks or Lactic acid in exercise or acetoacetic acid in untreated diabetes Mellitus.
Acidaemia stimulate the respiration via the respiratory center. This respiratory stimulation will leads to reduction in H2CO3.

Respiratory acidaemia: occurs in underventilation when CO2 is retained in the body by breathing a gas mixture containing a high percentage of CO2.

Alkalosis: refers to a condition reducing hydrogen ion concentration of blood plasma (alkalemia). Generally, alkalosis is said to occur when pH of the blood exceeds 7.45. The opposite condition is acidosis (when pH falls below 7.35).

Causes:
1- The cause of alkalosis is hyperventilation, resulting in a loss of carbon dioxide.
2- Alkalosis can be caused by prolonged vomiting, resulting in a loss of hydrochloric acid with the stomach content.
3- Severe dehydration

Auto – Exam:-
How long of bleeding from simple woud.

Post – Exam:-
1- What factors help blood clotting?
2- What role of platelets in blood clotting?
<table>
<thead>
<tr>
<th>Pre-Exam</th>
<th>Auto-Exam</th>
<th>Post-Exam</th>
</tr>
</thead>
</table>
| The blood doesn't remain as a liquid outside the body because the blood clot is formed | **Bleeding time** = 2-7 minutes | 1- Increase of temperature.  
2- (Ca) salts.  
3- Injury of blood vessels.  
4- Stasis of blood circulation.  
5- Foreign body.  
6- Vit | 1- Formation of platelets plug (Temporary).  
2- : Formation of blood clot (Perminant). |

1- Intact blood vessel.  
2- Good blood circulation.  
3- Removal of the activated clotting factors by the liver.  
4- Antithrombin.  
5- Plasmin.  
6- Heparin: natural substance present in liver, lungs, heart, muscles and bas |

المصادر:

Title of lecturer (4): Anaemia

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject: Physiology.

Central Idea: -
1. Normal amount of blood.
2. What would happen if blood volume reduced.

Aims: -
Student will be able to:
1. Know volume of blood and its content of (Hb).
2. Diagnose some types of Anaemia.

Pre-Exam: -
1. What is Anaemia.
2. Are there many types of Anaemia?

Anaemia

It is a condition of deficiency of number of R.B.C. in the blood or the content of Hb inside the R.B.C. or both.

Classification of Anaemia:

A. According to etiology:
1. Aplastic anaemia: Due to decrease in number of R.B.C. produced by the bone marrow.

Aplastic anaemia: primary (cause unknown).

Secondary: - Drug (e.g chloramphenicol cytotoxic drugs).

- Exposure to X ray radiation

2. Haemorrhagic anaemia: Due to blood loss.

- Acute (accidents) Rx.: Blood transfusion.

- Chronic (e.g bleeding peptic ulcer) Rx.: Treat the cause.

3. Nutritional anaemia:

Iron → Iron deficiency anaemia.
Vit B12 → Megaloblastic anaemia.
Folic acid →

4- **Pernicious anaemia**: Due to deficiency of intrinsic factor secreted from stomach. Rx. : Vit B12 ampules for life.

5- **Haemolytic anaemia**: Due to increase destruction of R.B.C.
   - Hereditary factor (Sickle cell anaemia)
   - Erythroblastosis foetus incompatible blood transfusion.

B- **According to morphology**:

1- **Normocytic Normochromic anaemia**: Size of R.B.C. normal, Hb content is normal.
   But there is deficiency in number of R.B.C. e.g (Renal failure).

2- **Microcytic hypochromic anaemia**: Size of R.B.C smaller, Hb content is less. e.g : Iron deficiency anaemia.

3- **Macrocytic Normochromic or hyperchromic anaemia**: Size of R.B.C. larger, Hb content normal or more but there is decrease in number of R.B.C.
   e.g : Megaloblastic anaemia due to decrease in vit B12, Folic acid, Intrinsic factor.

4- **Macrocytic hypochromic anaemia**: size of R.B.C. larger, Hb content less.
   e.g : Anaemia associated with twin pregnancy due to decrease in Fe & Vit B12.

**Auto – Exam:**
How can you diagnose anaemia by inspection.

**Post – Exam:**
1- Define anaemia.
2- Enumerate 3 types of anaemia.
<table>
<thead>
<tr>
<th>Pre – Exam</th>
<th>Auto- Exam</th>
<th>Post- Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaemia : Decrease in R.B.C. count</td>
<td>You can recognize that according to signs and symptoms like pale colour …. Et.</td>
<td>Anaemia : It is a condition of deficiency of number of R.B.C. in the blood or the content of Hb inside the R.B.C. or both.</td>
</tr>
<tr>
<td>There are many types of anaemia</td>
<td>1- Aplastic anaemia: Due to decrease in number of R.B.C. produced by the bone marrow. 2- Heamorrhagic anaemia: Due to blood loss. 3- Nutritional anaemia: Iron deficiency anaemia. Megaloblastic anaemia. Vit B12 Folic acid</td>
<td></td>
</tr>
</tbody>
</table>

المصادر:
1- د. ظافر الياسين – الفسلجت السريريت – وزارة الصحة 1983
2- د. رشدي فتحي عبد الفتاح – أساسيات عامة في علم الفسيولوجيا 1988
3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974
Title of lecturer(5) : Jaundice

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject : Physiology.

Central Idea :-
1- Definition of Jaundice.
2- Causes of Jaundice.

Aims:-
Student will be able to know :
1- Causes of Jaundice.
2- Reasons of R.B.C. Hemolysis.

Pre – Exam :-
1- What do you know about Jaundice.
2- When does Jaundice occur.

Jaundice
Failure to excrete bilirubin by normal way gives rise to Jaundice: yellowish discolouration of skin, conjunctiva of eyes due to accumulation of bilirubin in blood more than normal limit (0.2 - 1.2 mg/100ml). Urine becomes dark brown due to presence of bile pigment.

Types of Jaundice:
1- Pre – hepatic J.
This is due to excessive break down of red blood (Haemolysis) and the liver can't deal with the large amount of bilirubin produced.
e.g physiological J. which occurs in the baby shortly after birth.

2- Hepatocellular J.
Due to liver disease as in viral hepatitis and Jaundice caused by drugs and poisons.
3- Post – hepatic J.
Is caused by the blockage of the common bile duct due to an impact gall stone or carcinoma of head of pancreas.

Fate and Haemolysis of R.B.C.:
After haemolysis of R.B.C. most of Iron and globin protein is used to build up new R.B.C., the rest will be taken by the reticulo-endothelial system which are phagocytes present in bone marrow, spleen, liver. At beginning Hb loose its O₂ and so become dark blue in colour. Then change to green due to presence of bilivirdin which is converted to bilirubin (yellow pigment). This is transferd through plasma liver cells where it will be excreted as bile through the common bile duct in to the duodenum, then go to large intestine to be excreted to outside with faeces as stericobilin. If this process fails at any step it will lead to Jaundice.

R.B.C. → Destroyed and haemolysed → Hb → Globin (protein)

Haem → 4 (Fe) atoms

Bilivirdin (pigment) → Biliribin pigment (unconjugated)

Liver cells → Conjugated bilirubin (bilirubin + glucoronic acid)

Common bile duct → Small intestine (duodenum) → Large intestine → Stericobiliogen → Stericobilin (in stool brown colour).
Blood groups

1- ABO System .
2- Rh System .

There is agglutinogen in R.B.C. and there is agglutinin in plasma .

<table>
<thead>
<tr>
<th>Blood group</th>
<th>Agglutinogen in R.B.C.</th>
<th>Agglutinin in plasma</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A</td>
<td>Anti B</td>
<td>42%</td>
</tr>
<tr>
<td>B</td>
<td>B</td>
<td>Anti A</td>
<td>9%</td>
</tr>
<tr>
<td>AB</td>
<td>A+B</td>
<td>---</td>
<td>3%</td>
</tr>
<tr>
<td>O</td>
<td>---</td>
<td>Anti A+ Anti B</td>
<td>46%</td>
</tr>
<tr>
<td>Rh⁺</td>
<td>D</td>
<td>---</td>
<td>85%</td>
</tr>
<tr>
<td>Rh⁻</td>
<td>---</td>
<td>---</td>
<td>15%</td>
</tr>
</tbody>
</table>

In blood transfusion : Examine the blood group of the donor and recipient .

Rh system :

Rh factor : It is another agglutinogen called D .

Anti D is formed when :
1- If person Rh⁻ received blood from Rh⁺ person .
2- In the marriage of Rh⁻ woman an Rh⁺ man so the foetus may be Rh+ and so Anti D antibodies are formed in the mother's plasma during labour when mixing of the mother's blood with the foetal blood , baby will be in danger of death inside the uterus or to deliver with severe Jaundice a condition called Erythroblastosis foatalis .

Rx. : Anti D immunoglobulin given to mother directly after labour .
O\(^-\): Is the universal donor which can be given to all other groups without any fear of agglutination because there is no agglutinogen on the R.B.C.

AB\(^+\): Is the universal recipient which can receive blood from all other groups without agglutination because there is no agglutinin in the plasma.

**Compatibility Test:**

There is an important test must be done before blood transfusion process called (cross matching) and that occurs by centrifuging two samples of blood in different test tubes one for donor and other for recipient, then make mixing between R.B.C. of donor with plasma of recipient on slide, so if there any agglutination means the blood must be not given because presence of (sub groups) on R.B.C. membranes but it is very weak activity and not observed in ordinary test of blood grouping so compatibility test is very necessary in this process.

**Auto – Exam:-**

Define Jaundice with one reason of it.

**Post – Exam :-**

1- Enumerate types of Jaundice.

2- Mention causes of Jaundice.
<table>
<thead>
<tr>
<th>Pre-Exam</th>
<th>Auto-Exam</th>
<th>Post-Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>yellowish discolouration of skin, conjunctiva of eyes due to accumulation of bilirubin</td>
<td>Jaundice: Failure to excrete bilirubin by normal way</td>
<td>Types of Jaundice:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1- Pre – hepatic J.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2- Hepatocellular J.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3- Post – hepatic J.</td>
</tr>
</tbody>
</table>
| | 1- **Pre – hepatic J.**  
  e.g physiological J. in the baby shortly after birth. | |
| | 2- **Hepatocellular J.**  
  Due to liver disease as in viral hepatitis and Jaundice caused by drugs and poisons | |
| | 3- **Post – hepatic J.**  
  Is caused by the blockage of the common bile duct | |

المصادر:

1- د. ظافر الياسين – الفصلجة السريرية – وزارة الصحة 1983
2- د. رشدي فتحي عبد الفتاح – أساسيات عامة في علم الفسيولوجيا – 1988
3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974
Title of lecturer (6) : Cardio- Vascular System

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject: Physiology.

Central Idea: -
1- General idea about anatomy of Cardio- Vascular System
2- How dose heart work.

Aims: -
Student will be able to:
1- Know parts of heart.
2- Some knowledge about heart valves.

Pre –Exam: -
1- What is the heart considered for the body.
2- What is the heart located.

Cardio- Vascular System (The Circulatory System)

The C.V.S consist of:
1- Blood
2- Heart
3- Blood vessels - Arteries
   - Veins
   - Capillaries

The heart and blood vessels are the mechanism by which a constant circulation of the throughout the body is maintained.

The blood is pumped by the heart along the arteries to the capillaries and is returned by veins.

Functions of the Circulatory System:
1- To maintain a constant blood supply to the brain and vital centers at all times
2- To adjust the blood flow to other organs according to their requirements:
a- Blood supply to muscles is increased during exercise.
b- Blood supply to abdominal organs increase during digestion.
c- Blood supply to body surface (skin) is varied in order to regulate body temperature.

Heart: It is a hollow muscular organ lying in the thorax between the lungs and in relation to the upper surface of the diaphragm. It is situated behind the sternum and extend to the left for 9 cm. It is conical in shape, the base is directed upwards and to the right and the apex directed downwards and to the left.

Heart chambers:
The heart is divided by a septum into right and left halves which do not communicate with each other.
Each half consists of two chambers, an upper thin walled (atrium) and a lower thick walled (ventricle). The atria act as receiving chambers for the pump and the ventricles as distributers.
The opening between each atrium and ventricles is guarded by a valve which permits blood to flow only from the atrium to the ventricle and prevents any back flow in the opposite direction.

Structure of the heart:
Heart consists of three layers:
1- The pericardium (outer layer).
2- The myocardium (middle layer) or the heart muscle, this layer is thin in atria and thick in ventricles.
3- The endocardium (inner layer).

Heart valves:
These are fibrous structure which permits the blood flow in one direction and prevents it's returned in the opposite direction.
1- **Mitral valve (Bicuspid)**: This valve is between the left atrium and left ventricle and permits the blood flow from left atrium to left ventricle and prevents its return in the opposite direction.

2- **Tricuspid valve**: This permits blood flow from right atrium to right ventricle.

3- **Aortic valve**: Permits blood flow from left ventricle to aorta.

4- **Pulmonary valve**: Permits blood flow from right ventricle to pulmonary artery.

Auto – Exam: What are benefits of heart valves.

Post – Exam:

1- Enumerate chambers of the heart.

