Introduction to Pathology

Lecture: 1

Dr. Payman Anwar Rashid

2/10/2023

Fall Semester
Course Name : Systematic Pathology
Second Grade

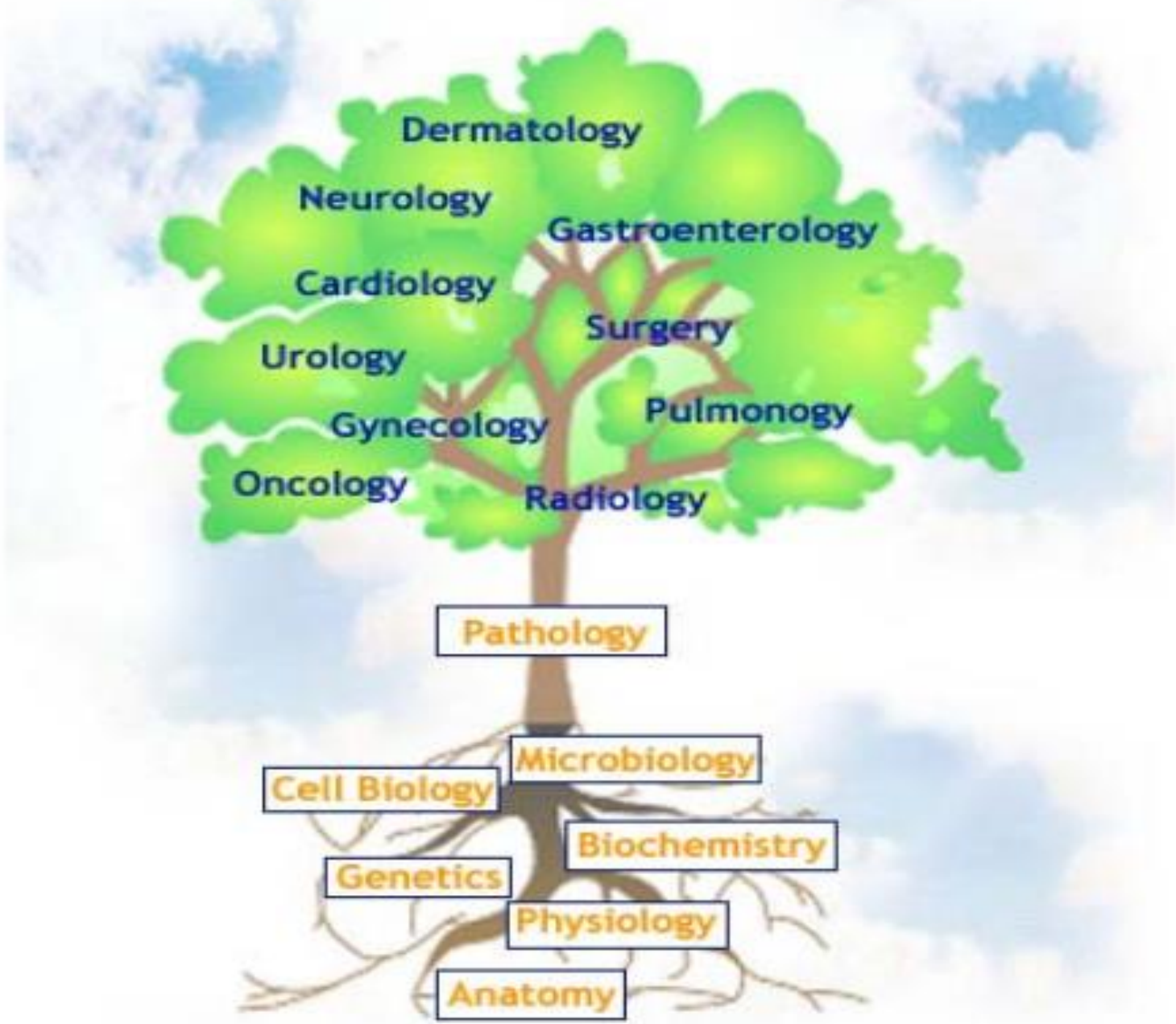
Lecture Outline:

* Introduction to Pathology

* Types of Biopsy.

- What is pathology?
- Who is a pathologist?
- What is a disease?
- How are diseases diagnosed?

The Tree of Medicine



Pathology (Gr. pathos “disease” + logos “word, reason”) is the study of the links between diseases and the basic science

What is a Disease?

- A disease is a physical or functional disorder of normal body systems that places an individual at increased risk of adverse consequences

- Diseases are diagnosed by physicians or other health care providers through a combination of tools

- When a disease is diagnosed, treatment is given to prevent complications and to improve prognosis

Diagnosis (Gr. dia “through” + gnosis “knowledge”)

- Diagnoses are made by three general categories of physicians or health care providers:
  - **Clinical diagnosticians** identify diseases by examination of patient’s history and physical examination
  - **Pathologists** identify diseases by examining cells and tissues removed from the body
  - **Radiologists** identify diseases by imaging the intact body

Pathology:

is the study of the structural and functional causes of human disease.

