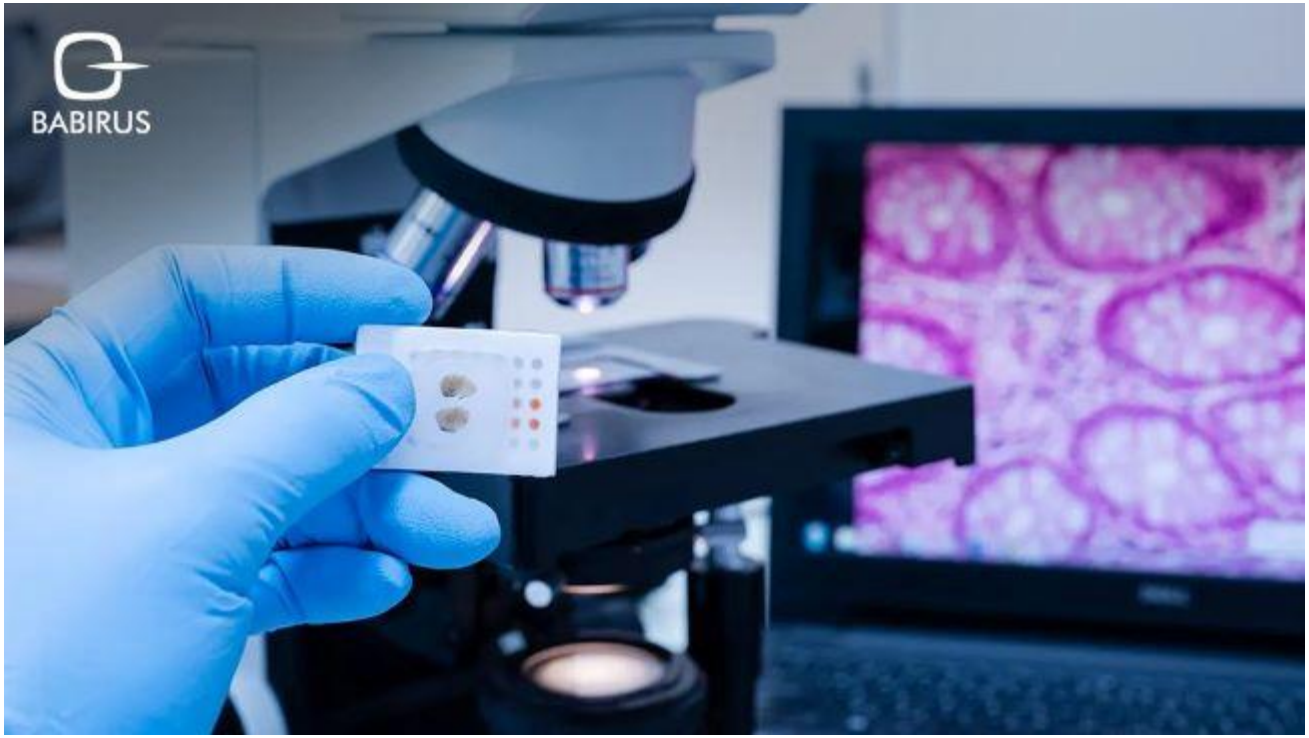
# Introduction to Histology

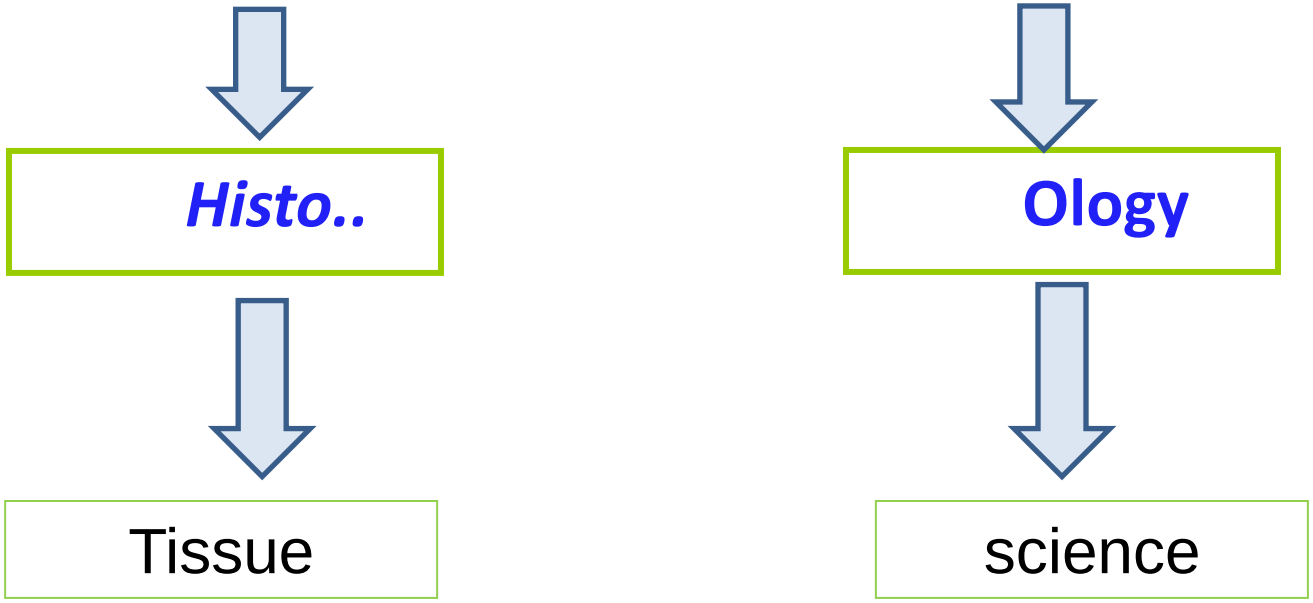



**Dr. Heba Sharaf Eldin**

Assistant Professor of Histology & Cell Biology

# What *is* Histology

# Histology *is*

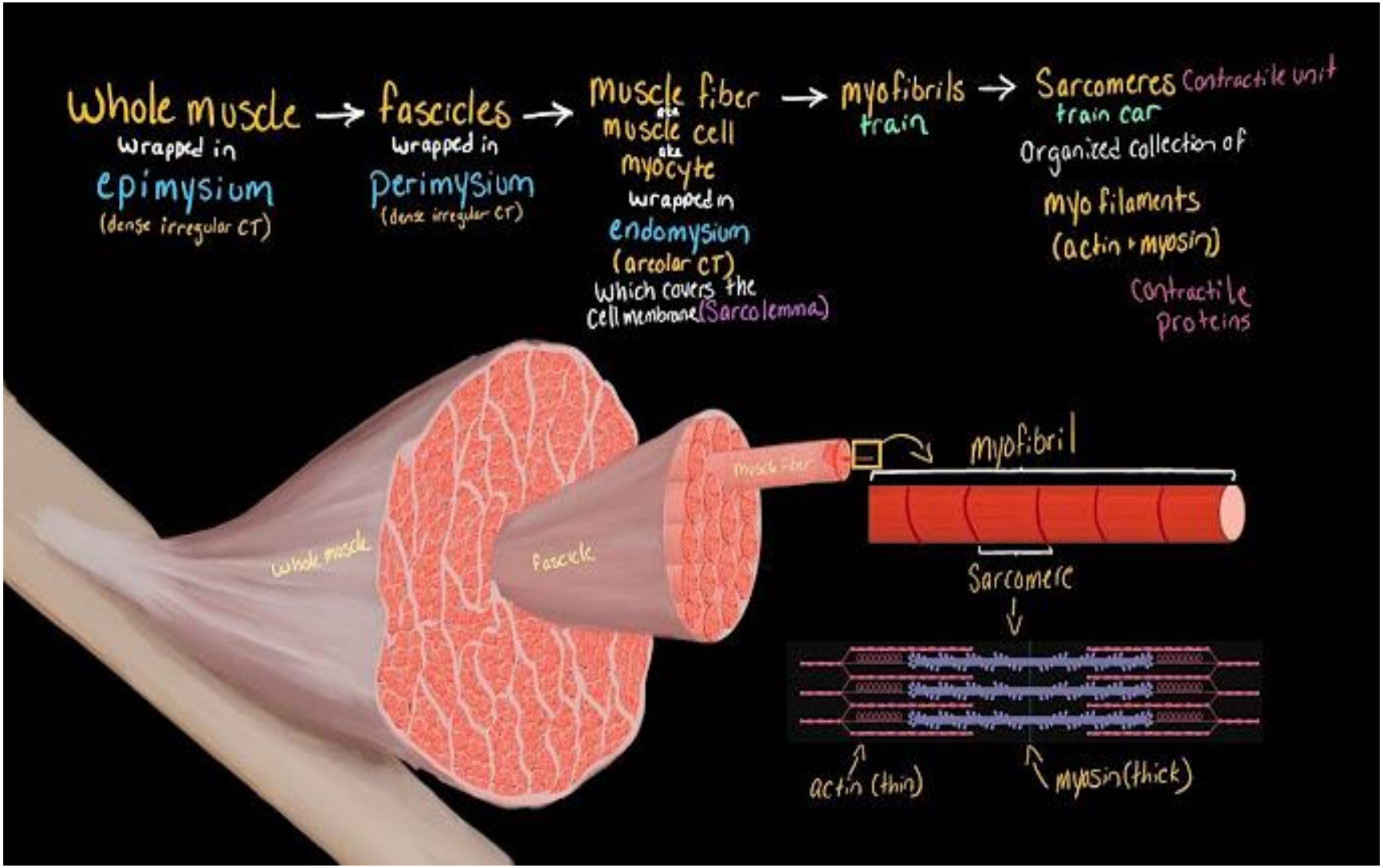



***Histology*:**

- The study of normal cells and tissues structure, mainly By using microscopes.
- *Why ?* The small size of cells and matrix components makes the study of histology dependents on the use of microscopes.

# Histology :

The Study of microscopic anatomy (microanatomy) of biological tissues.



# Histology *involves:*

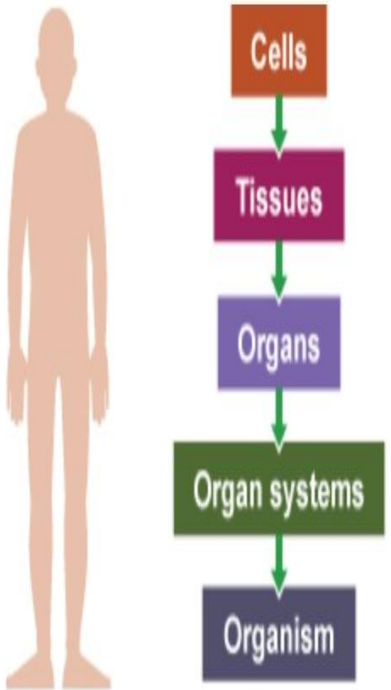
- The structure of different cells and their arrangement.
- Correlation between the structure and the functions of the cells and tissues specific to each organ.
- All aspects of tissue biology.
- Advances in *biochemistry*, *molecular biology, physiology*, immunology, and pathology are essential for a better knowledge of tissue biology.

