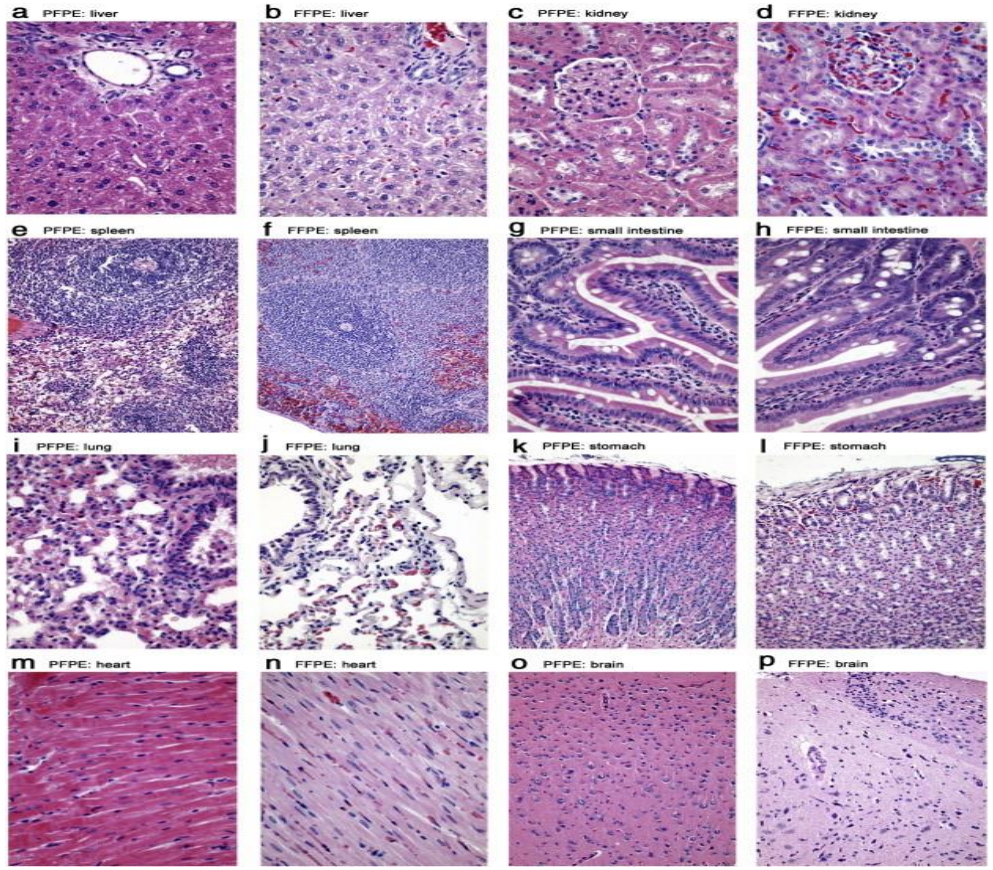
General Histology / Second Grade



Introduction to general histology
Lecture 1

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Introduction to general histology

- **Histology is a science that deals with studying the structure and function of different types of tissues.**
- **Each tissue is a group of cells similar in structure and organized to perform one or more function.**
- **The human body organs are complex organs, built up of different types of tissue working together to perform the function of that organ.**
- **All body tissue are originally raised from one of the three specialized embryonic layers; the ectoderm, the mesoderm, or the endoderm.**

Types of Tissues

- **The human body tissues are of four primary or basic types :**
- **1- Epithelial tissue; covers body surfaces, lines body cavities and forms glands.**
- **2- Connective tissue; underlines or surrounds and supports the other three basic tissues, structurally and functionally.**
- **3- Muscle tissue; made up of contractile cells and it is responsible for movement of the body and its parts.**
- **4- Nervous tissue; gathers, transmits, and integrates information from outside and inside the body to control the activities of the body and its parts.**

Preparation of Histological Slides

- **The procedure of preparing slides to be examined by a light microscope should be pass in the following steps:**
- **1)Obtaining the tissue:**
- **The tissue required for microscopic sections should be cut from the organ using very sharp knife, to prevent damage of tissue cells. Then the piece of tissue sliced into thin slices. The processes of sectioning should be completed as soon as possible, to prevent damage of the tissue.**