The four aspects of a disease process that form the core of pathology are:

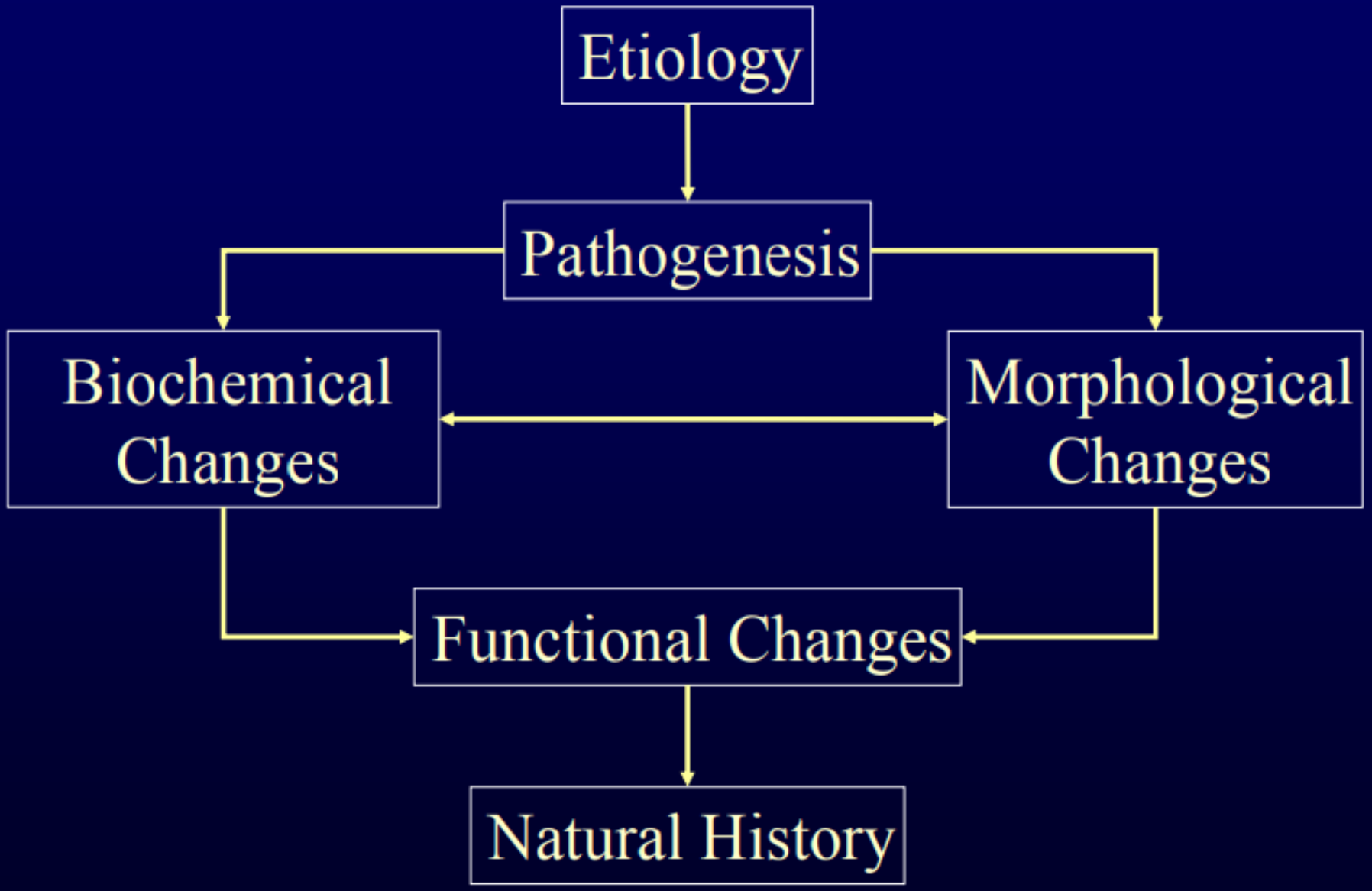
1. The causes of a disease (etiology).

2. The mechanisms of disease development (pathogenesis).

3. The structural alterations induced in cells and tissues by the disease (morphology) including gross and microscopic examination.

4. The functional consequences of the morphologic changes (clinical signs and symptoms).

The Disease Paradigm



Biopsy:

Is a piece of tissue or organ removed surgically from a patient for histopathological examination.

Autopsy ?

Types of biopsy:

