



Lecture title: Introduction to histology

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Histology – is the science that studies microscopic structure and function of the any organism, the organization of the tissues and organs.

Cytology – is the science that study the structure and functions of the cell.

Embryology – is the science that research embryonic development (formation) of animal body

Why we study histology?

It is the bases of other subject in medicine. It intertwines the disciplines of cell biology, biochemistry, physiology, and as appropriate, pathology. Students will recognize the importance of this subject as they refer to the text later in your careers.

How to study histology - histological methods

Histology studies the microstructures. So, we should have the aid of microscope to study..... Several types of microscopes are available.

1- **light microscopy** (LM) including several type, such as

- bright-field microscopy
- Confocal and polarizing microscopy
- Phase-contrast microscopy

2- **Electron microscopy** (EM) that includes

- Transmission EM



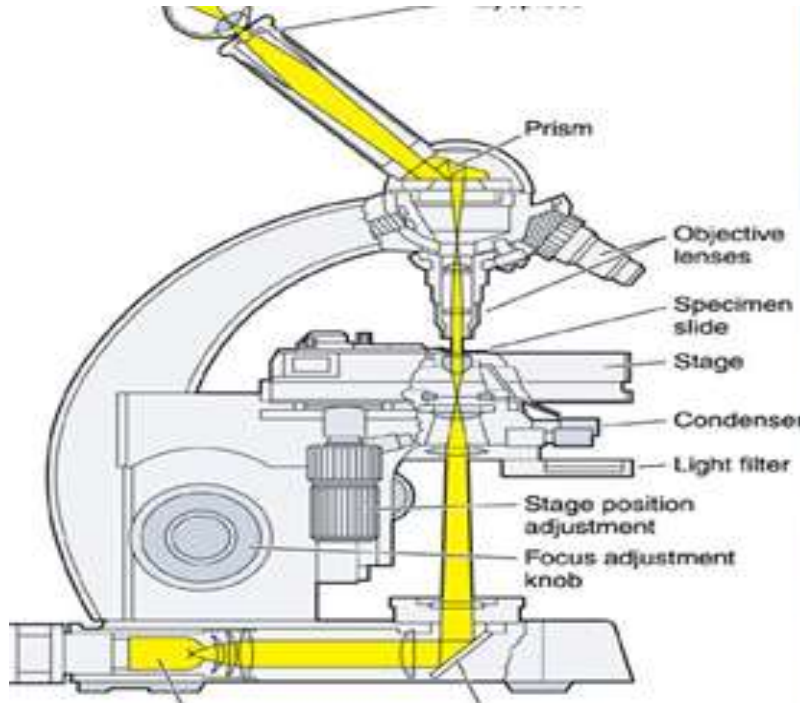
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- Scanning EM

Light Microscopes

- Compound microscopes are composed of a specific arrangement of lenses that permit a high magnification and good resolution of the tissues being viewed.
- The present-day light microscope uses a specific arrangement of groups of lenses to magnify an image (Fig. 1).
- Because this instrument uses more than just a single lens, it is known as a compound microscope.
- The light source is an electric bulb with a tungsten filament whose light is gathered into a focused beam by the condenser lens.
- The light beam is located below and is focused on the specimen
- Light passing through the specimen enters one of the objective lenses; these lenses sit on a movable turret located just above the specimen.
- Usually four objective lenses are available on a single turret, providing low, medium, high, and oil magnifications.

Generally, in most microscopes the first three lenses magnify 4, 10, and 40 times, respectively, and are used without oil; the oil lens magnifies the image 100 times. The image from the objective lens is gathered and further magnified by the ocular lens of the eyepiece.

- This lens usually magnifies the image by a factor of 10— for total magnifications of 40, 100, 400, and 1000—and focuses the resulting image on the retina of the eye.



Steps required in preparing tissues for light microscopy include

- (1) Fixation by (formalin 10%)
- (2) dehydration and
- (3) Clearing by (ethyl alcohol)
- (4) Embedding (liquid paraffin)
- (5) Sectioning (microtome)
- (6) Staining the sections. (hematoxylin & eosin stain) H&E

• The most commonly used ROUTINE stains in histology are **Hematoxylin and Eosin (H&E).**

• **Hematoxylin** is a base that preferentially colors the acidic components of the cell a bluish tint. Because the most acidic components are deoxyribonucleic acid (DNA) and ribonucleic acid (RNA), the nucleus and regions of the cytoplasm rich in ribosomes stain dark blue; these components are referred to as **basophilic**.



- **Eosin** is an acid that dyes the basic components of the cell a pinkish color. Because many cytoplasmic constituents have a basic pH, regions of the cytoplasm stain pink; these elements are said to be *acidophilic*.