# Hierarchical organization of the human body

**1-CELL:** smallest structural & functional unit in the body.

**2-TISSUE:** 4 basic:

- Epithelial.
- Connective.
- Muscular.
- Nervous.



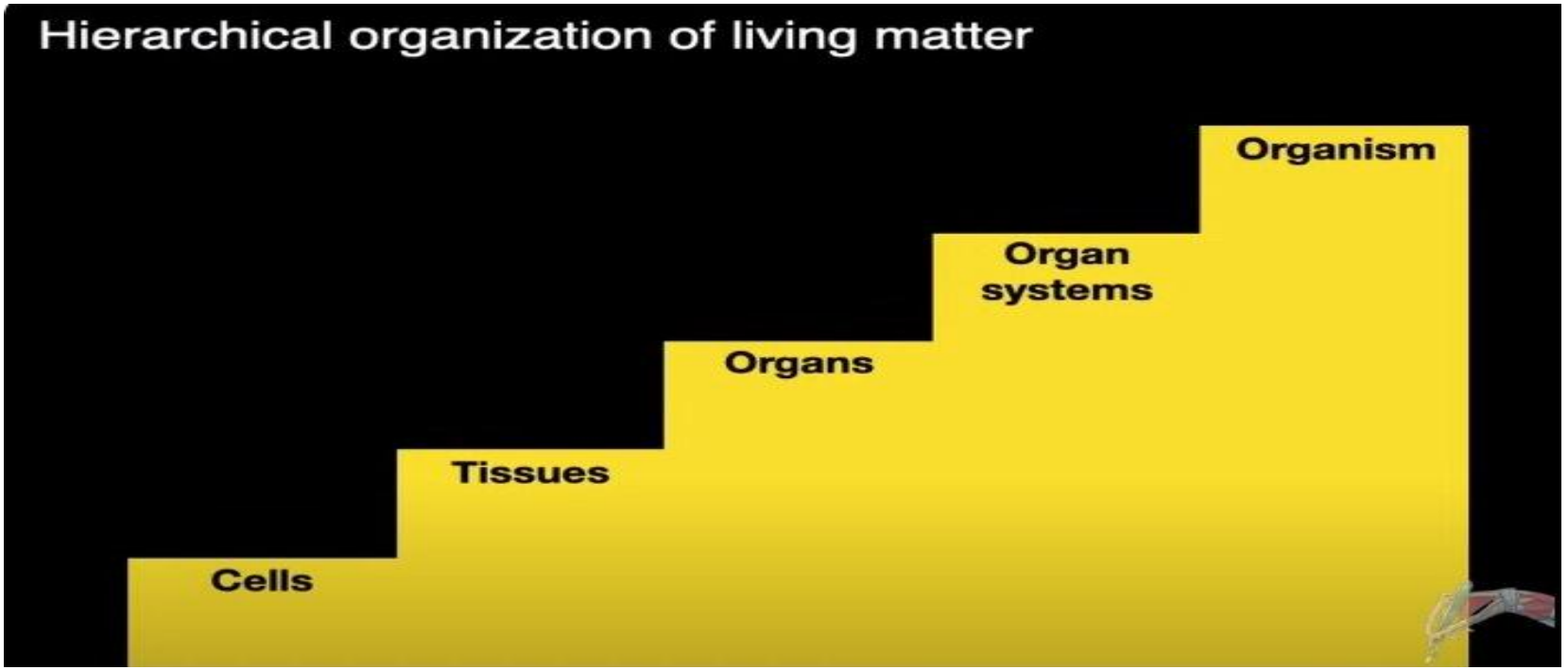

**3-ORGAN :** different tissues together perform special function.

**4-SYSTEMS :** different organs together perform complex function.

-Different types of *cells* form  together different types of tissues.