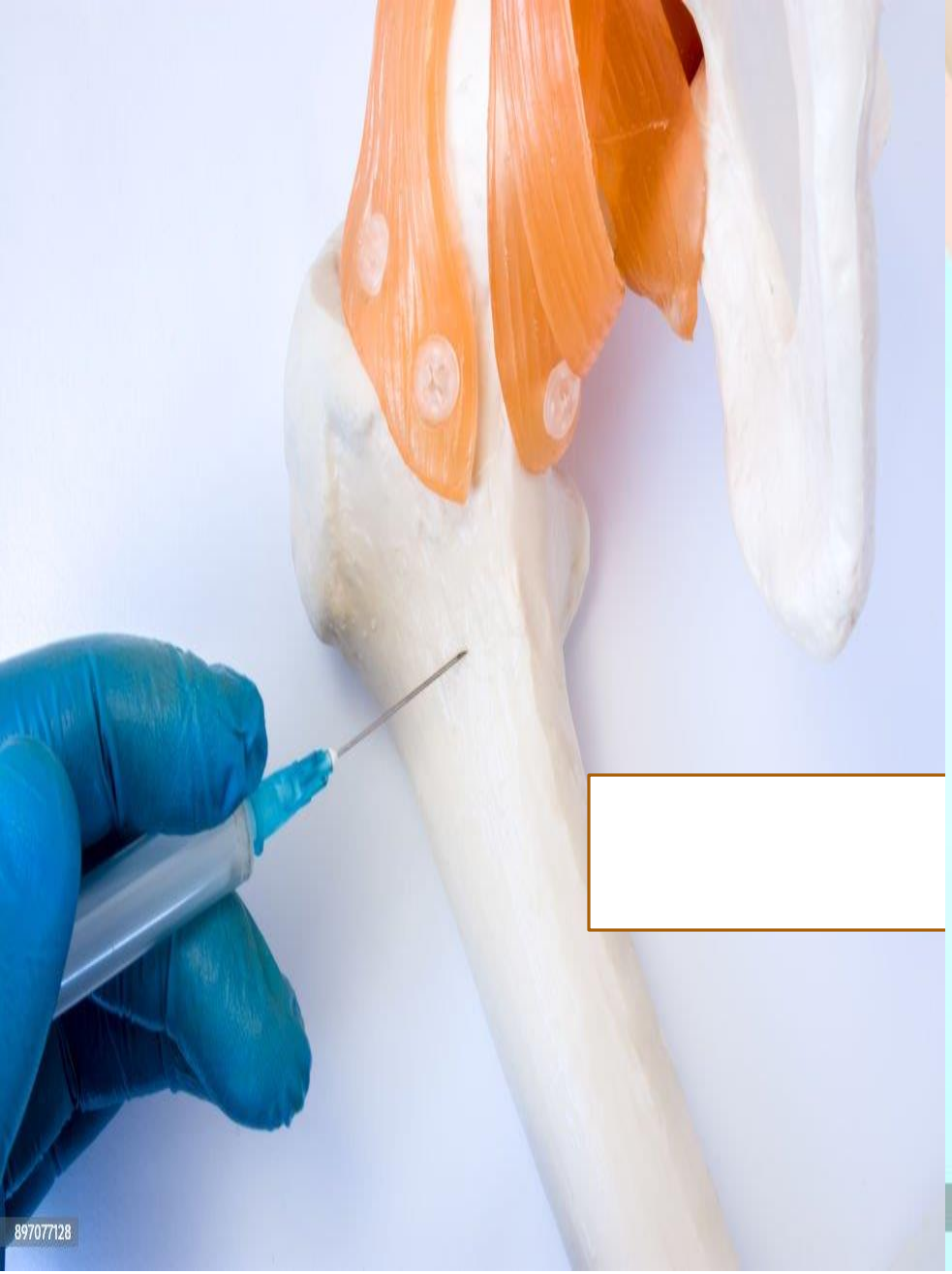
1. Incisional biopsy: means removal of part of diseased tissue or organ for histopathological examination.

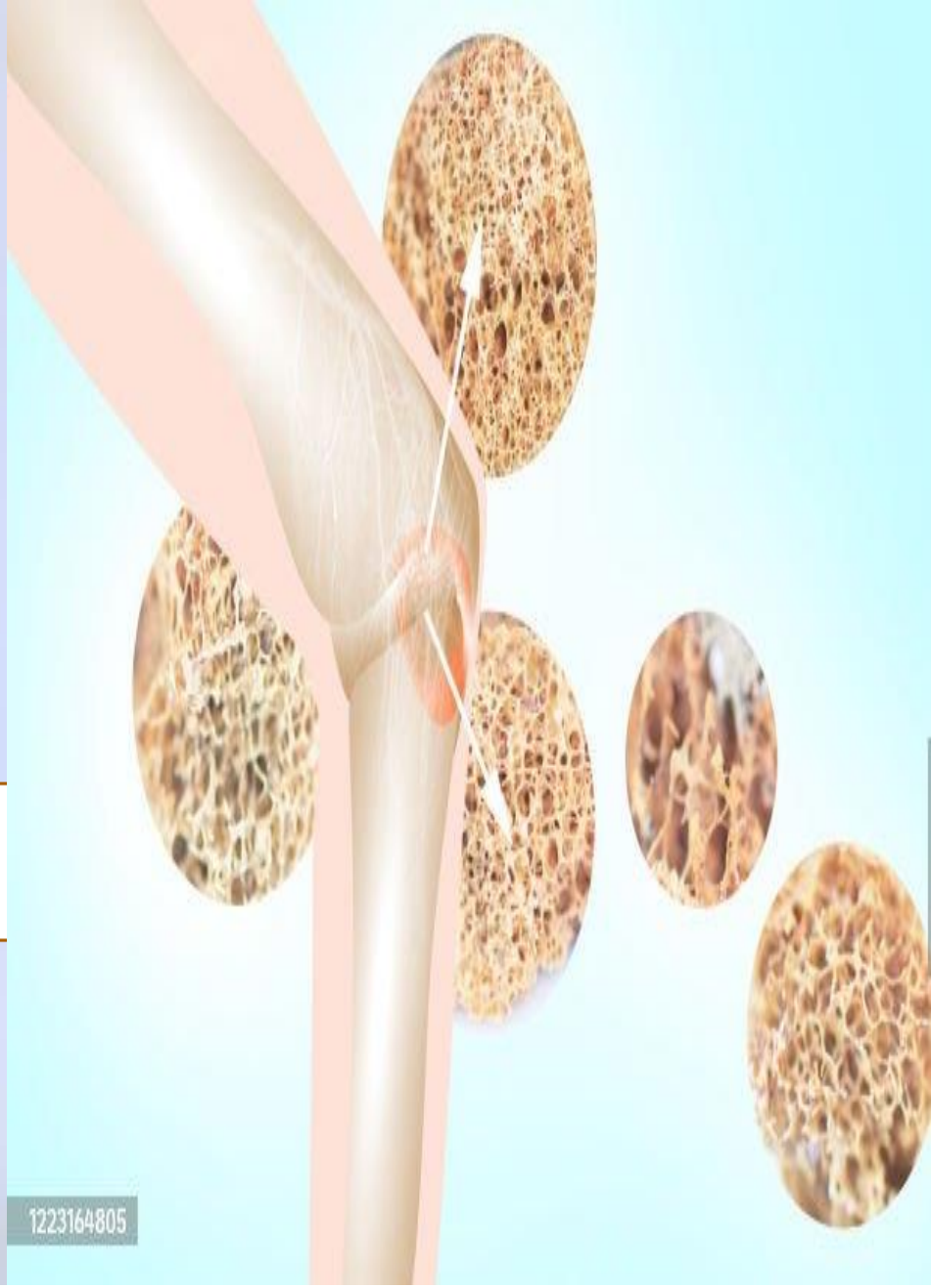
2. Excisional biopsy: means removal of whole diseased tissue or organ for histopathological examination.