2- Enumerate heart valves with their sites.
<table>
<thead>
<tr>
<th>Pre –Exam</th>
<th>Auto- Exam</th>
<th>Post- Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>The heart as a pump to supply the body tissues and cells with blood.</td>
<td>The heart is divided by a septum into right and left halves which do not communicate with each other. Each half consists of two chambers, an upper thin walled (atrium) and a lower thick walled (ventricle). The atria act as receiving chambers for the pump and the ventricles as distributors.</td>
<td>1- <strong>Mitral valve</strong> (Bicuspid): This valve is between the left atrium and left ventricle and permits the blood flow from left atrium to left ventricle and prevents its return in the opposite direction. 2- <strong>Tricuspid valve</strong>: This permits blood flow from right atrium to right ventricle. 3- <strong>Aortic valve</strong>: Permits blood flow from left ventricle to aorta. 4- <strong>Pulmonary valve</strong>: Permits blood flow from right ventricle to pulmonary artery.</td>
</tr>
</tbody>
</table>

Heart lying in the thorax between the lungs and in relation to the upper surface of the diaphragm. It is situated behind the sternum and extend to the left for 9 cm.

<table>
<thead>
<tr>
<th>المصادر:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- د.ظاهر الياسين – الفصلحة السريرية – وزارة الصحة 1983</td>
</tr>
<tr>
<td>2- د.رشدي فتحي عبد الفتاح – أساسيات عامة في علم الفسيولوجيا – 1988</td>
</tr>
<tr>
<td>3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974</td>
</tr>
</tbody>
</table>
Title of lecturer(7) : Situation of heart on surface of the body.

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject : Physiology.

Central Idea :-

1- Heart as a pump.

Aims:-

Student will be able to:

1- Know meaning of cardiac output.

Pre – Exam :-

1- Why did heart considered as a pump.

Situation of heart on surface of the body:

The human heart has a mass of between 250 and 350 grams and is about the size of a fist. It is located anterior to the vertebral column and posterior to the sternum. It is enclosed in a double-walled sac called the pericardium. The superficial part of this sac is called the fibrous pericardium. This sac protects the heart, anchors its surrounding structures, and prevents overfilling of the heart with blood.

The outer wall of the human heart is composed of three layers. The outer layer is called the epicardium, or visceral pericardium since it is also the inner wall of the pericardium. The middle layer is called the myocardium and is composed of cardiac muscle which contracts. The inner layer is called the endocardium and is in contact with the blood that the heart pumps. Also, it merges with the inner lining (endothelium) of blood vessels and covers heart valves.

The heart is divided by a septum into right and left halves which do not communicate with each other.
Each half consists of two chambers, an upper thin walled (atrium) and a lower thick walled (ventricle). The atria act as receiving chambers for the pump and the ventricles as distributers.

The opening between each atrium and ventricles is guarded by a valve which permits blood to flow only from the atrium to the ventricle and prevents any back flow in the opposite direction.

**Heart as a pump:**

The left ventricle pumps the blood to all the body tissues through the aorta. The right ventricle pumps the deoxygenated blood to lungs through the pulmonary artery.

**Stroke volume:**
The amount of blood which is pumped by each ventricle in every beat, during rest it is 70 cm$^3$.

**Heart rate:**
The number of heart beats in one minute, normally and during rest it is 70/min.

Increase in heart rate = Tachycardia - physiologically (exercise) - pathologically (hyperthyroidism)

Decrease in heart rate = Bradycardia - physiological (athletic) - pathological (hypothyroidism)

**Cardiac output:** The amount of blood pumped by each ventricle in one minute, normally and during rest it is 5 liters/min.

Cardiac output = Stroke volume $\times$ Heart rate

$$= 70 \times 70 = 4900 \text{ cm}^3 = 5 \text{ L./min.}$$

**Cardiac cycle:**

Contraction $\times$ Relaxation in body muscle

Systole $\times$ Diastole in cardiac muscle

The two sides of the heart act together, the systole starts at atria then to the ventricle then diastole starts.
This systole and diastole of atria and ventricles is called (the cardiac cycle) and each cycle takes 0.8 seconds.

Systole 0.3 sec.  Diastole 0.5 sec.

**Course of blood through the heart:**
Blood from veins of head, neck and upper limbs enters the right atrium by the superior venacava and from rest of the body and lower limbs by the Inferior venacava.

Blood passes through the right atrioventricular opening in to the right ventricle this opening is guarded by the tricuspid valve.

Blood leaves the right ventricle by the pulmonary artery (Deoxygenated blood) it passes to the capillaries of the lungs and is collected up in the 4 pulmonary veins which pass to the left atrium (oxygenated blood).

Blood then passes through the left atrioventricular opening which is guarded by the mitral valve, to the left ventricle, then the blood leaves the left ventricle by the large main artery of the body (Aorta).

**Blood circulations:**

1. **Pulmonary circulation:**
   - Right atrium → right ventricle → pulmonary artery
   - Left atrium ← 4 pulmonary veins ← veinules ← lungs

2. **Systemic circulation:**
   - Left atrium → left ventricle → Aorta → small arteries
   - Right atrium ← Sup veinules ← capillaries ← arterioles
   - Inf venacava at tissue and cell body
The cardiac muscle has 2 characters:
1- Rhythmicity
2- Conductivity

**The conductive system of the heart consists of:**

1- **Sino – Atrial node (S.A node)**: in the right atrium.
2- **Atrio – Ventricular node (A.V node)**
3- **Atrio – Ventricular bundle (bundle of His)**
   Rt bundle branch
   Lt bundle branch
4- **Purkinjie fibers**

**Normal sinus Rhythm:** It is the normal cardiac impulse which originated from the S.A node and spread through the conductive system of the heart to reach the ventricular fibers.

**Auto – Exam:**
How can know roughly heart size.

**Post – Exam:**
1- Define cardiac out put.
2- Name two causes reduce cardiac out put.
<table>
<thead>
<tr>
<th>Pre –Exam</th>
<th>Auto- Exam</th>
<th>Post- Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>The heart considered as a pump because it's pumped the blood to all the body.</td>
<td>We can know roughly heart size from hand’s</td>
<td><strong>Cardiac out put</strong>: The amount of blood pumped by each ventricle in one minute, normally and during rest it is 5Liters/min</td>
</tr>
<tr>
<td>The heart considered as a pump because it's pumped the blood to all the body.</td>
<td>We can know roughly heart size from hand’s</td>
<td>The causes which reduce cardiac out put are starvation and loss the blood.</td>
</tr>
</tbody>
</table>

المصادر:

1- د.ظافر الياسين – الفسلجة السريرية – وزارة الصحة 1983
2- د.رشدي فتحي عبد الفتاح – أساسياث عامة في علم الفسيولوجيا – 1988
3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974
Title of lecturer(8) : Electrocardiogram

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject : Physiology.

Central Idea :-
1- How dose heart act?
2- What do normal heart sounds mean?

Aims:-
Student will be able to:
1- Know areas of heart valves.
2- recognize normal and abnormal sounds.

Pre –Exam :-
1- What do you know about E.C.G
2- How many sounds for heart.

The Electrocardiogram E.C.G.:

E.C.G.: It is a change in the electrical voltage which associates the spread of the cardiac impulse from the sino- atrial node to the atria, then down the atrioventricular bundle and finally to the ventricles, this change can be recorded at distances remote from the heart.
The recording shows fluctuations throughout the cardiac cycle which are known as waves and complexes.

Types of leads:
1- Standard limb leads
   Lead I   Rt arm + Lt arm
   Lead II  Rt arm + Lt foot
   Lead III Lt arm + Lt foot

2- Augmented unipolar leads:
   avR    Rt arm + zero electrode
   avL    Lt arm + zero electrode
avF   Lt foot   + zero electrode

3- **Chest leads** : These are 6 leads put on the chest: V1, V2, V3, V4, V5, V6.

**The normal E.C.G.**:

P- wave = Atrial systole.

Q.R.S complex = ventricular systole.

T-wave = ventricular diastole.

Changes in the E.C.G. may indicate heart disease as Ischemic heart disease and myocardial infarction.

**Heart sounds**:

1- **First heart sound (lub)** : This is due to closure of mitral and tricuspid valves, so it occurs at beginning of ventricular systole.

2- **Second heart sound (dup)** : Due to closure of pulmonary and aortic valves, so it occurs at beginning of ventricular diastole.

3- **Third heart sound** : Due to flow of blood to the ventricle.

4- **Fourth heart sound** : Due to contraction of atria.

The 3rd and 4th heart sounds are not heard normally by stethoscope but may be recorded by phonocardiograph.

**Abnormal heart sounds (Murmurs)**:

1- **Functional murmurs** : Abnormal heart sound due to rapid filling of ventricles but there is no structural changes in the valves, these murmurs are always systolic. E.g: In pregnancy and anaemia.

2- **Organic murmurs** : Abnormal heart sounds due to structural changes of the heart or its valves, these are either systolic and diastolic according to the lesion. E.g: Stenosis and Incompitance.
Areas of the heart valves:
1- Closure of mitral valve is best heard at 5th left intercostal space.
2- Closure of tricuspid valve is heard at the 6th right cartilage.
3- Closure of aortic valve is heard at 2nd right cartilage.
4- Pulmonary closure is heard at 2nd left intercostal space.

Auto – Exam:
Name direction of heart.

Post – Exam:
1- Enumerate the leads of E.C.G
2- Enumerate heart valves with their sites.
<table>
<thead>
<tr>
<th>Pre –Exam</th>
<th>Auto- Exam</th>
<th>Post- Exam</th>
</tr>
</thead>
</table>
| E.C.G.: It is a change in the electrical voltage which associates the spread of the cardiac impulse from the sino-atrial node to the atria, then down the atrio-ventricular bundle and finally to the ventricles, this change can be recorded at distances remote from the heart. | The direction of heart to left side. | Types of leads:  
1- Standard limb leads  
Lead I Rt arm + Lt arm  
Lead II Rt arm + Lt foot  
Lead III Lt arm + Lt foot  
2- Augmented unipolar leads:  
avR Rt arm + zero electrode  
avL Lt arm + zero electrode  
avF Lt foot + zero electrode  
3- Chest leads: These are 6 leads put on the chest: V1, V2, V3, V4, V5, V6. |
| There are four sounds for heart. | Areas of the heart valves:  
1- Closure of mitral valve is best heard at 5th left intercostal space.  
2- Closure of tricuspid valve is heard at the 6th right cartilage.  
3- Closure of aortic valve is heard at 2nd right cartilage.  
4- Pulmonary closure is heard at 2nd left intercostal space. |

المصادر:

1- د.ظافر الباسين - الفضيلة السريرية - وزارة الصحة 1983
2- د.رشدي فتحي عبد الفتاح - أساسيات عامة في علم الفيسيولوجيا – 1988
3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974
Title of lecturer (9): Arterial blood pressure

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject: Physiology.

Central Idea: -
1- Nature of blood flow.
2- Relationship between atmosphere and blood pressure instrument.

Aims: -
Student will be able to:
1- Learn the difference between arterial and veinous blood pressure.
2- How can measure blood pressure.

Pre -Exam: -
1- Which one is higher arterial or veinous blood pressure.
2- Name the instrument used to measure blood pressure.

Arterial blood pressure

Blood pressure: It is the force which is exerted by the blood on the walls of the blood vessels.

<table>
<thead>
<tr>
<th>Systolic B.P</th>
<th>120</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.P=</td>
<td></td>
</tr>
<tr>
<td>Diastole B.P</td>
<td>80</td>
</tr>
</tbody>
</table>

Systolic B.P:
It is the upper limit of B.P inside the aorta, and big arteries during ventricular systole. Normally at rest = 90 - 140 mm.Hg

Diastole B.P:
It is the lower limit of B.P inside the aorta and big arteries during ventricular diastole. Normally at rest = 70 - 90 mm.Hg
Blood vessels:

<table>
<thead>
<tr>
<th>Arteries</th>
<th>Veins</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Carry blood from heart to body tissues</td>
<td>1- Carry blood from body tissues to the heart</td>
</tr>
<tr>
<td>2- Thick muscular wall</td>
<td>2- Thin muscular wall</td>
</tr>
<tr>
<td>3- Deep located except the radial artery</td>
<td>3- More superficial</td>
</tr>
<tr>
<td>4- Bright red colour</td>
<td>4- Dark red (blue)</td>
</tr>
<tr>
<td>5- Contain oxygenated blood except the pulmonary artery</td>
<td>5- Contain deoxygenated blood except the 4 pulmonary veins</td>
</tr>
<tr>
<td>6- Blood flow under high pressure</td>
<td>6- Blood flow under low pressure</td>
</tr>
<tr>
<td>7- Bleeding is pulstile and difficult to stop</td>
<td>7- Bleeding is slow ,continuer and easily to stop</td>
</tr>
</tbody>
</table>

Capillaries:
Small vessels which communicate the ending of arteries with the beginning of vein .It has thin walls through which the gas exchange , nutrients and waste products pass between the blood and body cells .

Characters of blood vessels: It has the ability contract and relax
1- Control the blood pressure (B.P.)
2- Regulation the amount of blood to body organs according to their demand.
So the vasodilatation will lead dilatation of the muscle in wall of blood vessels leading to dilation of the vessel ,and this will decrease the B.P.