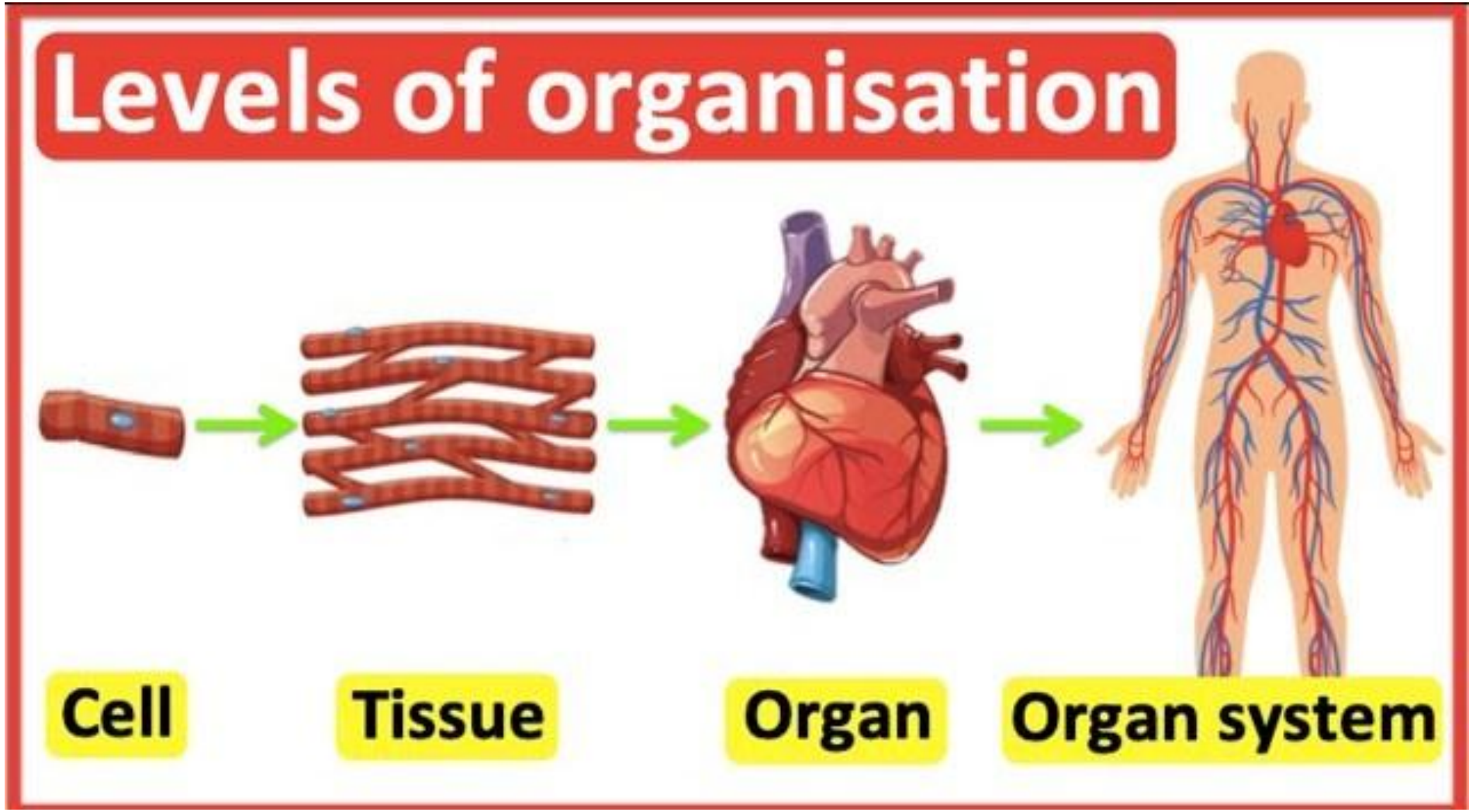
-Different types of *tissues*  together form human body organs.

-Human body *organs* form body systems.



*Example*

# Cardiovascular system



# **Why it *is*** essential to study Histology

- Histological structure determines the functions of different tissues and organs .

- When *diseases* such as cancer or inflammation affect a tissue, there are often *specific changes* in the microscopic structure of the tissue known as ***histopathology or pathology***.

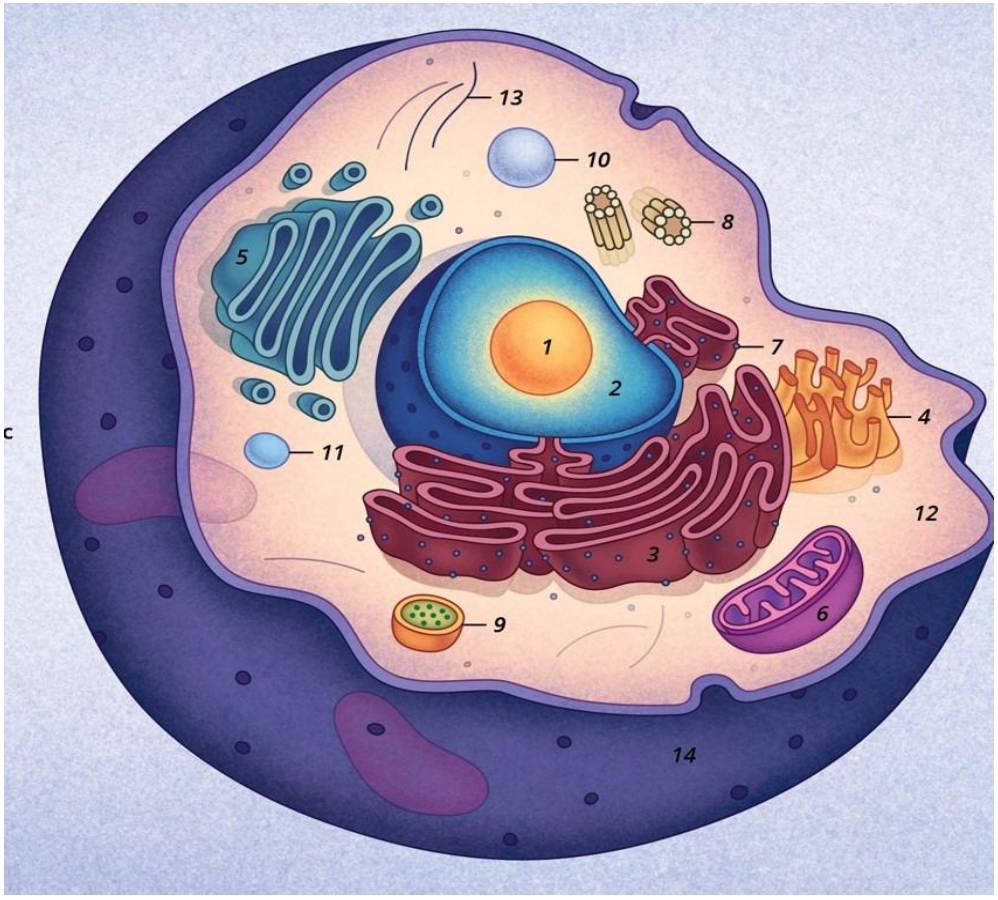
- Comparing the normal structure of cells and tissue versus abnormal ones is essential for an understanding of *pathology*.

# The cell

The cell is the *structural* and *functional* unit of the organism.