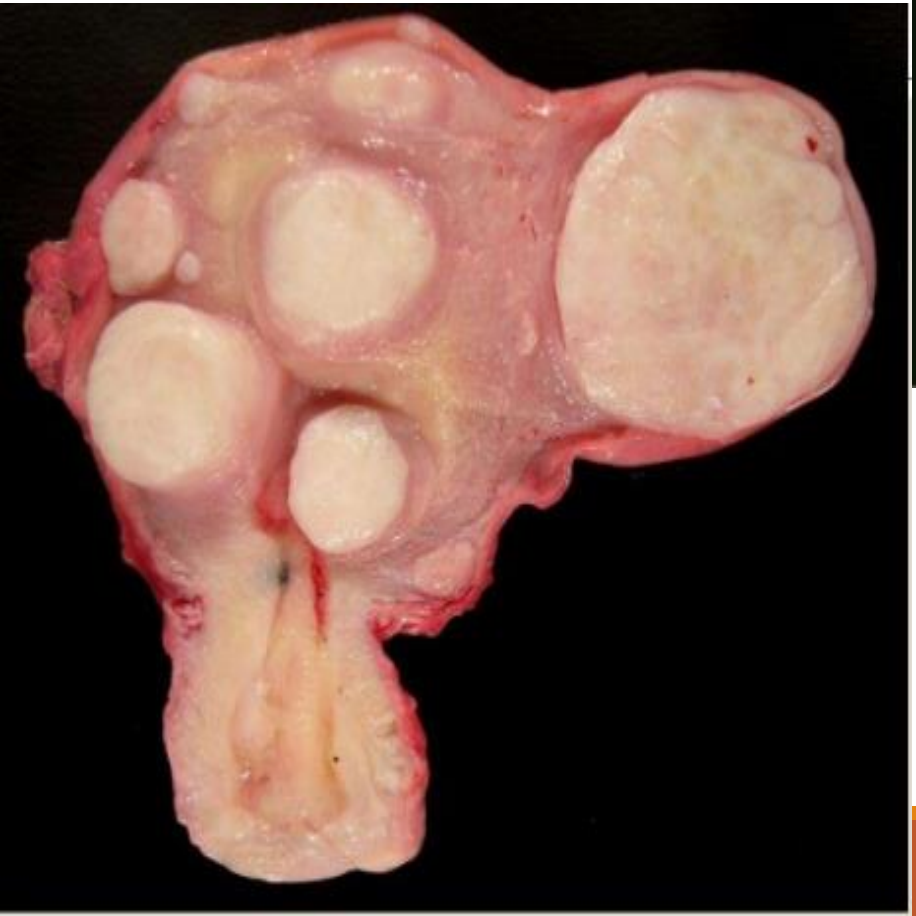
3. Endoscopic biopsy: means removal of small piece of tissue during endoscopic examination for histopathological study.