Measurement of B.P.:
The instrument which measure the B.P is called sphygmomanometer .
There are two method to measure B.P.:
1- Palpatory method: by the radial pulse, this only record the systolic B.P.

2- Auscultatory method: by using medical stethoscope, this record systolic and diastolic B.P.

**Blood flow:**
Normal blood flow is silent and laminar, the abnormal of blood flow is turbulent and noisy.

**Auto – Exam:**
Dose the blood flow silently or noisy.

**Post – Exam:**
1- Define arterial blood pressure.
2- Explain method of measurement.
<table>
<thead>
<tr>
<th>Pre-Exam</th>
<th>Auto-Exam</th>
<th>Post-Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial blood pressure is higher than venous blood pressure.</td>
<td>The blood flows silently.</td>
<td>Blood pressure: It is the force which is exerted by the blood on the walls of the blood vessels.</td>
</tr>
<tr>
<td>The instrument which used to measure blood pressure is sphygmomanometer</td>
<td>1- <strong>Palpatory method</strong>: by the radial pulse, this only record the systolic B.P.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2- <strong>Auscultatory method</strong>: by using medical stethoscope, this record systolic and diastolic B.P.</td>
<td>1- د.ظاهر الياسين – الفصلحة السريرية – وزارة الصحة 1983</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2- د.رشدي فتحي عبد الفتاح – أساسيات عامة في علم الفسيولوجيا – 1988</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974</td>
</tr>
</tbody>
</table>
Title of lecturer(10) : Factors affecting blood pressure

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject : Physiology.

Central Idea :-

1- Maintenance of normal blood pressure.
2- Keep blood vessels healthy as possible.

Aims:-

Student will be able to:

1- Measure systolic and diastolic blood pressure.
2- Know some factors increased or decrease blood pressure.

Pre – Exam :-

1- Name two factors reduce blood pressure.
2- Name two factors increase blood pressure.

Factors affecting the B.P.

1- Sex : B.P is higher in ♂.
2- Age : B.P is higher in elderly.
3- Body Weight.
4- Gravity.
5- Posture.
6- Excitement.
7- Muscular activity.
8- Some drugs like Alcohol, adrenaline lead to increase B.P.
9- Some conditions : Bleeding and anesthesia lead to decrease B.P.

Factors which determine B.P:

1- Cardiac output:

It is the amount of blood which is pumped by each ventricle every minute.

Cardiac output = Stroke volume X Heart rate
Increase in Heart rate  
Increase in Stroke volume  
Increase in Cardiac output  
Increase in B.P

2- Peripheral resistance:
It is the frictional resistance of the blood vessels against the blood flow. It depends on:

a- Vascular wall: cross sectional area of blood vessels.
Increase cross sectional leads to decrease of B.P.

b- Blood volume: decrease of blood volume leads to decrease of B.P.

c- Blood viscosity: increase of blood viscosity leads to increase of peripheral resistance then increase of B.P.

Abnormalities of B.P:

1- Hypertension:
increase of systolic B.P more than 140 mm.Hg and increase diastolic B.P more than 90 mm.Hg.

Types of Hypertension:

a- Essential hypertension: unknown cause.

b- Arteriosclerosis:
Due to presence of cholesterol on the walls of blood vessels so to lead to thickness of wall and decrease the cross sectional area which lead to increase in peripheral resistance and increase of B.P.

c- Renal hypertension: due to renal ischemia.

2- Hypotension:
Decrease of systolic B.P below 100 mm.Hg. and decrease of diastolic B.P below 70 mm.Hg.

Causes: Haemorrhage, Diarrhea, sever vomiting, sever burns.
Control of B.P. :

1- Sympathetic nerve :
   stimulation of sympathetic nerve \[\rightarrow\] Heart rate \[\rightarrow\] B.P.

2- Parasympathetic nerve :
   Stimulation of parasympathetic nerve \[\rightarrow\] Heart rate \[\rightarrow\] B.P

3- Baroreceptors :
   These are present in the aortic arch and in the carotid sinus, the baroreceptors are sensory receptors affected by the B.P. so in case of hypertension it stimulate the vasomotor center in brain in Medulla oblongata.

Auto – Exam :
Do you think that blood pressure increase during exercise.

Post – Exam :
1- Name two factors affecting systolic blood pressure.
2- How can measure diastolic blood pressure.
References:

1- د.ظافر الياسين – الفلسلجة السريرية – وزارة الصحة 1983
2- د.رشدي فتوح عبد الفتاح – أساسيات عامة في علم الفسيولوجيا – 1988
3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974
Title of lecturer(11) : Respiratory system

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject: Physiology.

Central Idea: -
1- Importance of respiratory system.
2- Function of respiratory system.

Aims: -
Student will be able to:
1- learn about respiratory system.
2- Anatomy of respiratory system.

Pre-Exam: -
1- How many times you breath in one minute?
2- Where does diaphragm located.

Respiratory System

The respiratory system consists of: -
1- Nasal cavities (nose)
2- Pharynx
3- Larynx
4- Trachea
5- Bronchi
6- Bronchioles  Lungs
7- Alveoli

The lungs:
The lungs are a pair of conical shaped organs enveloped in membrane called pleura, the lung occupy the greater part of the thoracic cavity, each lung is divided in to lobes, the right lung has 3 lobes and the left lung has 2 lobes.
The lung consist of alveoli.

Function of respiratory system:
1- Absorption of oxygen from the air.
2- Excretion of CO₂ from the blood.
3- Regulation of blood pH 7.4
4- Production the voice.

**Respirator muscles:**
1- Intercostal muscles.
2- Diaphragm.
3- Accessory muscles: muscles of neck and shoulder.

**The diaphragm:** is a curved sheet of smooth muscle which separates the thorax from the abdomen.

**The functions of diaphragm:**
1- It separates the thoracic cavity from the abdominal cavity.
2- It assists in breathing.
3- It helps expel substances from the abdominal cavity.

**Respiratory system consists of 2 parts:**
1- Upper conducting part called Dead space: It is the inspired air in the nasal cavities, pharynx, trachea and bronchi which not share in the gases exchange. It is 150 cm³.
2- Lower respiratory part: It is the real respiratory system where gases exchange take place, it is includes the ends of bronchioles and the alveoli.

**Respiratory rate:** Number of inspiration and expiration in one minute.

Normally at rest in adult: 15-20/min in children: 20-40/min

**Auto – Exam:**
Which lung is larger right and left.

**Post – Exam:**
1- Enumerate parts of respiratory system.
2- Mention the function of diaphragm.
<table>
<thead>
<tr>
<th>Pre -Exam</th>
<th>Auto- Exam</th>
<th>Post- Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normally at rest in adult : 15-20 /min</td>
<td>The right lung is larger than left lung.</td>
<td>1- Nasal cavities (nose)</td>
</tr>
<tr>
<td>The diaphragm : is a curved sheet of smooth muscle which separates the thorax from the abdomen</td>
<td></td>
<td>2- Pharynx</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3- Larynx</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4- Trachea</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 Bronchi</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6- Bronchioles Lungs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7- Alveoli</td>
</tr>
<tr>
<td></td>
<td>The functions of diaphragm:</td>
<td>The functions of diaphragm:</td>
</tr>
<tr>
<td></td>
<td>1- It separates the thoracic cavity from the abdominal cavity.</td>
<td>1- It separates the thoracic cavity from the abdominal cavity.</td>
</tr>
<tr>
<td></td>
<td>2- It assists in breathing.</td>
<td>2- It assists in breathing.</td>
</tr>
<tr>
<td></td>
<td>3- It helps expel substances from the abdominal cavity.</td>
<td>3- It helps expel substances from the abdominal cavity.</td>
</tr>
</tbody>
</table>

المصادر :
1- د.ظ.ف.ر الياسين – الفصلحة السريرية – وزارة الصحة 1983
2- د.رشدي فتحي عبد الفتاح – أساسيات عامة في علم الفسيولوجيا – 1988
3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974
Title of lecturer (12): Respiratory volumes

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject: Physiology.

Central Idea:
1- There are several volumes.
2- Vital capacity differ from person to other.

Aims:
Student will be able to:
1- Recognize inspiratory reserve volume.
2- Recognize expiratory reserve volume.

Pre–Exam:
1- Which are is more inspiratory or expiratory reserve volume.

Respiratory volumes:
1- Tidal volume (T.V.):
The amount of air which pass in and out of the lungs during the ordinary quite breathing, it is about 400 ml.

2- Inspiration reserve volume (I.R.V.):
The additional amount of air taken in by deep forced inspiration, it is 3.5 L.

3- Expiration reserve volume (E.R.V.):
The additional amount of air which is given out by deep forced expiration, it is 1.1 L.

4- Residual volume (R.V.):
The amount of air which remains in the lungs after the deepest possible expiration, it is 1.2 L.

Lung capacities:
1- Total lung capacity (T.L.C):
The total amount of air in the lungs.

2- Inspiratory capacity (I.C)
   The maximum amount of air which can be inspired.
   I.C = T.V. + I.R.V

3- Vital capacity (V.C)
   The maximum amount of air can be expired forcefully after a maximum inspiration.
   V.C = T.V. + I.R.V + E.R.V
   In ♂ = 4.5 L.
   In ♀ = 3.5 L.

4- Functional residual capacity (F.R.C):
   The amount of air which remain in the lungs after a normal expiration.
   F.R.C = E.R.V + R.V

Factors which affect the Vital capacity:
1- Sex
2- Age
3- Height
4- Size of body
5- Disease of lung:
   Disease which affect the respiratory volumes and vital capacity:
   1- Obstructive air disease like Asthma.
   2- Constrictive disease like fibrosis.

Auto – Exam:
What volume of expiration.

Post – Exam:
1- Enumerate respiratory volumes with their values.
2- Mention some factors affecting the vital capacity.
<table>
<thead>
<tr>
<th>Pre -Exam</th>
<th>Auto- Exam</th>
<th>Post- Exam</th>
</tr>
</thead>
</table>
| Inspiration reserve volume is more than expiratory reserve volume. | The volume of expiration is 400 ml. | Respiratory volumes:  
1- Tidal volume (T.V.): it is about 400 ml.  
2- Inspiration reserve volume (I.R.V.): it is 3.5 L.  
3- Expiration reserve volume (E.R.V.):  
4- Residual volume (R.V.): it is 1.2L |

Factors which affect the Vital capacity:  
1- Sex  
2- Age  
3- Height  
4- Size of body  
5- Disease of lung |

المصادر:  
1- د. ظافر الياسين – الفسلجة السريرية – وزارة الصحة 1983  
2- د. رشدي فتحي عبد الفتاح – أساسيات عامة في علم الفسيولوجيا 1988  
3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974  
Title of lecturer(13) : Disease which affect the respiratory volumes

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject : Physiology.

Central Idea :-
1- Vital capacity and some diseases.

Aims:-

Student will be able to : 
1- Diagnose some diseases affecting on vital capacity.
2- Know function of nose.

Pre - Exam :-
1- Mention one disease affects on respiratory volumes.

Disease which affect the respiratory volumes
1- Obstructive air disease like Asthma.
2- Constrictive disease like fibrosis.

Factors affecting the respiratory system :
1- Age : fast in children.
2- Exercise.
3- Emotional factor.
4- Diseases : pneumonia \(\xrightarrow{}\) increase respiratory rate.
5- Level of Co2 in blood :
\[\text{Co}_2 \text{ in blood} \xrightarrow{}\text{stimulation of respiratory center} \xrightarrow{}\text{Increase respiratory rate}\]
6- Level of O2 in blood
\[\text{O}_2 \text{ in blood} \xrightarrow{}\text{stimulation of respiratory center} \xrightarrow{}\text{Increase respiratory rate}\]
7- Change of blood pH:
Acidosis \(\xrightarrow{}\) Increase respiratory rate
Alkalosis \(\xrightarrow{}\) Decrease respiratory rate
**Mechanism of respiration:**

1. **Inspiration:**
   Contraction of intercostal muscles and diaphragm will lead to increase of thoracic cavity, so the air enters to lungs.

2. **Expiration:**
   The diaphragm and intercostal muscles relax so the thoracic cavity returns to normal size and expired air leaves the lung to the outside.

**Functions of the nose:**

1. Small hairs inside the anterior nares act as a filter for dust in the inspiral air.
2. Each cavity is lined by mucous membrane covered with ciliated columnar epithelium and richly supplied with blood, so the air entering the respiratory tract will be warmed and moistened before reaching the lungs.

**Auto – Exam:**

Do you think that heredity affects respiratory system.

**Post – Exam:**

1. What function of nose.
2. Name two types of diseases affect on activity of respiratory system.
<table>
<thead>
<tr>
<th>Pre-Exam</th>
<th>Auto- Exam</th>
<th>Post- Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibrosis is the disease which affect on respiratory system</td>
<td>Heredity affects on respiratory system as Asthma</td>
<td>1- Small hairs inside the anterior navies act as filter for dust in the inspiral air. 2- Each cavity is lined by mucous membrane covered with ciliated columnar epithelium and richly supply with blood, so the air entering the respiratory tract will be warmed and moistened before reaching the lungs affect on respiratory system</td>
</tr>
<tr>
<td>1- Obstructive air disease like Asthma. 2- Constrictive disease like fibrosis.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

المصادر:

1- د. ظافر الياسين – الفصلحة السريرية – وزارة الصحة 1983
2- د. رشدي فتحي عبد الفتاح – أساسيات عامة في علم الفسيولوجيا – 1988
3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974
Title of lecturer (14): Function of alveoli

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject: Physiology.