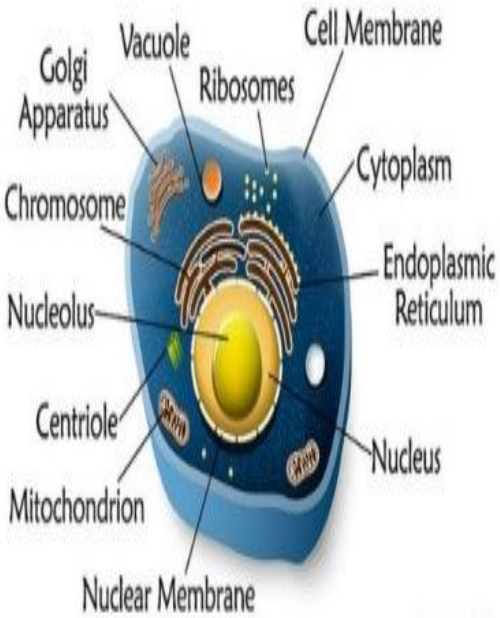
## Refresh your information

1. Nucleulous
2. Nucleus
3. rER
4. sER
5. Golgi apparatus
6. Mitochondria
7. rER
8. Centoriole
9. Lysosome
10. Coated Vesicle
11. Transporting Vesicle
12. Cytosole
13. Filaments
14. Cell membrane

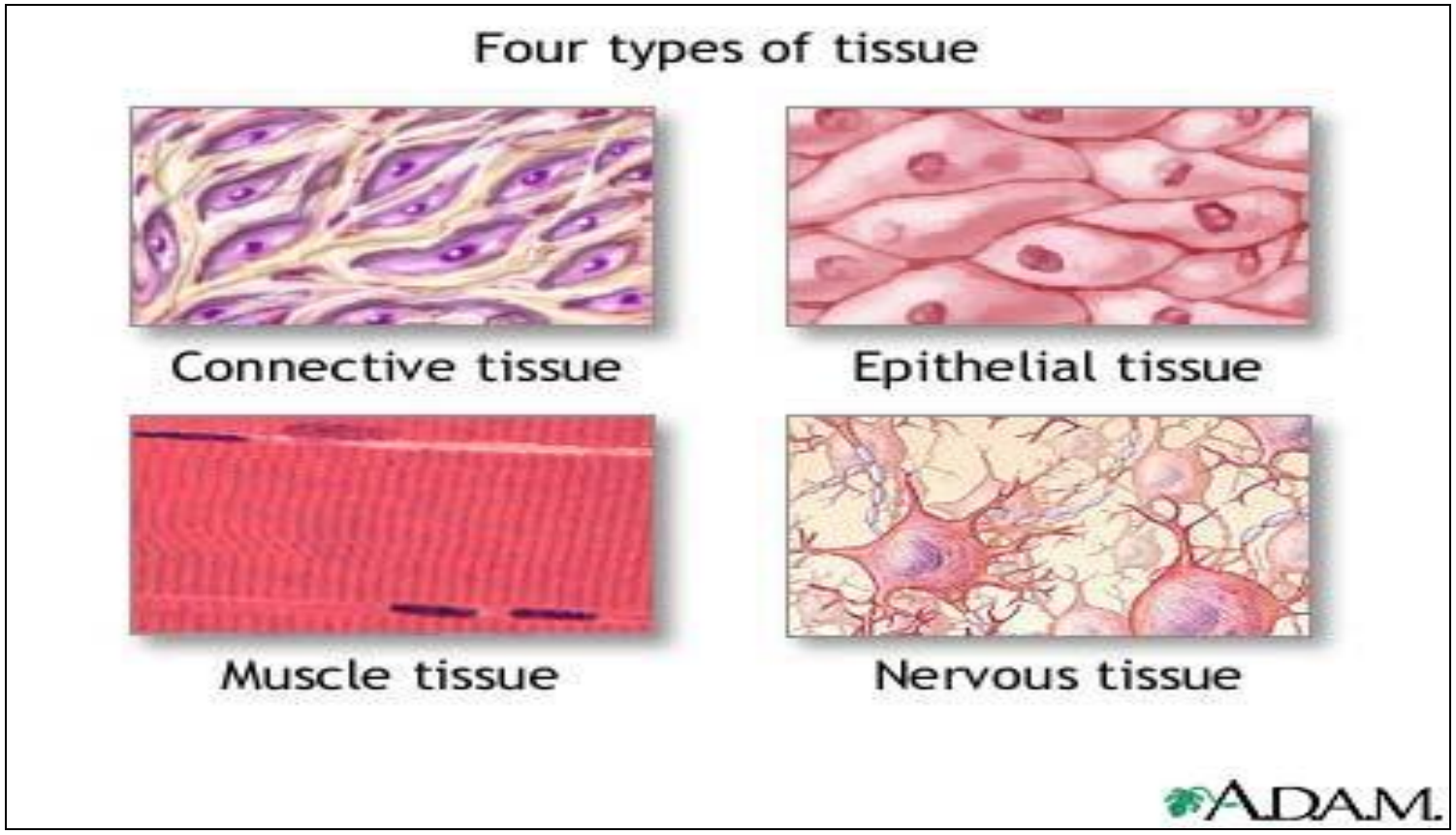


# The cell

- Cell membrane
- Cytoplasm
  - Cytosol
  - Cytoplasmic inclusions
  - Cytoskeleton
    - Microfilaments
    - -intermediate filaments
    - Microtubules
  - Cytoplasmic organelles
    - Membranous organelle
      - -Mitochondria
      - -rER
      - sEr
      - -Golgi apparatus
      - -Lysosomes
      - -Coated vesicles
    - Non membranous organelles
      - -Ribosomes
      - -Microtubles
      - Centrioles
      - -Microvilli
      - Cilia
- nucleus
  - Nuclear envelope
  - Nucleolus
  - Chromatin
    - Extended
    - Condensed
  - Nuclear matrix