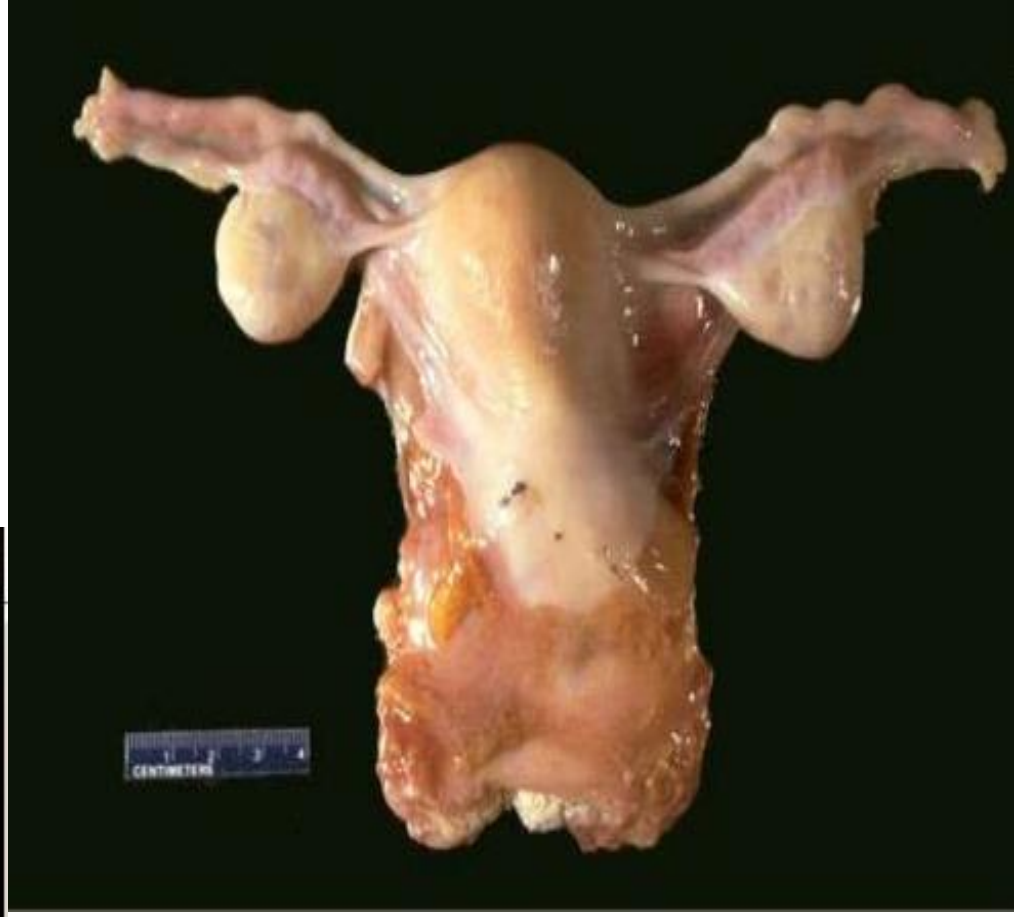
---

4. Fine needle aspiration cytology: means aspiration of cells from a tissue or organ by a syringe for microscopical examination.