Central Idea:
1- Gases exchange process.
2- Acid alkaline balance.

Aims:
Student will be able to:
1- Know how dose gases exchange occur.
2- Reasons of acidemia.

Pre-Exam:
1- Is the blood acidic or alkaline as you think?

Functions of Alveoli:
1- The gas exchange between the air inside and the blood in the capillaries in the walls so the blood take O₂ and give CO₂.
2- Regulation of blood pH in case of Acidosis of blood the respiratory rate increase and more CO₂ is given out so to return the normal blood pH = 7.4

Types of ventilation:

1- Pulmonary ventilation:
Pulmonary ventilation = Tidal volume X Respiratory rate
\[= 400 \times (15-20)\]
\[= 6 - 8 \text{ L. /min}\]

2- Alveolar ventilation:
Alveolar ventilation = (Tidal volume - Dead space) X Respiratory rate
\[= 400 - 150 \times (15-20)\]
\[= 3750 – 5000 \text{ cm³ /min}\]
Acidaemia (Acidosis) :
This is the fall of blood pH below 7.4 caused by either :
1- Reduction in the sodium bicarbonate level (metabolic acidaemia).
2- Increase in Co2 in solution (Respiratory acidaemia ) .

Metabolic acidaemia : occurs when acids enter the blood as phosphoric acid from soft drinks or Lactic acid in exercise or acetoacetic acid in untreated diabetes Mellitus.

Acidaemia stimulate the respiration via the respiratory center .This respiratory stimulation will leads to reduction in H2Co3 .

Respiratory acidaemia : occurs in underventilation when Co2 is retained in the body by breathing .

Auto – Exam :
Where dose alveoli located.

Post – Exam :
1- Why did O2 combined with (Hb) in alveoli .
2- Mention the ratio of (NaHCO₃) to (H₂CO₃) in the normal blood .

<table>
<thead>
<tr>
<th>Pre - Exam</th>
<th>Auto- Exam</th>
<th>Post- Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>The blood slightly alkaline</td>
<td>Alveoli located in lungs.</td>
<td>$O_2$ combined with (Hb) in alveoli because higher concentration of $O_2$.</td>
</tr>
<tr>
<td>NaHCO₃ 20</td>
<td>H₂CO₃ 1</td>
<td></td>
</tr>
</tbody>
</table>

المصادر:

1. د.ظافر الياسين – الفسلجة السريرية – وزارة الصحة 1983
2. د.رشدي فتحي عبد الفتاح – أساسيات عامة في علم الفسيولوجيا – 1988
3. Cordon sears – Anatomy physiology for nurses oxford publication – London 1974
Title of lecturer (15) : Digestive system

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject: Physiology.

Central Idea: -
1- Anatomy of digestive system.
2- Functions of digestive system.

Aims: -
Student will be able to:
1- Digestive and absorption of food.

Pre – Exam: -
1- What function of blood in digestive system.

Digestive system

Digestive system consists of:
1- Mouth (Tongue – Teeth)
2- Pharynx
3- Oesophagus (Esophagus)
4- Stomach
5- Small intestine
6- Large intestine
7- Rectum
8- Accessory glands (Salivary glands, Liver, Pancreas)

Functions of digestive system: 
1- Ingestion (mastication and swallowing)
By the mouth, pharynx and oesophagus.
2- Digestion (In stomach and small intestine)
Number of chemical processes performed by enzymes secreted by the glands which convert the complicated foodstuffs into simple form which can be absorbed.

3- Absorption: (mainly in small intestine).

4- Egestion: The excretion of food residue (faeces) to outside by large intestine

Mouth: contains
1- Lips
2- Tongue
3- Teeth
4- Saliva

Tongue: muscular organ which contains the taste buds and helps in swallowing and speech.

Functions of mouth:
1- Intake of food.
2- Mastication by teeth.
3- Swallowing.
4- Help in speech.

Salivary glands:
1- Parotid glands.
2- Submandibular glands.
3- Sublingual glands.

The salivary glands secrete saliva through their ducts into the buccal cavity.

Saliva: colourless alkaline fluid which is secreted by the salivary glands, amount 1L./day.
Saliva consist of:
1- Water 90%
2- Mucin
3- (Ca) salts
4- Salivary amylase enzyme.

Decrease saliva (dry mouth):
Causes:
1- Mouth breathing.
2- Drugs (Atropine).

Increase saliva:
Causes
1- Intake of food.
2- Smell or slight of food.
3- Special types of food.

Functions of saliva:
1- Saliva amylase enzyme digestion of carbohydrate.
2- Moistening of food by mucin so helps in swallowing the bolus.
3- Deposition of Ca salts on the teeth.
4- Moistening of mouth helps in speech.
5- Solvent of some foods and drugs.
6- Removes the remnant of food from teeth.

Pharynx:
Expanded part of the digestive tract about 13 cm. long.
Function: Swallowing of bolus to the oesophagus.

Auto – Exam:
What is the most important part in the digestive system.

Post – Exam:
1- Name parts of digestive system.
2- What are functions of mouth and pharynx.
The blood carried the simple foodstuffs from the small intestine to the tissues and cells.

The stomach is the important part in the digestive system.

1. Mouth (Tongue – Teeth)
2. Pharynx
3. Oesophagus (Esophagus)
4. Stomach
5. Small intestine
6. Large intestine
7. Rectum
8. Accessory glands (Salivary glands, Liver, Pancreas)

The function of mouth is to intake the food and mastication then swallowing then push the food to pharynx then to the Oesophagus.

المصادر:
1- ظافر الياسين – الفسلجة السريرية – وزارة الصحة 1983
2- د.رشدي فتحي عبد الفتاح – أساسيات عامة في علم الفسيولوجيا – 1988
3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974
Title of lecturer(16) : Oesophagus

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject : Physiology.

Central Idea :-
1- Organ in digestive system

Aims:-
Student will be able to :
1- Anatomy of Oesophagus and stomach
2- Functions of each organ

Pre –Exam :-
1- What function of Oesophagus

Oesophagus :
Muscular tube 25 cm. long, it expends from pharynx to cardiac orifice.
Function : pushes the bolus to stomach by its peristaltic movement.

Stomach :
Dilated potion of alimentary canal, it lies in the upper part of abdomen. It consists of :
1- Cardiac orifice.
2- Fundus.
3- Body.
4- Pyloric antrum.
5- Pyloric orifice.
The stomach secreats the :

Gastric juice : Acidic colourless fluid about 2 L./day.
It consists of :
1- Water 90%
2- Mucin.
3- HCL. 4- Pepsin enzyme.
Factors affecting the secretion of gastric juice :

1- Neural factor :
Stimulation of vagus nerve ➔ Increase gastric juice .

2- Hormonal factor :
Secretion of gastrin hormone ➔ Increase gastric juice .

Function of stomach :
1- Acts as reservoir of food .
2- Breaks the food in to chyme and mix it with gastric juice .
3- Secretion of gastric juice which contains :
   HCL :
   a- neutralized the alkaline saliva and acidifies food .
   b- antimicrobial agent.
   c- aids the action of pepsin .
   pepsin enzyme : Digestion of proteins into peptones .
   Mucin : products the mucous membrane of stomach from the action of pepsin and HCL (prevent gastric ulcer).
4- Secretion of intrinsic factor which is important for the absorption of vit B12 from small intestine .

Auto – Exam :
Name situation of Oesophagus

Post – Exam :
What benifets of digestive juices.
<table>
<thead>
<tr>
<th>Pre-Exam</th>
<th>Auto-Exam</th>
<th>Post-Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function of oesophagus pushes the bolus to stomach by it's peristaltic movement.</td>
<td>Oesophagus located between pharynx and stomach</td>
<td>Digestive juices convert the complicated foodstuffs in to simple form which can be absorbed.</td>
</tr>
</tbody>
</table>

المصادر:

1- د. ظافر الياسين – الفصلحة السريرية – وزارة الصحة 1983
2- د. رشدي فتحي عبد الفتاح – أساسيات عامة في علم الفسيولوجيا – 1988
3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974
Title of lecturer (17) : Duodenum

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject : Physiology.

Central Idea :-
1- Study of lower parts of digestive system.

Aims:-
Student will be able to :
1- Anatomy of these parts and food absorption.

Pre – Exam :-
1- Why did small and large intestine named as that.

Small intestine :
Extend from pyloric sphincter of stomach to the first part of intestine (caecum), it is about 6 meters long, it consists of 3 parts:
1- Duodenum
   In duodenum opens the bile duct and pancreatic duct.
2- Jejunum.
3- Ileum.

Functions of small intestine:
1- Secretion of intestinal juice (3L./day) which is composed of water, mucin and enzymes.
2- Digestion of foodstuffs by enzymes:
   - Erypsin enzyme digests the proteins.

Polypeptide       Erypsin       Amino acid
- Complete the digestion of carbohydrates
Maltose           Maltase       glucose
Lactose           Lactase       glucose + galactose
Sucrose           Sucrase       glucose + fructose
3- Secretion of mucin which protects the mucous membrane from the action of acidic chyme and prevent the duodenal ulcer.

4- Absorption: It is the transport of simple digested food from cavity of small intestine into the blood (glucose and amino acids) or in to lymph (fatty acid and glycerin). Absorption is the function of intestinal villi.

5- Pushing of reiminant of food to the large intestine by it's peristaltic movement.

**Large intestine:**

It is 1.5 meters long. It consists of:

1- Caecum and appendix.

2- Ascending colon.

3- Transverse colon.

4- Descending colon.

5- Sigmoid colon.

6- Rectum.

7- Anal canal.

**Function of large intestine:**

1- Slight absorption (water, some salts and drugs).

2- Secretion of mucin which lubricates the faeces so helps in its passage through the anus.

3- Some bacteria in large intestine live as normal flora and provide the body with vit B and vit K.

4- Egestion of waste products to outside by defecation by its peristaltic movement.

5- Bacterial decomposition of cellulose.
**Auto – Exam:**
Which one is longer small or large intestine

**Post – Exam:**
1- What function of duodenum .
2- Enumerate two functions of large intestine .

### Keys Answers of Exams

<table>
<thead>
<tr>
<th>Pre -Exam</th>
<th>Auto- Exam</th>
<th>Post- Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small and large intestine named according to cross of intestine</td>
<td>Small intestine is longer than large intestine</td>
<td>1- Secretion of mucin which lubricates the faeces so helps in it's passage through the anus. 2- Some bacteria in large intestine live as normal flora and provide the body with vit B and vit K .</td>
</tr>
</tbody>
</table>

المصادر :
1- د.ظافر الياسين – الفسلجة السريرية – وزارة الصحة 1983
2- د.رشدي فتحي عبد الفتاح – اساسيات عامة في علم الفسيولوجيا – 1988
3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974
Title of lecturer(18) : Enzymes secreated in digestive tract

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject : Physiology.

Central Idea :-

1- What are enzymes and what their functions

Aims:-

Student will be able to :

1-some enzymes secreated in digestive tract
2- Learn few reasons can reduce the secretion

Pre –Exam :-

1- What do you know about diabetes mellitus ?

Enzymes which secreated in digestive system :

1- Salivary amylase which digest of carbohydrates .
2- Pepsin enzyme secreated in stomach which digest proteins .
3- Enzymes secreated in small intestine :
   - Erypsin enzyme digests the proteins .

Polypeptide $\xrightarrow{\text{Erypsin}}$ Amino acid
- Complete the digestion of carbohydrates

Maltose $\xrightarrow{\text{Maltase}}$ glucose
Lactose $\xrightarrow{\text{Lactase}}$ glucose + galactose
Sucrose $\xrightarrow{\text{Sucrase}}$ glucose + fructose

4- Enzymes secreated in pancreas :
   1- Pancreatic Amylase which convert all starchs (carbohydrate )in to Maltose.
   2- Lipase which convert fats in to fatty acids.
   3- Trypsin which convert peptones into amino acids .
**Pancreas:**

It is a big gland lies transverly across the posterior abdominal wall at the level of 2nd and 3rd lumber vertebrae behind the stomach.

The pancreas consists of head, body and tail. The head lies in the C-shaped curve of the duodenum.

The pancreatic duct opens with the bile duct in the duodenum by one opening.

**Functions of pancreas:**

The pancreas has 2 different secretions:

1- **Internal secretion** (Hormone) directly into blood so pancreas is an endocrine gland:

a- **Insulin hormone** from beta cells of Islets of Langerhans.

Insulin is absorbed directly into blood, the function of insulin is to enable the tissues to use sugar.

Normal level of glucose in blood = 80 – 120 mg/100ml of blood.

So if there is increase of glucose level in blood more than normal limit then more insulin secreted from pancreas to decrease the glucose level.

**Deficiency of Insulin → Diabetes Mellitus**

**Diabetes Mellitus:**

It is a disease caused by deficiency of Insulin hormone from Beta cells of pancreas.