Preparation of Histological Slides

- **2) Fixation:**
- **To prevent postmortem changes (after death) degeneration of the tissue, slices have to be placed in a certain fluid called fixative solution, such as formaldehyde, mercury bichloride, potassium dichromate, acetic acid or osmic acid (osmium tetroxide).**
- **Fixative solutions act in setting the components of the tissue close together and prevent bacterial growth which may also alter the structure of that tissue.**
- **Fixatives are also can harden the tissue, so it can easily sectioned into slices. Some fixatives may also be able to increase the capacity of the components of a tissue for dyes that are subsequently used in staining.**

Preparation of Histological Slides

- **Dehydration :**
- **Tissue water should be removed the tissue cells to permit infiltration of paraffin wax in the components of the tissue. This process can be completed by passages of the pieces of tissue directly from the fixative through successively increasing concentration (30%, 50%, 70%, 90%) solution of alcohol ended with two passages through absolute alcohol. The process of replacing water by alcohol is called dehydration.**

Preparation of Histological Slides

- **4)Using of clearing agents :**
- **The xylene, toluene, chloroform, benzen and cederwood oil are examples of clearing agents which have the ability to be soluble in both alcohol and melted paraffin wax. So the clearing agents replaces the alcohol in the tissue. Replacing alcohol by one of the clearing agent (xylene) can be achieved by passage the pieces of tissue from the absolute alcohol to successively increasing concentrations (30%, 50%, 70%, 90%) solutions of xylene and alcohol ended with absolute xylene.**

Preparation of Histological Slides

- **5) Embedding :**
- **The clearing agent should be replaced by paraffin wax by placing the pieces of tissue into melted paraffin wax, in an oven warmed enough to keep the wax in liquid state during the procedure. The original wax should be replaced by a fresh one two or three times at frequent intervals (10-15 minutes). This paraffin is allowed to be hardened in form of blocks contain the pieces of the tissue.**

Preparation of Histological Slides

- **6) Sectioning :**
- **The paraffin block contains a piece of tissue then fixed to a holder of a microtome to cut the tissue into thin section (2-10 µm) using of extremely sharp knife. Paraffin ribbon of individual slices adhering to one another come from the sectioning process to be floated on a water bath.**
- **Attaching the sections on glass slides :**
- **The paraffin sections are carefully separated from one another, and a single paraffin section is floated on a surface of a glass slide rubbed with a weak solution of adhesive medium of albumin and water.**

Preparation of Histological Slides

- **Preparation for staining :**
- **The paraffin material that still infiltrates within the this slices of tissue must be removed before the staining processes can be started. Removal of wax material can be completed by follows this procedure:**
- **1) Immerse the glass slide bearing a paraffin thin sections in a clearing agent (absolute xylene) for 30 minutes, to dissolve out the wax material.**
- **2) Wash the slide with 50/50% xylene and absolute alcohol for 2 minutes.**
- **3) Transfer the slides to successively weaker solution of alcohol (90%, 70%, 50%, and 30%) 2 minutes for each.**
- **4) Wash with running water for 2 minutes.**

Preparation of Histological Slides

- **7) Staining of tissue section :**
- **The procedure of staining of animal tissue can be completed by using basic and acidic dyes, Hematoxylen and Eosin (H and E). Histological section stained by hematoxylin (basic dye), gives blue or purple colure to the nucleus (basophilic materials). The eosin (acid dye) gives a pink or red colure to the cytoplasme (acidophilic material).**
- **The procedure of staining can be summarized as in the following steps :**
- **1- Immerse the slides bearing sections in hematoxylin for 10 mins.**
- **2- Wash with slow running tap water for 5 minutes.**
- **3- Check the section under the microscope, the nuclei should be stained deep blue, if not return to hematoxylin for another 5 minutes. The cytoplasm should be free of hematoxylin , if not immersed in acid alcohol for 30 seconds then wash water for 2 minutes.**

Preparation of Histological Slides

- **4- Transfer the sections to eosin for 5 minutes.**
- **5- Wash with running tap water for 2-5 minutes.**
- **6- Dehydrate with 30%, 50%, 70%, 90% and absolute alcohol, 2 minutes for each.**
- **7- Immerse in clearing agent (xylol) for 2 minutes.**
- **8- Mount with D.P.X. or Canada balsam by placing one drop of the mounting material on the section and then cover it with a cover slip.**
- **9- The slide should be dried up or kept in oven for 10 minutes.**