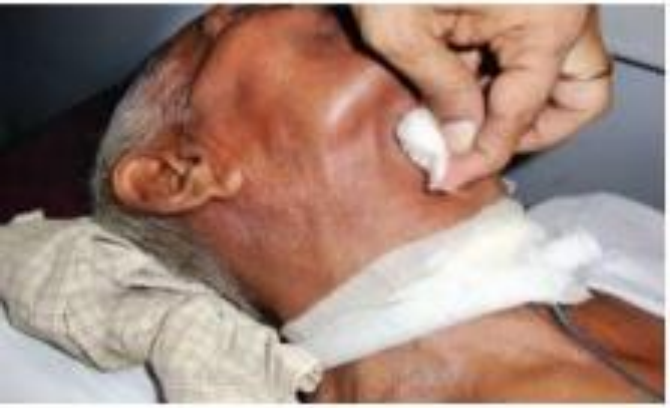

897077128


1223164805

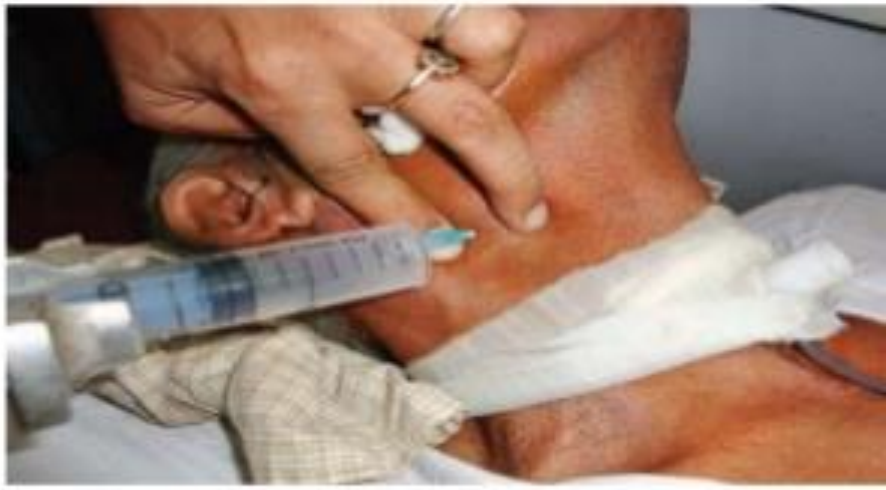



CENTIMETERS

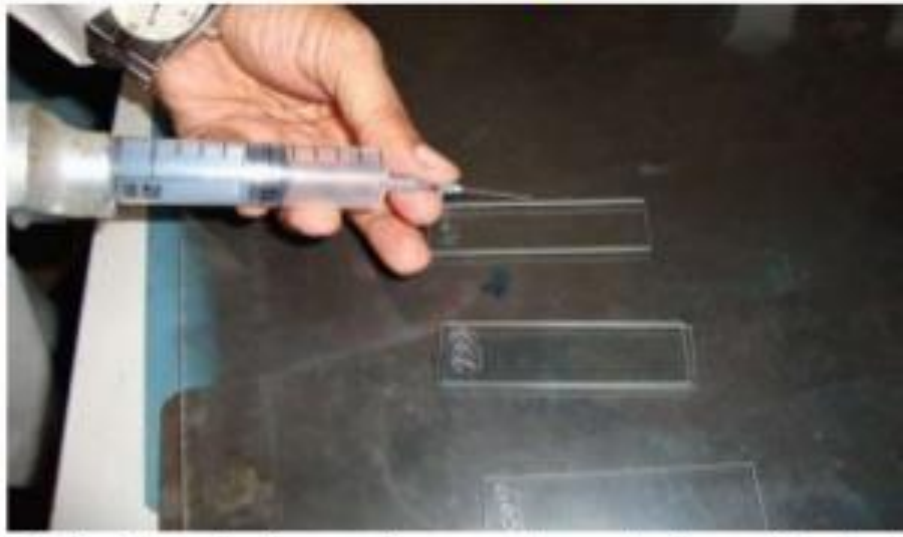
FNAC with aspiration



Site of FNAC should be cleaned by spirit swab



Needle is introduced in the swelling and is gently moving to and fro. Simultaneously negative suction is also created by withdrawing the piston



Air is taken in the syringe and needle is reattached

The aspirated material is expelled and the smear is made by gently pressing the upper slide on the lower one

How to send specimen for histopathological examination?

1. Special form that contain the following information:

a. name of patient, age and sex.

b. name of hospital, name and number of ward where the patient is present.

c. name and signature of the physician whose responsible for the patient.

d. date of sending the biopsy.

---

e. diagnosis of the disease and summary about patient's clinical sign, symptoms and physical finding.

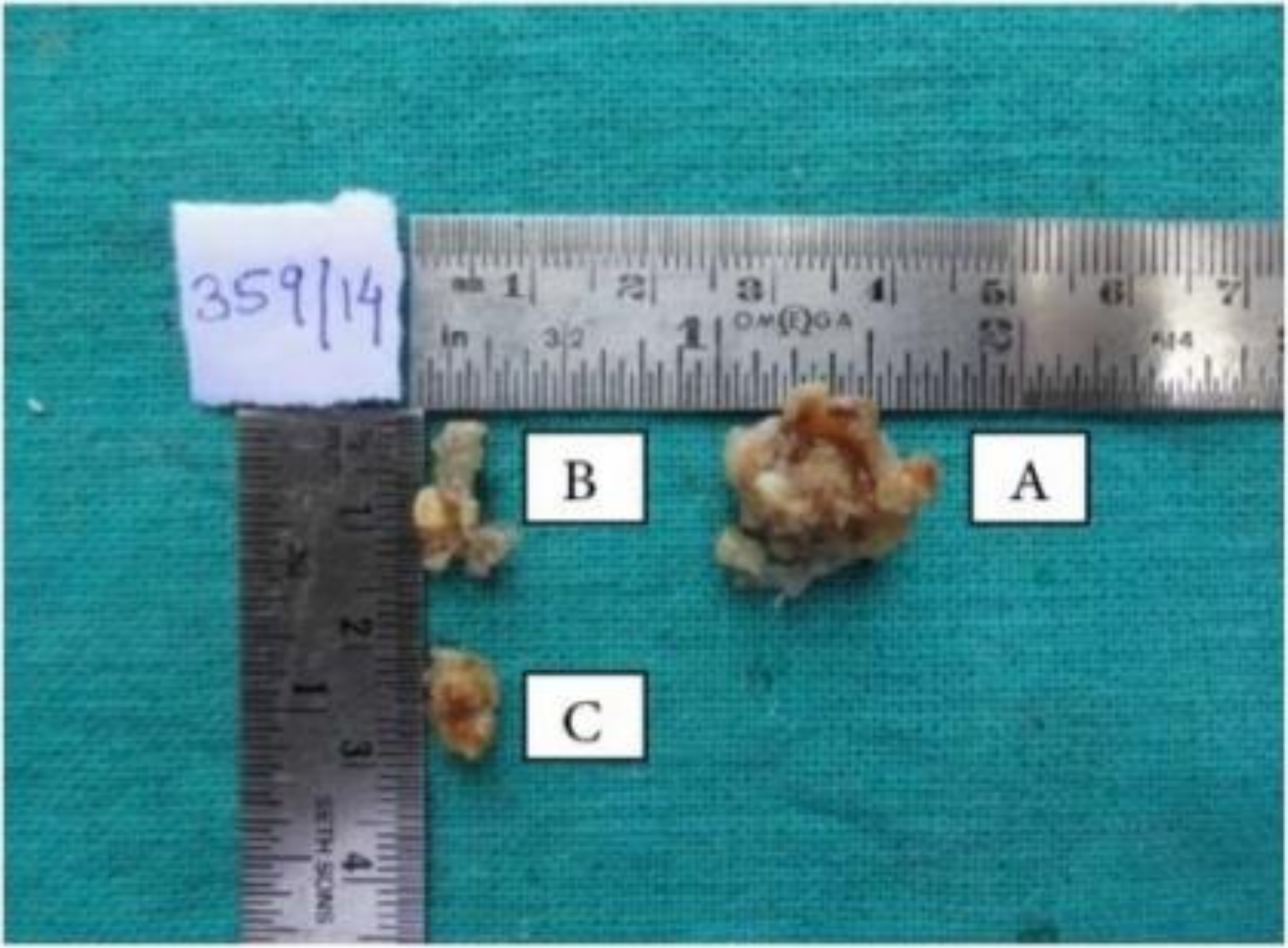
f. name of the organ or the tissue that the biopsy is taken from.