Characterized by:

1- Polyurea,
2- Polydipsia.
3- Polyphagia.
4- Increase glucose level in blood.
5- Glucosurea.
b- **Glucagon hormone** secreted from alpha cells of langerhans of pancreas ,It has opposite function of Insulin so it increase the level of glucose in blood by converting the liver glycogen into glucose .

2- **External secretion**

**The pancreatic juice** :It is an alkaline fluid leaves the gland by the pancreatic duct which opens in duodenum .

Normal amount = 3/4 L./day.

**The pancreatic juice consist of** :

- Enzymes
- NaHCo3

**The pancreatic enzymes are** :

1- Pancreatic Amylase which convert all starchs (carbohydrate )in to Maltose.
2- Lipase which convert fats in to fatty acids.
3- Trypsin which convert peptones into amino acids .

**Auto – Exam** :

Enumerate the enzymes secreated from pancreas.

**Post – Exam** :

1- Name two enzymes in digestive tract .
2- Mention functions of pancreas.
### Pre-Exam

It is a disease caused by deficiency of Insulin hormone from Beta cells of pancreas.

Characterizes by:
1. Polyurea,
2. Polydepsia.
3. Polyphagia.
4. Increase glucose level in blood.
5. Glucosurea.

### Auto-Exam

**The pancreatic enzymes are:**

1. Pancreatic Amylase which convert all starchs (carbohydrate) in to Maltose.
2. Lipase which convert fats in to fatty acids.
3. Trypsin which convert peptones into amino acids.

### Post-Exam

Enzyme salivary amylase and pepsin enzyme.

Pancreas secreated two hormones
1. Insulin hormone.
2. Glucagon hormone.

### المصادر:

1. د.ظافر الياسين – الفصلجة السريرية – وزارة الصحة 1983
2. د.رشدي فتحي عبد الفتاح – اساسيات عامة في علم الفسيولوجيا – 1988
3. Cordon sears – Anatomy physiology for nurses oxford publication – London 1974
Title of lecturer (19) : Liver

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject: Physiology.

Central Idea: -

1- Most large gland in the body and accessory organ of digestive system.

Aims:-

Student will be able to:

1- Secreation of bile.

2- Digestion and metabolism of carbohydrates.

Pre-Exam: -

1- How many parts in liver.

Liver:

The largest organ in the body. It lies in the right hypochondrium under the diaphragm. It consists of right big lobe and left small lobe.

Blood supply:

1- Hepatic artery.

2- Portal vein.

The liver secreted bile which is carried by the common bile duct and stored in the gall bladder, the bile duct opens into duodenum.

Functions of liver:

1- Secretion of bile.

2- Storage of glycogen.

3- Formation of urea.

4- Production of plasma proteins (Albumin and Globulin).

5- Destruction of fats.

6- Storage of vit B12 and Iron.

7- Destruction of toxic substances.

8- Production of heparin.
9- Production of clotting factors.
10- Formation of R.B.C. in embryo.

**Bile:** It is an alkaline secretion of the liver, its colour is yellow to green, it consists of:
1- Water 90%.
2- Mucin
3- Bile pigment.
4- Bile salts.

**Functions of bile salts:**
1- Assist the action of pancreatic enzymes especially Lipase.
b- Help the absorption of fat from intestine.

**Metabolism**

**Metabolism:** Series of changes involving the building up and breaking down of substance for use in the body.

**Metabolism includes:**
1- **Anabolism:** Building up of fresh tissues from the nutritive materials (food).
2- **Catabolism:** Chemical changes involving the breaking down of worn out tissues and their removal.

**Diet consists of:**
1- Organic compounds:
a- Carbohydrates.
b- Fats.
c- Proteins.
2- Non – organic compounds:
a- Water.
b- Salts.
3- Vitamins.

**Factors affecting metabolism:**
1- Muscular work increases metabolism.
2- The basal metabolism depends on the surface area of body.
Surface of body ———> Metabolism
3- Age
In children metabolism is greater than adult.
4- Fever ———> Metabolism
5- Thyroid gland
Hyperthyroidism ———> increase metabolism.
Hypothyroidism ———> decrease metabolism.

**Carbohydrate metabolism:**

Carbohydrates consists of carbon, hydrogen and oxygen.
1- All starches and sugars are converted in to glucose by action of enzymes:
   a- Cooked starch _salivary amylase_ → maltose
   b- All starch _pancreatic amylase_ → maltose
   c- Maltose _maltase_ → glucose
2- Glucose is absorbed by stomach and small intestine and carried by portal vein to the liver where it is stored as liver glycogen.
3- When required glycogen is reconverted in to glucose.
4- Oxidation of glucose in to water + Co2 + heat + energy.
5- Normal fasting blood sugar 80-120 mg/100 ml. blood.

**Auto – Exam:**

Is digestion of fats easy like carbohydrates.

**Post – Exam:**

1- Enumerate three functions of liver.
2- What is final form of carbohydrates digestion?
<table>
<thead>
<tr>
<th>Pre-Exam</th>
<th>Auto- Exam</th>
<th>Post- Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liver is consist of two lobes.</td>
<td>Digestion of fat is difficult than carbohydrate.</td>
<td>1- Secretion of bile 2- Storage of glycogen. 3- Formation of urea.</td>
</tr>
<tr>
<td></td>
<td>The final form of carbohydrate digestion is glucose.</td>
<td></td>
</tr>
</tbody>
</table>

المصادر:

1- د.اظافر الياسين – الفسلجة السريرية – وزارة الصحة 1983
2- د.رشدي فتحي عبد الفتاح – اساسيات عامة في علم الفسيولوجيا – 1988
3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974
Title of lecturer (20) : Digestion and metabolism of proteins and fats

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject : Physiology.

Central Idea :-
1- Prime components of food.
2- Digestion & metabolism of these compounds.

Aims:-
Student will be able to:
1- Proteins are complex compounds.
2- Fats will change into fatty acids.

Pre – Exam :-
1- Which type of food has most energy, proteins or fats.

Protein metabolism:
Consist of Nitrogen + S + P + H2 + O2
1- Protein pepsin peptones
2- Peptones Erypsin & Trypsin Amino acid.
3- Absorption of amino acid in small intestine carried to liver.
4- Formation of urea in the liver.
5- The remainder used for repair and body building.

Fat metabolism:
Fats contain: carbon + hydrogen + O2.
1- Fats lipase Fatty acids + glycerol
2- In presence of bile salts these are absorbed from small intestine and recombined into fats.
3- Lymph carry them to thoracic duct then to blood which take them to fat stores of the body.
4- On need they are carried to liver.
5- In starvation and diabetes mellitus: Incomplete oxidation of fat to Acetones and Ketones.

**Auto – Exam:**
Mention two types of foods contain proteins.

**Post – Exam:**
1- How dose protein digested and where.
2- How dose fat digested and by which enzyme.

<table>
<thead>
<tr>
<th>Pre -Exam</th>
<th>Auto- Exam</th>
<th>Post- Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fats has most energy than proteins.</td>
<td>Meat and egg contain protein.</td>
<td>protein digests by pepsin enzyme in stomach.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fat digests by lipase enzyme from pancreas into fatty acids.</td>
</tr>
</tbody>
</table>

المصادر:

1- د.ظافر الياسين – الفصلية السريرية – وزارة الصحة 1983
2- د.رشدي فتحي عبد الفتاح – أساسيات عامة في علم الفسيولوجيا – 1988
3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974
Title of lecturer (21): Diseases affect digestive system

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject: Physiology.

Central Idea:
1- Food and its relation with digestive system

Aims:
Student will be able to:
1- Decrease of some enzymes and their effects on digestive system

Pre-Exam:
1- Mention two diseases affect digestive system.

Disease which affect the digestive system:
1- Stomatitis
Inflammation of the mouth due to infection or vitamin deficiency.

2- Mumps
Inflammation of the salivary glands especially the parotid gland.

3- Gastric ulcer
Damage of mucous membrane of stomach, the symptom is epigastric pain and vomiting.

4- Duodenal ulcer
Damage of membrane of duodenum.

5- Appendicitis
Inflammation of the appendix with pain in right iliac fossa.

6- Diseases of large intestine
Like dysentery, ulcerative colitis and cancer. Main symptom is diarrhea or constipation.

7- Hepatitis
Inflammation of liver, the symptom is Jaundice.
8- Cholecystitis
Inflammation of gall bladder usually associated with gall stones.

**Enzyme deficiency diseases:**

1- **Protease deficiency:**
Problems in calcium metabolism such as: osteoporosis, gouty arthritis, bone spurs.

2- **Amylase deficiency:**
Skin problems such as: psoriasis, eczema, allergic.

3- **Lipase deficiency:**
High cholesterol, high triglycerides, diabetes.

4- **Sucrase deficiency:**
Depression because brain cannot get glucose.

5- **Lactase deficiency:**
Diarrhea, allergic symptoms.

**Auto – Exam:**
How can you keep digestive system away from harm.

**Post – Exam:**
1- Name two diseases of digestive system.
<table>
<thead>
<tr>
<th>Post -Exam</th>
<th>Auto- Exam</th>
<th>Pre- Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stomatitis and mumps are the diseases of digestive system.</td>
<td>We can keep digestive system away from harm by eat good and healthy food, exercise</td>
<td>The diseases of digestive system are hepatitis and Cholecystitis</td>
</tr>
</tbody>
</table>

المصادر:

1- د.ظافر الياسين – الفسلجة السريرية – وزارة الصحة 1983
2- د.رشدي فتوح عبد الفتاح – أساسياث عامت في علم الفسيولوجيا – 1988
3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974
Title of lecturer (22) : Urinary system

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject : Physiology.

Central Idea :-
1- Function of the kidney.
2- Absorption of necessary materials in kidney.

Aims:-
Student will be able to:
1- Anatomy of kidney.
2- Formation of stones and reasons.

Pre – Exam :-
1- How did waste products removed from the blood.

Urinary system

The urinary system is one of the four excretory system of the body.

Organs of urinary system :
1- Kidneys
2- Ureters.
3- Urinary bladder.
4- Urethra

Kidneys:
Pair of organs, the right kidney is slightly lower in position than left kidney.
Kidney is flattened bean shaped organ.
In adult it is 12 cm. length, 6 cm. wide, 3 cm. thickness. the two kidneys lie in the abdominal cavity under the diaphragm on the two sides of the vertebra columnn. Almost vertically on the posterior abdominal wall.
Each kidney is surrounded by an outer membrane called the kidney capsule.
Kidney has 2 surfaces an outer lateral convex and the other is inner medial concave surface called the hilum, through which the renal artery enters and the renal vein and ureter leave the kidney.
The adrenals (suprarenal glands) are situated on the upper pole of each kidney.

Each kidney consists of:
1- Cortex (outer layer): light pale in colour, it looks granulates.
2- Medulla (inner layer): dark in colour consist of pyramids.
3- Pelvis of kidney: It is the beginning of the ureter.

Function of kidney:
1- Formation of urine.
2- Excretion of waste products from metabolic process, eg: urea, excess salts and toxins.
3- Regulation of acid–base balance to maintain blood pH 7.4.
4- Regulation of Electrolytes balance.
5- Production of erythropoietin.
6- Changing the inactive vit D to active form.
7- Regulation of water and fluid balance.
8- Secretion of hormones like Renin prostaglandin.

Formation of urine:
It is 4 steps:
1- Glomerulus filtration.
2- Tubular reabsorption.
3- Tubular secreation
4- Concentration of urine.

1- Glomerulus filtration:
Simple physical process occurs in the glomerulus, the substances filtered under pressure. It is not selective.
Filtered substances are:
Water, soluble salts, glucose, amino acid, urea, uric acid, creatinine and drug.

Non filtered substances are:
R.B.C. and plasma proteins.

2- Tubular reabsorption:
Urine is formed in a rate 120 ml./min. but the daily urine output is 1-1.5 L. So most of water which is filtered in the previous step is absorbed again in proximal convoluted tubules.
All of the glucose which is filtered is reabsorbed again from the body need. Other nutrient like Amino acids and minerals are reabsorbed according to the body need.

3- Tubular secretion:
This occurs in the convoluted tubules and it is an active vital process, it is a selective process. Excess of H⁺ is secreted in the urine to keep the blood pH constant (7.4).
Abnormal substances like penicillin is also secreted from the tubule into the urine.

4- Concentration of urine:
In the distal convoluted tubule the excess of water which is filtered in first step will return the blood circulation under the effect of Anti diuretic hormone (A.D.H) from the posterior lobe of the pituitary gland. Decrease of A.D.H causes diabetes insipidus.

Normal constituents of urine:
1- Excess water.
2- Excess electrolytes like Na⁺, K⁺, Mg⁺, Ca⁺.
3- Excess acids and alkaline.
4- Metabolic waste products: include urea, uric acid and creatinine.
Blood supply of kidney:
Kidneys are supplied with blood from the renal artery which is a branch of the abdominal aorta. The renal artery divides into smaller arteries called the afferent arteriole which enters the malpighian body forming network of capillaries called glomerulus.
Blood leaves the glomerulus by efferent arteriole which divides into capillaries around the tubule. Blood then collects from these capillaries to form small venules which are collected to gather to form the renal vein which leaves the kidney and opens in the inferior vena cava.
Each kidney consists of the million nephronmes which are a tiny coiled tubule.