# Human tissues

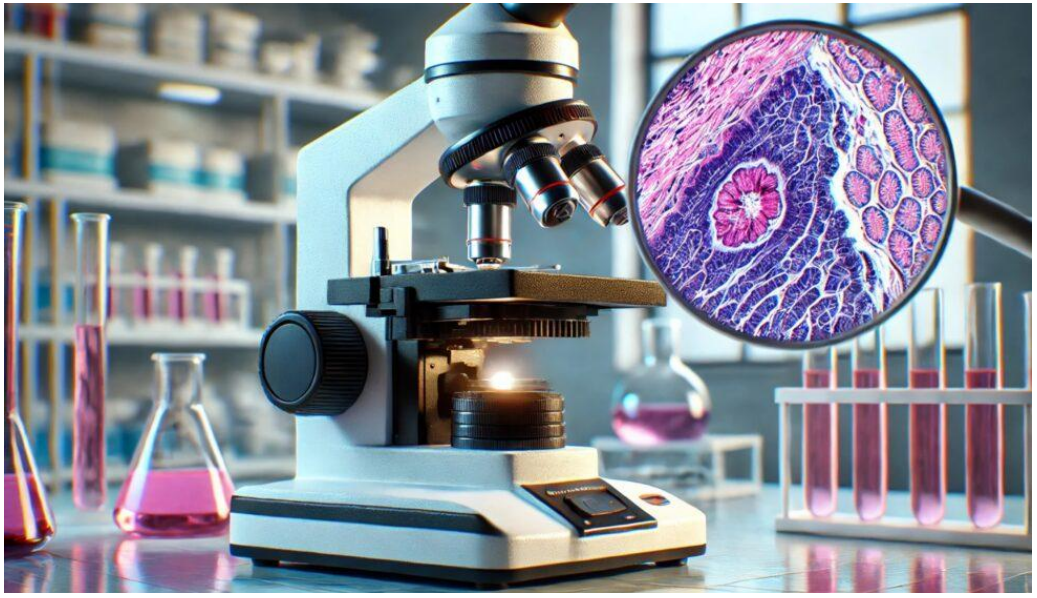


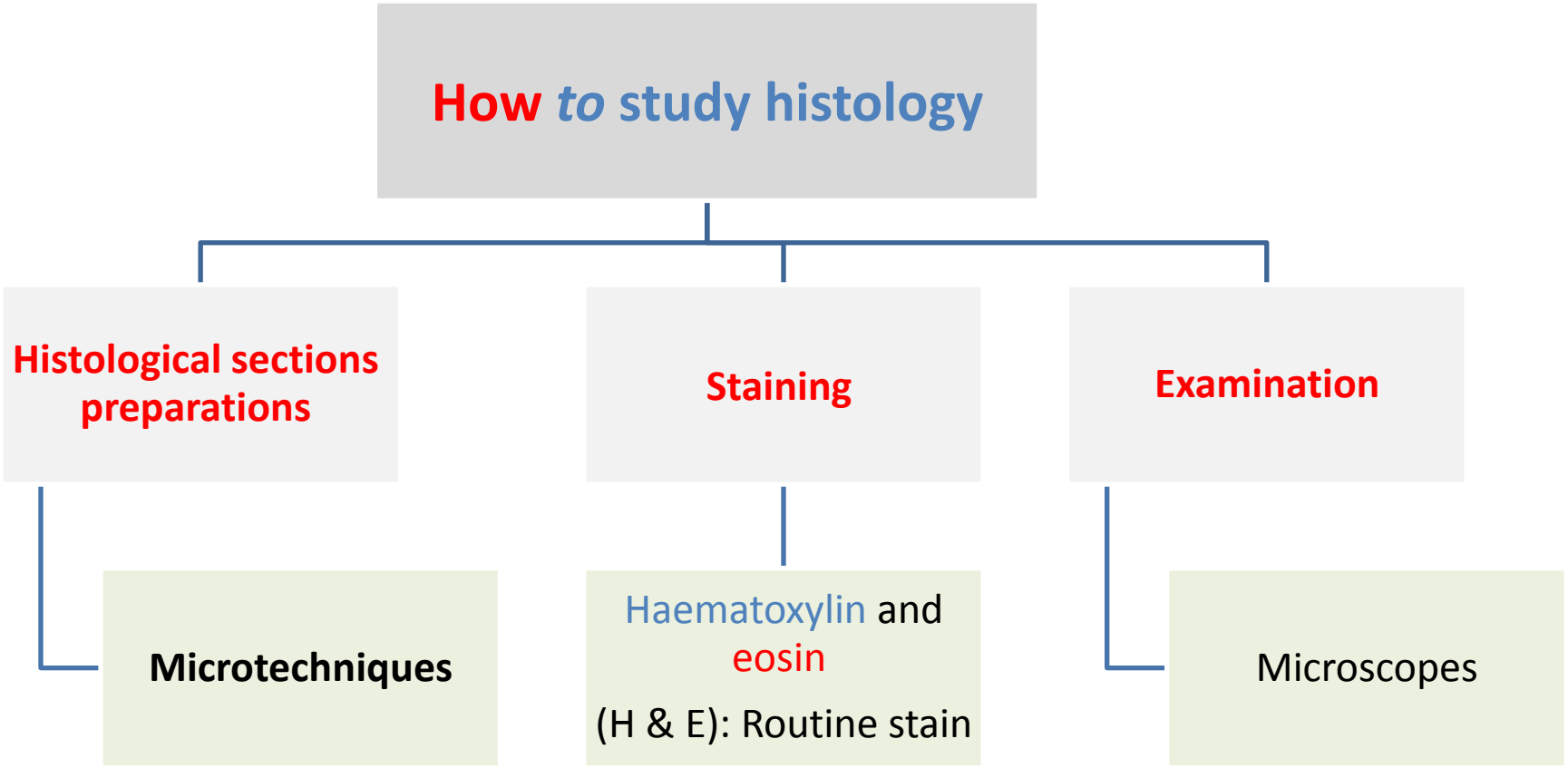
# 4Tissues

- **Cells**
- **Extra-ceullar Matrix**

ECM consists of many kinds of macromolecules

# How *to* study histology




How *to* study histology
Histological sections preparations
Staining
Examination
Microtechniques
Haematoxylin and eosin
(H & E): Routine stain
Microscopes

# Types of microscopes

## Magnification

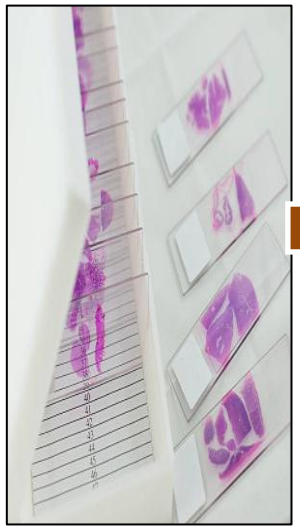
### Light microscope

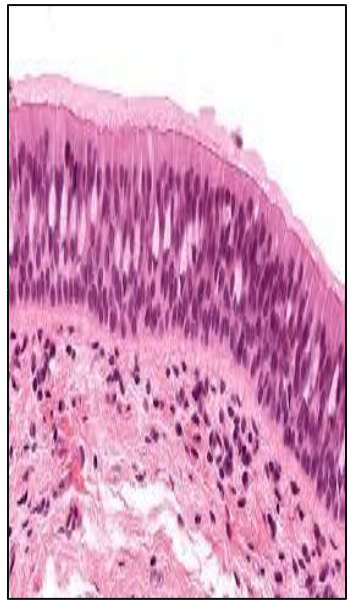
**X Up to 1000**

### Electron microscope

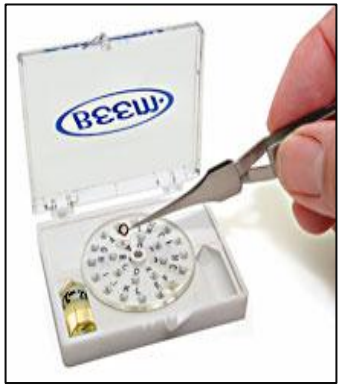
**X up to 400,000**

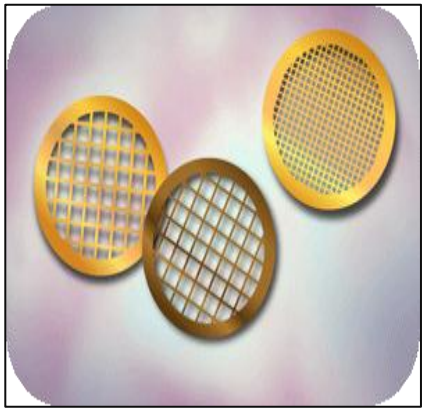
# Light microscope

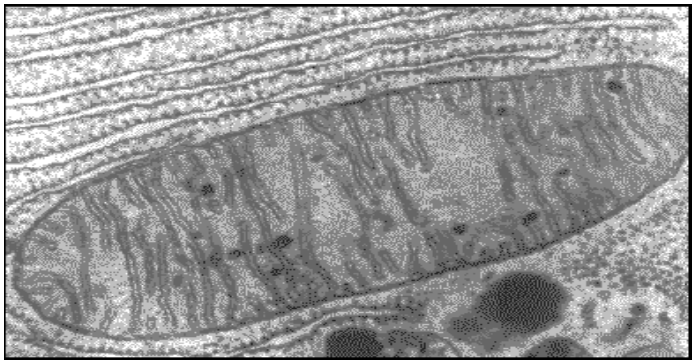