2. The biopsy should be put in fixative solution immediately after removal of the tissue and the volume of fixative solution should be 10 times more than the size of the tissue or organ.

3. Name of patient, name of hospital , name and number of ward, name of physician and date should be written on the biopsy container.

Tissue Processing

For Histopathological Examination


359|14
B
A
C


626620-25 (Stainless Steel Cover)

The most common method used for tissue processing is the Routine Paraffin Wax method.

This method include several steps:

1. **Fixation.**
2. **Dehydration.**
3. **clearing.**
4. **Paraffin wax impregnation.**
5. **Blocking out.**
6. **Cutting with microtome.**
7. **Rehydration.**
8. **Staining.**
9. **Microscopical examination.**

Fixation:

aims of fixation

1- To avoid autolysis (i.e. digestion by enzymes present within the cells).

2- Prevent putrefaction by bacteria.

3- To preserve the structure & molecular composition of the tissue.

- **One of the best fixative solution for routine light microscopy is a buffered isotonic solution of 10% Formaldehyde.**

- **Amount of fixative should be 10 times the size of tissue.**
- **Speed of fixation is 1mm/hour.**

Dehydration:

means extraction of water from cells by bathing the tissue in a graded series of mixtures of ethanol & water (usually from 70%-100% ethanol).

Clearing:

The ethanol in the tissue then replaced by a solvent miscible with the embedding medium.

The most common clearing solution used is Xylene.

It also clear the tissue and make it transparent.

- 12 stations
  - 1 jar – formalin
  - 6 jars – grades of alcohol
  - 3 jars – xylene
  - 2 jars – molten paraffin wax

Embedding (Paraffin impregnation):

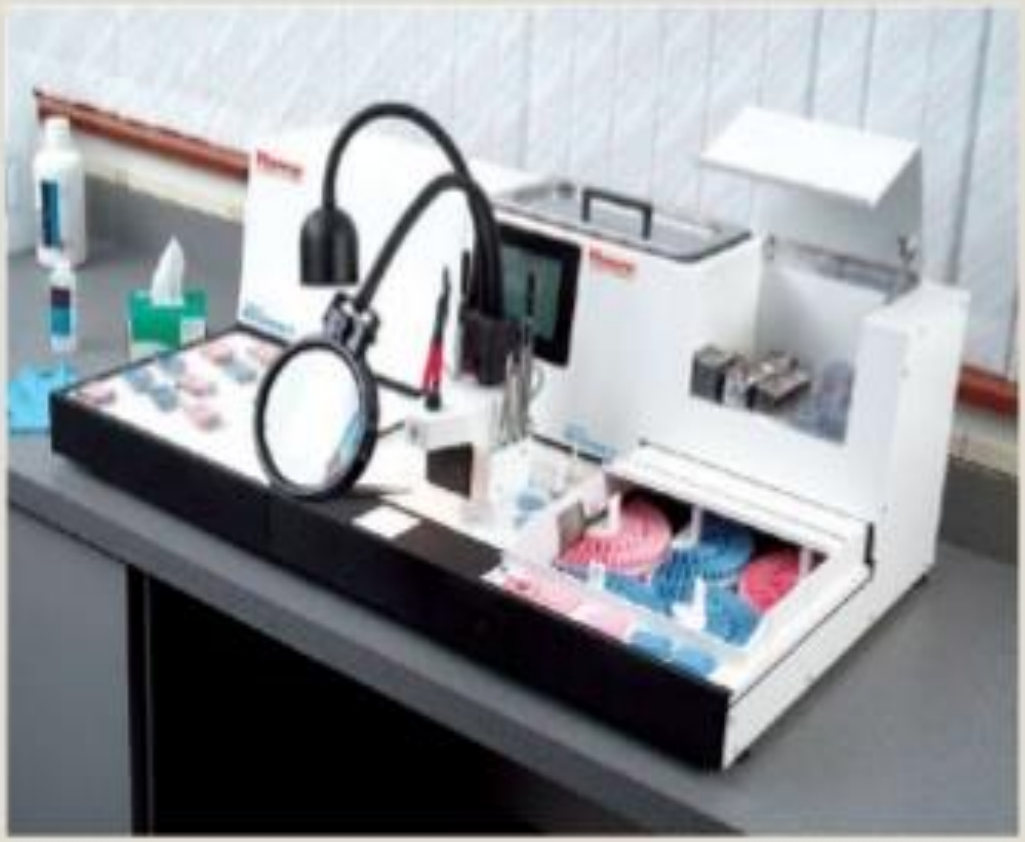
Once the tissue is impregnated with the solvent it is placed in melted paraffin in the oven typically at 58-60 C . The heat causes the solvent to evaporate and the spaces within the tissue become filled with paraffin.

Blocking out:

The tissue together with its impregnated paraffin hardens after being taken out of the oven.

- Embedding – with molten wax
- Wax blocks –
  - Metallic L (Leuckahart's) blocks
  - Plastic moulds

- Wax reservoir
- Heated area for steel moulds
- Wax dispenser
- Separate hot and cold plates



Remove tissue from cassette

Fill mould with wax and orientate tissue

Cutting by microtome:

The blocks containing the tissue are then taken to a microtome and are sectioned by the microtome's steel blade to a thickness of 1-10 micron.