Structure of nephron:
1. Malpighian body - glomerulus - bowman's capsule
2. Proximal convoluted tubule.
3. Loop of henle.
4. Distal convoluted tubule.
5. Collecting duct.

Abnormal constituents of urine:
1. Glucose: In diabetes mellitus.
4. Stones:
Increase concentration of some salts in the blood so it will accumulate and form stones like (Ca) phosphate or oxalate. This stone may be formed in the kidney or it will pass through the ureter or in the bladder.
If this small it may pass through urine to outside, but sometimes it is large and cause pain (Renal colic) or it may cause urinary obstruction so may need surgical interference.
5- **Bile**: in case of Jaundice.

6- **Ketone and Acetone**: in case of diabetes mellitus, fasting, starvation.

7- **Chorionic gonado trophic hormone**: in first few weeks of pregnancy.

**Renal failure**:

Failure of the kidney to form urine.

1- So lead to retention of water (oedema).
2- Retention of excess minerals and salts.
3- **Uremia**: increase of urea in blood more than upper normal limit 40mg/100ml.
4- Changes in Acid – Base balance and disturbance of blood pH.
5- **Anuria**: decrease amount of urine.
6- **Hypertension**.
7- **Anaemia**.
8- **Albuminurea**.

**Rx. Of renal failure**:

1- Restriction of protein in diet.
2- Artificial kidney.
3- Kidney transplantation.

**Auto – Exam**:

Nome disease diagnosed by signs appear in urine.

**Post – Exam**:

1- Enumerate three function of kidney.
2- Mention some necessary materials reabsorbed by kidney.
<table>
<thead>
<tr>
<th>Pre-Exam</th>
<th>Auto-Exam</th>
<th>Post-Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste products removed from the blood by glomerulus filtration</td>
<td>The disease which diagnosed by signs appear in urine is diabetes mellitus.</td>
<td>1- Formation of urine.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2- Excretion of waste products from metabolic process, eg: urea, excess salts and toxins.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3- Regulation of acid– base balance to maintain blood pH 7.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The necessary materials reabsorbed by kidney are water and glucose.</td>
</tr>
</tbody>
</table>

المصادر:

1- د.ظافر الياسين – الفسلجة السريرية - وزارة الصحة 1983
2- د.رشدي فتحي فتحي عبد الفتاح - أساسيات عامة في علم الفسيولوجيا - 1988
3- Cordon sears – Anatomy physiology for nurses oxford publication - London 1974
Title of lecturer(23) : Nervous system
Target group: 1st class of Nursing Department Technical Institute in Mosul.
Subject : Physiology.
Central Idea :-
1- Importance of nervous system.
2- Anatomy of nervous system.
Aims:-
Student will be able to :
1- Learn about parts of nervous system.
2- Functions of nervous system.
Pre –Exam :-
1- what is the benefit of nervous system.

Nervous system :
The nervous system is divided into :

1- Central nervous system
Consists of :
- Brain
- Spinal cord.

2- Peripheral nervous system
consists of :
- Cranial nerves(12 pairs)
- Spinal nerves (31 pairs)

3- Autonomic nervous system
consists of :
- Sympathetic nervous system.
- Parasympathetic nervous system.
The nervous system consist of collection of nerve cells (neurons) and nerve fibers.

Characters of neuron:

1- Irritability:
the ability to receive the sensory stimulation from the internal or external environment.

2- Conductivity:
the ability to conduct the neural stimulation to all the body tissues and organs which respond to it.

The neuron consists of:

1- Cell body.
2- Nucleus.
3- Nucleolus.
4- Cytoplasm.
5- Dendrites.
6- Axon.
7- Nerve endings.
8- Schwann cell.
9- Ranveir nodes.
10- Myelin sheath.
11- Synapse.
12- Nissl's granules.

Synapse:
It is the space present between the nerve endings of one neuron and the dendrites of other neuron, through this synapse the neural stimulus is transmitted by the chemical transmitters which is secreted from the vesicle present in the nerve endings.
Type of neurons (According to function):

1- Sensory neuron:
It transmits the neural stimulus from the receptor organs (organs of sensation) or other internal organs to the central nervous system.

2- Motor neuron:
It transmits the neural stimulus from the central nervous system to organs of response like muscles and glands.

3- Association neuron:
It transmits the nerve impulse from one neuron to other.

Types of neuron according to structure:

1- Unipolar neurons, which have only one process, classified as an axon and dendrites. Unipolar neurons are found as most of the body's sensory neurons, the axon carries the action potential into the central nervous system.

2- Bipolar neurons with two processes, a dendrite and an axon, bipolar are found in the retina of the eye.

3- Multipolar neuron has many poles or processes, the dendrites and the axon.
   Multipolar neurons are found as motor neurons in the central nervous system.

Nerve fibers:
The nerve fibers is the axon of the neuron. It is long and ends at distance from the cell body.

Types of nerve fibers:

1- Sensory nerves:
Transmits the nerve impulse to the central nervous system.

2- Motor nerves:
Transmits the neural orders from central nervous system to the muscles or glands.
3- Mixed nerves :
Sensory and motor at same time.

Types of chemical transmitters :
1- Acetyele choline : secreted at the ends of the parasympathetic nerve fibers.
2- Nor adrenaline : It is chemical transmitter secreted at the ends of the sympathetic nerve fibers.
3- Serotonin : Chemical transmitters it's function is only inside the central nervous system.

Central nervous system :
It consist of : - (Brain - Spinal cord)

Brain :
Consist of :
1- Cerebrum.
2- Cerebellum.
3- Brain stem :
   a- Mid brain
   b- Pons
   c- Medulla oblongata
the brain is the largest part of the nervous system and occupied a large space in skull. the brain is surrounded by meningies.

Meningies :
They are 3 layers surrounded the brain. It's function is nutrition and production of brain from external effecting. They are :
1- Pia matter (inner layer).
2- Arachnoid matter (middle layer).
3- Dura matter (outer layer).
Between the pia and arachnoid layer there is a space called subarachnoid space which is filled by cerebro spinal fluid.
Cerebro spinal fluid (C.S.F.):
It is the fluid which fill the space of the brain and the subarachnoid space. It also present in the spinal cord canal, it is about 100 cm$^3$ it is aqueous fluid contains glucose, some salts and proteins. It's function nutrition and protection.

Cerebrum:
It is the largest part of the brain, it consists of 2 parts (right and left). The surface of brain is characterized by presence of guruses and suleuses.

Cerebral lobes:
1- Frontal lobe.
2- Parietal lobe.
3- Temporal lobe.
4- Occipital lobe.

Layers of cerebrum:
1- Cortex (outer layer): It is gray in colour due to presence of neurons.
2- Medulla (inner layer): It is white in colour due to presence of nerve fibers.

Functional areas of cerebral cortex:
1- Motor area:
In frontal lobe, it is concerned with the muscular voluntary movement of the body.

2- Sensory area:
In the parietal lobe, it receives the sensory impulse from skin like, touch, pain and heat.

3- Auditory area:
In the temporal lobe, it receives the nerve impulse of sound waves from the ear.

4- Olfactory area:
In the temporal lobe and receives the sensory stimulation from nose.
5- **Visual area**:
In the occipital lobe and receives the sensory stimulation from eye

**The cerebrum contains important areas like**: 

1- **thalamus**:
It is located in the center of cerebrum and it is important center in regulation of sensory stimulation.

2- **Hypothalamus**:
It is very small but very important due to presence of important centers which regulates the body temperature, hunger center and sleep center.

**Functions of cerebrum**:
1- It controls all voluntary functions of the body.
2- Contains all the sensory centers like taste, hearing, vision and smell.
3- Thinking, learning and memory.

**Cerebellum**:
It is located under the occipital lobe of the cerebrum, it is also composed of 2 layers:
1- Outer cortex (gray colour).
2- Inner medulla (white colour).

**Functions of cerebellum**:
1- Maintaining the balance of the body during movement.
2- Regulating muscle tone.
3- Co-ordinates movement in association with cerebral cortex.
4- Equilibrium.

**Brain stem**:
Consists of:
1- Mid brain
2- Pons
3- Medulla oblongata
Functions of brain stem:
1- Transmits the nerve impulse from the spinal cord to brain and the opposite direction.
2- Medulla oblengata contains the important vital centers of body:
   a- The respiratory center,
   b- The cardiac center.
   c- The vasomotor center.

spinal cord:
It is part of the (C.N.S) which begins as continuator of medulla oblengata. It is located in the spinal inside the vertebrae and ends at the first lumbar vertebra.
It's length about 45 cm. The spinal cord has central canal called the central canal which contains the cerebro spinal fluid (C.S.F), the spinal cord is covered by menigies as the brain.

Layer of spinal cord:
1- Cortex (outer layer) white in colour due to presence of nerve fibers.
2- Medulla (inner layer) gray in colour due to presence of cell body.

Functions of spinal cord:
1- Center of reflex activities, it is the function of the gray matter.
2- Transmits the nerve impulse from body to the brain and opposite.

The arch of reflex consists of:
1- Muscle 2- Tendon 3- Sensory nerve 4- Spinal cord 5- Motor nerve

Types of reflexes:
1- Knee reflex.
2- Biceps reflex.
3- Triceps reflex.
4- BaBaniski reflex.
**Auto – Exam:**

Is spinal cord a part of central nervous system?

**Post – Exam:**

1- Enumerate parts of nervous cell.
2- How does nerve impulse spread?

---

### Pre - Exam

The nervous system is the important system of the body. It is regulate the action of all organs in the body and controlled the voluntary and involuntary movement.

### Auto- Exam

Spinal cord is the part of central nervous system.

### Post- Exam

1- Cell body .2- Nucleus
3- Nucleolus .4- Cytoplasm.
5- Dendrites.6- Axon.
7- Nerve endings .8- Schwann cell.
9- Ranveir nodes .10- Myelin sheath.
11- Synapse .12- Nissl's granules.

The nerve impulse is spread by chemical transmitters.

---

المصادر:

1- د.ظافر الياسين – الفصلية السريرية – وزارة الصحة 1983
2- د.رشدي فتوح عبد الفتاح – أساسيات عامة في علم الفسيولوجيا – 1988
3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974
Title of lecturer: peripheral nervous system.
Target group: 1st class of Nursing Department Technical Institute in Mosul.
Subject: Physiology.
Central Idea:
1-There are different parts in peripheral nervous system.
Aims:
Student will be able to know:
1- Function of Peripheral nervous system.
2- Function of cranial nerves.
3- Important part of nervous system in the body.
Pre-Exam:
1- What does Peripheral nervous system mean?
2- What are main components of sympathetic nervous system.

Peripheral nervous system:
It consists of:
1- Cranial nerves.
2- Spinal nerves.
Cranial nerves: originate from the brain and they are of 3 types, sensory, motor, and mixed.

Names and functions of cranial nerves:
1- Olfactory nerve
Sensory – smelling.
2- Optic nerve
Sensory – vision.
3- Oculomotor nerve
Motor – movement of eye ball, pupil, upper eye lid.
4- Trochlear nerve
Motor – movement of eye ball .

5- Trigeminal nerve
Mixed nerve – sensation and movement of muscle of mastication .

6- Abducons nerve
Motor nerve – circular movement of eye.

7- Fascial nerve
Mixed nerve – taste movement of muscle of face ,lips and eye lids .

8- Auditory nerve
Sensory nerve – hearing and equilibrium of body.

9- Glosopharynged nerve
Mixed (sensory ,motor and secretory) taste ,swallowing and secretion of saliva.

10- Vagus nerve
Mixed (sensory ,motor and secretory) swallowing , sensation in pharynx ,secreation of gastric ulcer .

11- Accessory nerve
Motor nerve – movement of head and shoulder .

12- Hypoglossal nerve
Motor – movement of tongue.

Spinal nerve :
These are 31 pairs originate from the spinal cord .

8  Pairs cervical nerves .
12 Pairs thoracic nerves .
5  Pairs lumber nerves .
5  Pairs sacral nerves.
1  pairs coccygeal nerves .

All of the spinal nerves are mixed (sensory & motor) .
Function of spinal nerves:
The spinal nerves are mixed nerves so it transmit the nerve impulse from the spinal cord to the body parts and in the opposite direction.

Autonomic nerves system
Some peripheral nerves collected together to perform special function which is involuntary like the movement of internal viscera.

The autonomic nerves system consists of:

1- Sympathetic nerves system:
The nerves originate from thoraco – lumber region of spinal cord, it contains chains of neural ganglia.
Type of chemical transmitter in the sympathetic nerves system is called Noradrenalin which is secreated in special condition as in fight or phobia or escape.

Functions or effects of sympathetic nervous system:
1- Dilate the pupil.
2- Inhibit the lacrimal glands secretion.
3- Decrease the secretion of saliva.
4- Increase the heart rate.
5- Increase the cardiac out put and blood pressure.
6- Dilate the respiratory passage.
7- Decrease the gastric and pancreatic juice.
8- Decrease the intestinal movement.
9- Increase sweating.
10- Erection of hair of body and head.