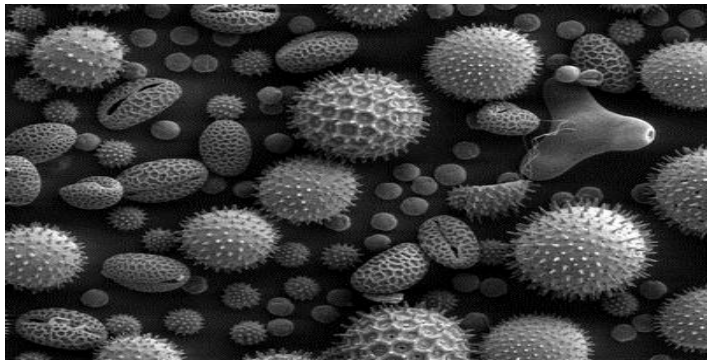
# Electron microscope







Transmission (TEM)



Scanning (SEM)

# Histology course

## Intended learning outcomes (ILOS)

At the end of this course You will be able to gain :

- ❑Knowledge and understanding
- ❑Practical and specific skills
- ❑ General skills
- ❑Competences

# Knowledge and understanding

- Know the basic steps in preparing sections for examination by different types of microscope.
- Identify the normal histological structure of the basic tissues of the body and some organs of the body.
- List the characteristics of the different tissues and organs under study.
- Correlate between histological structure and function.