Parasympathetic nerve system:
It consists of some cranial nerves and some of the spinal nerve. The chemical transmitters is Acetyl choline.
Functions or effects of parasympathetic nerve system:
This system acts especially in case of rest as during sleep.
1- Constricts the pupil of eye.
2- Stimulate the lacrimal glands secretion.
3- Increase the secretion of saliva.
4- Decrease the heart rate.
5- Decrease the cardiac output and blood pressure.
6- Constricts the respiratory passage.
7- Increase the gastric and pancreatic juice.
8- Increase the intestinal movement.
9- Plays important role in urination and defecation.

Auto – Exam:
1- Where is peripheral nervous system located.
2- Mention one activity of sympathetic nervous system.

Post – Exam:
1- Enumerate three parts of cranial nerves with function.
2- Name three function of sympathetic nervous system.
### Pre-Exam

Peripheral nervous system consist of cranial and spinal nerves, which transmit the nerve impulse from and to the central nervous system.

### Auto-Exam

The Peripheral nervous system located post the central nervous system.

### Post-Exam

1. **Olfactory nerve**
   - Sensory – smelling.
2. **Optic nerve**
   - Sensory – vision.
3. **Oculomotor nerve**
   - Motor – movement of eye ball, pupil, upper eye lid.
4. **Dilate the pupil.**
5. **Inhibit the lacrimal glands secretion.**
6. **Decrease the secretion of saliva.**

- Contraction of digestive tract.

### المصادراً:

1. ظافر الياسين – الفسلجة السريرية – وزارة الصحة 1983
2. رشدي فتحو عبد الفتاح – اساسيات عامة في علم الفسيولوجيا 1988
3. Cordon sears – Anatomy physiology for nurses oxford publication – London 1974
Types of muscles:
1- Striated muscles (voluntary).
2- Smooth muscles (involuntary).
3- Cardiac muscles.

Structure of muscles:

The muscle that you can see is composed of subunits called fascicles. Fascicles are bundles of individual muscle fibers. Each fiber is one elongated cell that may extend for the length of the muscle. Each muscle fiber cell has several nuclei (unlike most cells, which have only one), and is segmented into distinct sectional bands. Within each muscle cell are numerous myofibrils, which also
extend for the length of the muscle cell. Sarcomeres are the basic contractile subunit of myofibrils.

**Muscles contraction and relaxation**

Striated muscle is composed of numerous cylindrically shaped bundles of cells, each enclosed in a sheath called the sarcolemma. Each muscle fiber contains several hundred to several thousand tightly packed strands called myofibrils that consist of alternating filaments of the protein substances Actin and myosin interact before muscle contraction, forming the contractile material actomyosin.

The energy required for muscle contraction comes from the breakdown of adenosine triphosphate (ATP), a substance that is present in the cells and is formed during cellular respiration. A muscle fiber is stimulated to contract by electrical impulses from the nervous system. The point of contact between nerve and muscle is the neuromuscular junction, where the chemical substance acetylcholine is secreted, initiating the changes that cause the muscle to contract. During resting states, some of the fibers in the musculature are maintained in a state of partial contraction, known as muscle tone. This permits muscles to contract quickly when stimulated without having to overcome the inertia of total relaxation.

**Auto – Exam:**

When the smooth muscle find?

**Post – Exam:**

1- What is the muscle composed?
<table>
<thead>
<tr>
<th>Pre-Exam</th>
<th>Auto- Exam</th>
<th>Post- Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Striated muscles (voluntary).</td>
<td>Smooth muscle find in viscera</td>
<td>The muscle that you can see is composed of subunits called fascicles. Fascicles are bundles of individual muscle fibers</td>
</tr>
<tr>
<td>2- Smooth muscles (involuntary).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3- Cardiac muscles .</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

المصادر:

1- د.ظافر الياسين – الفسلجة السريرية – وزارة الصحة 1983
2- د.رشدي فتوح عبد الفتاح – اسسات عامة في علم الفسيولوجيا 1988
3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974
Title of lecturer (26): Conjunction of nerves with muscles

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject: Physiology.

Central Idea:
1- There are complete conjunction between different parts of the body

Aims:
Student will be able to:
1- Muscle relaxation
2- Stimulation of muscles by nerve.

Pre-Exam:
1- What is the benefit of conjunction of the muscle by nerve.

Conjunction of nerves with muscles

Although the peripheral nervous system controls muscle activation, each muscle type is controlled by a different mechanism. Skeletal muscle is controlled by the somatic nervous system (SNS). It is considered voluntary muscle since it is under our conscious control. Contraction of cardiac muscle is primarily controlled by an internal pacemaker, and the autonomic nervous system (ANS). It is considered an involuntary muscle control, since it is not under our conscious control. Smooth muscle, such as in the digestive system, is also controlled by the autonomic nervous system. Like heart muscle, it is not under our conscious control.

The motor unit:
It is collection of muscle fibers which are supplied by one nerve fibers.

Neuro-muscular junction:
It is special type of synapse which the nerve fiber ends as small branches which spread on the muscle fibers.
In this synapse the chemical transmitter called acetyl choline which plays important role in transmission of nerve impulse from nerve fiber to muscle fiber. The acetylene choline will be lysis by enzyme called cholinesterase enzyme.

**Striated muscle:**
Also called skeletal muscle, these muscles are used in the voluntary movement like walking, writing, and speaking.

**Contraction and relaxation of skeletal muscles:**
Every muscle fiber is supplied with one motor nerve fiber, when nerve impulse pass along the nerve fiber the muscle will contraction and become short. When no nerve impulse the muscle fiber will relax this is called muscle flaccidity.

**Smooth muscles:**
The muscle fibers are shorter and thick and there is no striation, these are present in the viscera like digestive system, respiratory passage, urinary bladder, uterus, and blood vessels.

The smooth muscles are supplied with 2 nerves:
1. Stimulatory nerve:
   This active and will leads to muscle contraction.
2. Inhibitory nerve:
   This is passive nerve will leads to muscle relaxation.

**Auto – Exam:**
Can muscle work without nerves?

**Post – Exam:**
1. Explain briefly the mechanism of stimulation of muscle by nerve.
<table>
<thead>
<tr>
<th>Pre-Exam</th>
<th>Auto-Exam</th>
<th>Post-Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>The muscle conjunction by the nerve to stimulate the muscle to contraction</td>
<td>The muscle cannot work without nerve.</td>
<td>Every muscle fiber is supplied with one motor nerve fiber, when nerve impulse pass along the nerve fiber the muscle will contraction and become short. When no nerve impulse the muscle fiber will relax this is called muscle flaccidity.</td>
</tr>
</tbody>
</table>

المصادر:

1- د. ظافر الياسين – الفسلجة السريرية – وزارة الصحة 1983
2- د. رشدي فتحي عبد الفتاح – أساسيات عامة في علم الفيسيولوجيا 1988
3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974
Title of lecturer(27) : Body temperature

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject : Physiology.

Central Idea :-
1- Human body temperature is almost constant.
2- There is control and regulation of body temperature.

Aims:-
Student will be able to:
1- Sources of gained and loss energy.
2- Regulation of body temperature.

Pre – Exam :-
1- What is normal body temperature.

Body temperature
Body temperature: It is a balance state between the heat production and loss from the body.

Heat is produced by :
1- Metabolic reaction.
2- Muscle contraction.
3- Environment.

Heat is lost from the body through:
1- skin by :
Sweating, conduction, convection, radiation.
2- Respiratory system.
3- Urinary system.
4- Digestive system.
Regulation of body temperature:
The body temperature is regulated by a special center located in the brain called hypothalamus.

Factors affecting body temperature:
1- Age: it is more in children than adult.
2- Exercise: increase in exercise.
3- Take the food increase the body temperature.
4- Hormones: hypothyroidism causes decrease in body temperature and hyperthyroidism causes increase in body temperature.

Measurement of body temperature:
The body temperature is measured by clinical thermometer which is graduated from 35C – 42 C.

Normal body temperature: 36.2 C – 37.5 C.

Area for measuring the body temperature:
1- Mouth.
2- Axilla.
3- Groin.
4- Rectum.

Hypothermia: when the body temperature is below 35C.
- Physiology in starvation
- Pathology in hypothyroidism.

Hyperpyrexia: increase in body temperature.
- Physiologically as in take the food, exercise.
- Pathologically in hyperthyroidism.
Auto – Exam :
Name tool used to measure body temperature.

Post – Exam :
1- Enumerate heat gained sources.
2- What is normal range of body temperature.

<table>
<thead>
<tr>
<th>Pre -Exam</th>
<th>Auto- Exam</th>
<th>Post- Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal body temperature : 37.5C.</td>
<td>The body temperature is measured by clinical thermometer which is graduated from 35C – 42 C.</td>
<td>1- Metabolic reaction.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2- Muscle contraction .</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3- Environment .</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Normal range of body temperature : 36.2 C – 37.5C.</td>
</tr>
</tbody>
</table>

المصادر :
1- د. ظافر الياسين – الفصلحة السريرية – وزارة الصحة 1983
2- د. رشدي فتوح عبد الفتاح – أساسيات عامة في علم الفسيولوجيا – 1988
3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974
Title of lecturer (28) : Drugs affect body temperature

Target group: 1st class of Nursing Department Technical Institute in Mosul.

Subject : Physiology.

Central Idea :-
1- Body temperature changes because some drugs.

Aims:-
Student will be able to know:
1- Type of drugs which cause changing in body temperature.
2- Changing affective drugs by others.

Pre –Exam :-
1- Is the body temperature affect by the drugs.

Drugs which affecting of body temperature:
It is called (Antipyretic) which include Aspirin and Paracetamol. Body temperature is a balance of the hypothalamic set point, neurotransmitter action, generation of body heat, and dissipation of heat. Drugs affect body temperature by different mechanisms. Antipyretics lower body temperature when the body's thermoregulatory set point has been raised by endogenous or exogenous pyrogens. The use of antipyretics may be unnecessary or may interfere with the body's resistance to infection, mask an important sign of illness, or cause adverse drug effects. Drugs may cause increased body temperature in five ways: altered thermoregulatory mechanisms, drug administration-related fever, fever from the pharmacologic action of the drug, idiosyncratic reactions, and hypersensitivity reactions. Certain drugs cause hypothermia by depression of the thermoregulatory set point or prevention of heat conservation. By affecting the balance of thermoregulatory neurotransmitters, drugs may prevent the signs and symptoms of hot flashes.
There are 2 systems to measure the body temperature:

1- Centigrade system (C)
2- Fahrenheit system (F)

To convert C to F =

\[ F = \frac{9}{5} \times C + 32 \]

To convert F to C =

\[ C = \frac{5}{9} \times (F - 32) \]

**Auto – Exam:**

Mention one drug lead to increase body temperature.

**Post – Exam:**

1- Mention one reason lead to increase body temperature physiologically.
المصادر:

1- د.ظ.افر الياسين – الفصلحة السريرية – وزارة الصحة 1983

2- د.رشدي فتحي عبد الفتاح – أساسيات عامة في علم الفسيولوجيا – 1988

3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974

4- Memmler / Wood – structure and Function of the Human Body – Fourth
Endocrine glands

Also called ductless gland because it's secretion which is called hormones reach the blood directly.

The endocrine glands are:

1. Pituitary gland.
2. Thyroid gland.
3. Parathyroid glands.
4. Adrenal glands.

Other endocrine glands are organs which have other function in addition to hormonal secretion:

Sex glands, pancreas, stomach, kidney, hypothalamus, thymus gland and placenta.

Hormone: It is the chemical messenger secreted by a ductless glands (endocrine glands) and carried by blood to affect the activity of other distant organ.

The organ or tissue affected by the hormone is called the target tissue.
The hormone is secreted in its normal amount to perform its normal function. Any change in its amount if decreased or increased will lead to disease.

**Chemical structure of hormones:**

1- Protein in nature: e.g.: Insulin hormone.
2- Steroid hormones which consist of lipid: e.g.: sex hormones and hormones of adrenal cortex.

**Control of endocrine gland activity:**

1- Nervous control.
2- Blood control:
   a- Metabolic regulation: like amount of Insulin hormone secretion depends on the amount of glucose level in the blood.
   b- Reciprocal regulation.

**Pituitary gland:**

It is a single gland about 1 cm in diameter, situated at the base of the brain in a bony cavity called pituitary fossa. The pituitary gland consists of 2 lobes: anterior and posterior. The pituitary gland called master gland because it controls the activity of many other endocrine glands.

**The hormone which secreted from anterior lobe of pituitary gland:**

1- **Human growth hormone:**

Hypossecretion of this hormone during childhood leads to condition called Dwarfism.

Hypersecretion during childhood lead to Gigantism.

Hypersecretion of the hormone after puberty will lead to disease condition called Acromegaly in which deformities of hands, feet and bone of face and jaws.
2- **Thyroid stimulating hormone (T.S.H):**
This stimulates the growth and activity of thyroid gland and secretion of thyroxin hormone.

3- **Adreno cortico trophic hormone (A.C.T.H):**
This hormone stimulates the adrenal cortex to secrete its hormone:
   a- Mineralo corticoid.
   b- Gluco corticoid.

4- **Gonado trophic hormone:**
This is important for development of sex glands and organs and the secretion of sex hormones:
   a- **The follicle stimulating hormone (F.S.H)**
      In female it's stimulates the ovary to secrete oestrogen, in male it stimulates the production of spermatozoa.
   b- **Luteinizing hormone (L.H)**
      In female it stimulates production of progesterone, in male it stimulates production of testosterone.
   c- **Prolactin hormone**
      This hormone helps the secreation of milk from the breast.

**The hormone which secreted from posterior lobe of pituitary gland:**

1- **Antidiuretic hormone:**
It concentrates the urine by increasing the absorption of water in the distal convoluted tubule and collecting duct.
Decrease of the A.D.H leads to disease called Diabetes insipidus.

2- **Oxytocin**
The functions of this hormone:
   a- Stimulates the contraction of uterus muscles in pregnant woman during labour.
   b- Stimulates the lactating ducts of breast to eject milk during lactation.
**Thyroid gland:**
Thyroid gland is situated in the lower part of the neck. It consists of 2 lobes joined together by the isthmus.
Thyroid gland secretes the hormone called thyroxin which contains large quantity of Iodine which is absorbed from food. Secretion of thyroxin hormone is regulated by the thyroid stimulating hormone (T.S.H).

**Functions of thyroxin hormone:**
1- It controls and increases the general metabolism of the body.
2- It affects the irritability of the nervous system.
3- Keeps the hair and skin in normal condition.
4- It affects the body growth and mental development in infancy.
5- Storage of Iodine.

**Hyperthyroidism:**
It means hypersecretion of thyroxin from the thyroid gland. It is generally associated with enlargement of gland called Goiter.
The disease produced is known thyrotoxicosis or called exophthalmic goiter.
This disease is characterized by protrusion of the eye balls, rapid pulse, increased sweating and increase in metabolism.

**Hypothyroidism:**
It means hyposecretion of thyroxin.
In adult lead to disease called Myxoedema, in this disease the patient becomes dull slow speech and movement, increase weight due to decrease metabolism.
Skin is dry and thick.
In infant hypothyroidism lead to disease called cretinism, dwarfism with failure of mental development.
Parathyroidism glands:
These are 4 small glands situated in the neck behind each of the four poles of thyroid gland.
It's function secretion of parathermone the function of which is to control the calcium metabolism of body.

Hypoparathyroidism:
It result in condition known as tetany when the body is unable to metabolism and the calcium level in blood is low.
Normal Ca level in blood is (10mg/100ml).

Hyperparathyroidism:
Lead to increase (Ca) in blood and urine and renal stones.

Adrenal gland:
Also called suprarenal glands, the adrenal glands are two small yellowish bodies situated on the upper pole of each kidney.
The adrenal gland consists of 2 layers:
1- Yellowish outer portion called cortex.
2- Darken interior portion called medulla.

Function of adrenal cortex:
The adrenal cortex is essential for life, it secreted steroid hormones:
1- The mineral corticoids eg. Aldosterone which maintain the water and electrolyte balance.
2- The gluco corticoids (cortisone and hydrocortisone) which affect the carbohydrate metabolism:
   a- They assist in conversion of carbohydrate in to glycogen.
   b- They increase the blood sugar.
   c- Help in utilization of fat.
   d- Antiallergic.
   e- Anti-inflammatory.
Hypersecretion of cortisone lead to disease called Cushing disease: this disease is characterized by obesity, moon face, hypertension, and glucocurea.

3- Sex like hormones:
Similar to sex hormones produced by testis and ovaries which affect the growth and sex development.

Function of Adrenal medulla:
The medulla secretes a substance called Adrenaline or epinephrine. Its action or function is the same as that of stimulation of sympathetic nervous system. So it leads to rise blood pressure due to constriction of arteries. Also increase of heart rate. It stimulates liver to convert glycogen into glucose. It relaxes the involuntary muscles of bronchi.

Adrenaline is secreted in large quantity in case of stress like danger, anger, and excitement.

The adrenal medulla also secretes other substance called noradrenalin; this also constricts blood vessels and lead to rise of blood pressure.

Hyposecretion of adrenal gland results:
Addison's disease, both cortex and medulla are affected characterized by low blood pressure, digestive disturbances, and brown pigmentation of skin and mucous membrane.

Auto – Exam:
What is the difference between endocrine glands and other glands.

Post – Exam:
1- Name three endocrine glands.
<table>
<thead>
<tr>
<th>Pre-Exam</th>
<th>Auto-Exam</th>
<th>Post-Exam</th>
</tr>
</thead>
</table>
| thyroid gland considered as an endocrine gland. | The endocrine glands secrete hormones into blood but other glands have ducts which carry the secretions. | 1- Pituitary gland.  
2- Thyroid gland.  
3- Parathyroid glands. |

المصادر:

1. د.ظافر الياسين – الفسلجة السريرية - وزارة الصحة 1983
2. د.رشدي فتوح عبد الفتاح – أساسيات عامة في علم الفسيولوجيا 1988
3. Cordon sears – Anatomy physiology for nurses oxford publication – London 1974
Title of lecturer (30): The female reproductive system
Target group: 1st class of Nursing Department Technical Institute in Mosul.
Subject: Physiology.
Central Idea: -
1- Reproduction is characteristic of live thing.
2- Human being has five senses.
Aims: -
Student will be able to know:
1- Structure of female reproductive system
2- Diagnose some diseases affect these systems.
Pre-Exam: -
1- What is ovary function?

The female reproductive system

It consists of:
1- Uterus.
2- Ovaries.
3- Fallopian.
4- Vagina.

Uterus:
The uterus is a hollow pear shaped organ situated in the pelvis between the bladder in front and the rectum behind.
In adult it is about 8 cm in length, 5 cm in width, 2.5 cm in thickness.

Structure:
The uterine wall consists of 3 layers:
1- Peritoneum (outer).
2- Myometrium (middle thick layer consist of involuntary muscle).
3- Endometrium (inner).
Functions of uterus:
1- To receive the fertilized ovum and to nourish the developing fetus during pregnancy.
2- To expel the fetus at end of pregnancy by uterine contractions.

Ovary:
There are two ovaries right and left situated in the pelvis on the two sides of the uterus.

Functions of ovary:
1- To produce the mature ova.
2- Acts as endocrine gland in producing the female sex hormones:
   a- Estrogen hormone.
   b- Progesterone hormone.

Functions of estrogen hormone:
1- Development of female sex organs.
2- Production of secondary sexual characters.

Functions of progesterone hormone:
It prepares the uterus to receive the fertilized ova and to prefect the fetus during pregnancy.

Fallopian tubes:
Two in number about 10 cm in length.
1- It's function is to collect the ova discharged from the ovary and transfer it towards the uterus cavity.
2- Fertilization of the ovum by spermatozoa usually occurs in the tube.

The male reproductive system:
Testis:
Two glandular organs oval in shape.
Functions:
1- Production of sperms.
2- Acts as endocrine gland in production of the male sexual hormones Androgen and Testosterone hormones which act in the development of the secondary male sexual characters.

Prostate:
It is a gland situated below the base of the bladder. It is anterior to the rectum. It surrounds the first part of the urethra.
Enlargement of the gland is common in elderly men and cause obstruction to urine outlet from the bladder and need surgical operation.

Functions of prostate:
It secretes 20% of the semen which contains the sperms.

The ear:
It the organ of hearing and equilibrium of the body.
Sound is produced by air vibrations which speared as sound waves.

Composition of ear:
1-External ear:
Consists of:

a- The auricle or pinna, it's function is to collect sound waves and conduct them to the external auditory canal.

b- The external auditory canal: It is a tubular passage about 2.5 cm long. It leads from pinna to the tympanic membrane or (ear drum) which separates the external ear from middle ear.

2- Middle ear:
a- It contains 3 small bones (ossicles):
The malleus, the incus and the stapes, by these ossicles the sound waves are transmitted from the tympanic membrane to the internal ear through two windows:
* The oval window of the vestibule of the internal ear.

* The round window of the cochlea below.

**b- Eustachian tube:**

It is 4 cm length and connects the nasopharynx with the middle ear, usually the open of this tube is closed and only opened during swallowing and yawning.

**c- The tympanic membrane:**

It separates the external ear from the middle ear.

**3- Internal ear:**

It consists of: a- The vestibule. b- The cochlea. c- Semicircular.

The vestibule is connected with the middle ear by the oval window.

All the structures of the internal ear are surrounded by fluid called perilymph and contain inside similar fluid called endolymph.

**The cochlea:**

Contains the organ of hearing (organ of corti) which consists of special cells (hair cells) which transmit the sound wave to the auditory nerve.

The organ of equilibrium in internal ear is the semicircular canal: these are 3 canals at right angels to each other and contain the endolymph inside.

Movement of head and change in position of body cause movement of the endolymph this stimulate the nerve ending of the vestibular portion of the ninth cranial nerve which transmit them to the cerebellum.

**Mechanism of hearing:**

Sound waves → pinna → external auditory canal → tympanic membrane → mallen → incus → slapes → oval window → vestibule → cochlea → perilymph → endolymph → organ of corti → nine cranial nerve → temporal lobe of brain (of opposite side).

**Deafness:**

It is inability of hearing. It is of 3 types:
1- **Conductive deafness**: the disease in the external or middle ear.

Causes:

a- Wax: the external ear.

b- Thickening of tympanic membrane.

c- Obstruction of Eustachian tube.

d- Lesion in the bony ossicles of the middle ear.

e- Infection disease like Mumps, diphtheria, measles, meningitis.

2- **Perception deafness**:

It is due to disease in the internal ear.

3- **Nerve deafness**:

Degeneration of the auditory nerve or in the cerebral cortex.

**The eye**:

Organ of vision:

The eye is situated in the orbital cavity.

**The accessory organs of the eye**:

1- The eyebrows.

2- The eye lids.

3- The conjunctiva.

4- The lacrimal glands.

5- The muscles of the eye.

**Functions of tears**:

1- Keeping the eye moist so allow movement of the eyelids.

2- Removal of dust and foreign bodies.

3- Antiseptic.

4- Expression.

**Composition of eye**:

The eye consists of 3 layers:

1- **Fibrous layer (outer)** it includes:
a- Sclera  
b- Cornea  

2- **Vascular layer (middle)**:  
It contains many blood vessels and capillaries and it is pigmented it includes:  
a- Choroid: thin pigmented membrane dark brown in colour it is between the sclera and retina.  
b- The ciliary body: it surround the iris behind the cornea.  
c- The Iris: it is the pigmented membrane which surrounds the pupil of the eye.  
the colour of the eye depends on the colour of the iris.  
the function of the iris is to regulate the amount of light entering the eye by dilating or constricting the pupil.  

3- **Nervous layer (inner) Retina**: it is the inner most layer of eye, it is a delicate membrane consists of nerve cells (Rode and Cones).  

**The light transmitting mechanism:**  
1- The aqueous humour: clean watery fluid situated between the cornea and iris and ciliary body.  
2- The lens: transparent convex structure, it is behind the iris and pupil of eye.  
3- The vitreous humour: semifluid or jelly like substance, it helps to preserve the spherical shape of eye ball.  

**In the retinal : 2 spots**  
1- Fovea centralis: It is the spot in which there is the strongest of acute vision due to large number of nerve cells.  
2- Blind spot: It is the spot where the blood vessels enter the eye and the optic nerve leaves the eye.
The mechanism of vision:
The eye is similar to simple camera:
The light waves enter through the cornea to the aqueous humour then through the pupil to the lens then to vitreous humour then to the retina then to optic nerve then to the optic chiasma to the occipital lobe of brain.

Diseases of the eye:
1- Myopia:
The eye ball is slightly elongated so the picture will fall in front of the retina.

2- Hyperopia:
The eye ball is flattened so the picture fall behind the retina.

3- Astigmatism.

4- Colour blindness:
The cones in the retina are sensitive to colours while the rods are not sensitive to colours.

Auto – Exam:
Mention normal range of hearing sounds.

Post – Exam:
1- Enumerate parts of male reproductive system.
2- Explain briefly mechanism of vision process.
<table>
<thead>
<tr>
<th>Pre-Exam</th>
<th>Auto-Exam</th>
<th>Post-Exam</th>
</tr>
</thead>
</table>
| 1- To produce the mature ova.  
2- Acts as endocrine gland in producing the female sex hormones:  
  a- Estrogen hormone. 
  b- Progesterone hormone | normal range of hearing sounds = 20-20000 hertz. | **Testis**:  
Two glandular organs oval in shape.  
**Prostate**:  
It is a gland situated below the base of the bladder. It is anterior to the rectum.  
It surrounds the first part of the urethra.  
Enlargement of the gland is common in elderly men and cause obstruction to urine outlet from the bladder and need surgical operation.  

The eye is similar to simple camera:  
The light waves enter through the cornea to the aqueous humour then through the pupil to the lens then to vitreous humour then to the retina then to optic nerve then to the optic chiasma to the occipital lobe of brain. |

المصادر:  
1- د. ظافر الياسين – الفصلجة السريرية – وزارة الصحة 1983  
2- د. رشدي فتحي عبد الفتاح – اساسيات عامة في علم الفسيولوجيا – 1988  
3- Cordon sears – Anatomy physiology for nurses oxford publication – London 1974  