# Practical and specific skills

- Use the light microscope efficiently.
- Handling the histological slides and learn how to examine them under light microscope.
- Recognize the cellular components in photographs taking by electron microscope.
- Differentiate between different types of tissues and some organs under the light microscope.
- Describe the microscopic structures of the tissue or organs and be able to identify each specific structure of microscopic images.
- Describe how the structures and the components of the tissue or organs contribute to particular properties and relate these to function(s) in a living individual organism.

# General skills

- Appreciate the importance of life long learning.

# Competences

- Apply the information described above to successfully complete the biomedical science courses that follow.

- Demonstrate the ability to use resources for completion of the laboratory assignments which involves answering questions, solving problems and thinking critically to arrive at a decision

# Overall aims of the Histology course

*To provide students with knowledge concerning:*

- Normal structure of  different tissues.
- How to identify them under the microscope.
- Functional & clinical correlation.

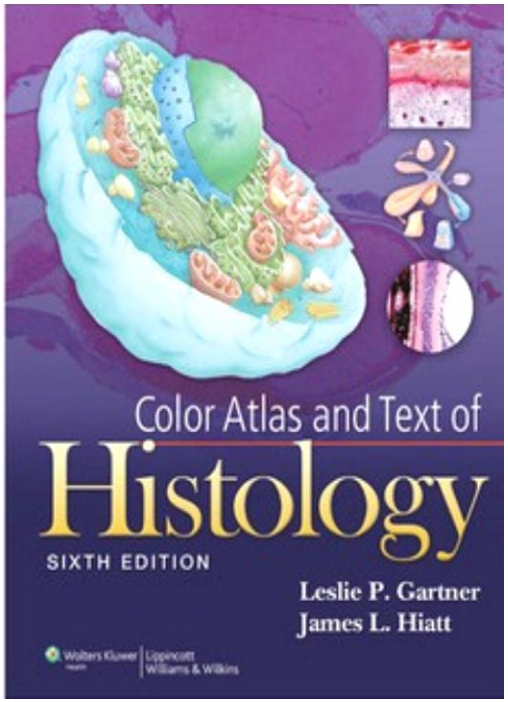

Histology
Cytology
Epithelium
Connective
Cartilage
Bone
Blood
Muscular
Nervous
Vascular
Lymphatic
skin
Respiratory system

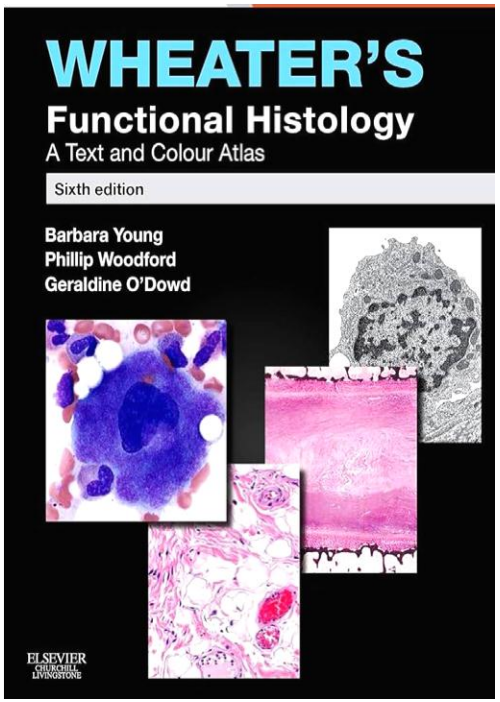
# Your curriculum

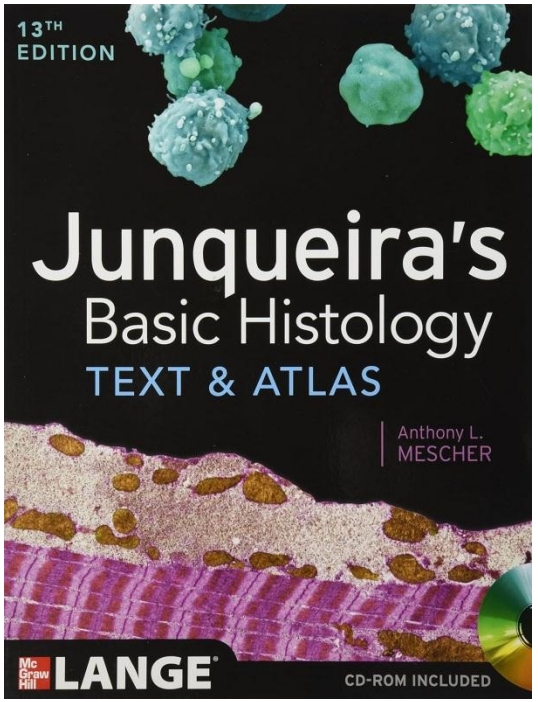
| Topic | Lecture | Practical |
|---|---|---|
| 1-Introduction to Histology and Histological techniques | 3 | 2 |
| 2-Epithelium | 3 | 2 |
| 3-Connective tissue | 3 | 2 |
| 4-Blood | 2 | 2 |
| 5-Cartilage | 1 | 1 |
| 6-Bone | 2 | 1 |
| 7-Muscle tissue | 2 | 2 |
| 8-Nerve tissue | 2 | 2 |
| 9-Cardio-vascular system | 2 | 1 |
| 10-Lymphatic (immune) system | 2 | 2 |
| 11-Integumentary system | 2 | 1 |
| 12-Introduction to Respiratory system | 2 | 1 |

# References

## Text books




## Web sites

www.histology-world.com

https://www.bbc.co.uk/bitesize/articles/zrp3ydm#znkd96f

# Thank you