(1 micrometer= 0.001mm)

The sections are floated on water and transferred to glass slides to be stained.

- Microtome – equipment
- Microtomy – technique
- 5 types of microtomes :
  1. Rotatory – MC used
  2. Sliding
  3. Freezing
  4. Rocking
  5. Base - sledge

Rehydration:

Means introduce water into the cells by using graded series of ethanol in descending concentration (i.e. 100% - 90% - 80% - 70% …). This step prepare the tissue for staining.

Staining:

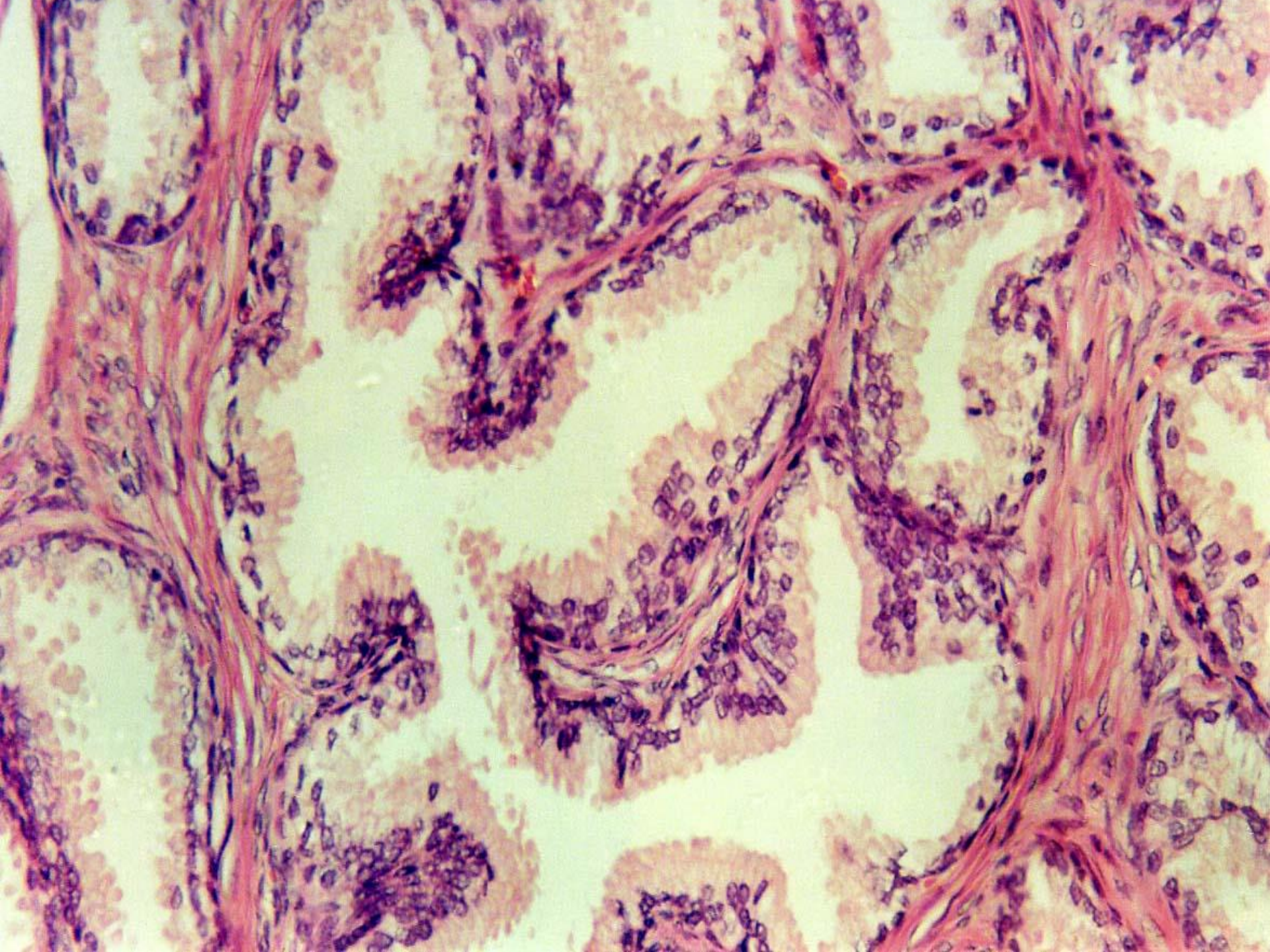
Of all dyes the combination of hematoxylin and eosin (H&E) is the most commonly used. Hematoxylin stains the cell nucleus and other acidic structure (such as RNA-rich portions of the cytoplasm and the matrix of hyaline cartilage) blue.

While eosin stains the cytoplasm and collagen pink.

- Haematoxylin – nuclear stain
- Eosin – cytoplasmic stain
- Mounted in DPX/Canada balsm
- End result :-

Nuclei	:	Blue
Cytoplasm	:	Pink
Muscle, collagen,		
RBCs, keratin, colloid protein	:	Pink


W.ARMSTRONG
E85302-18
I-1&2-1
BCC L ALA
DSW 07-31-07
W.ARMSTRONG
E85302-18
II-4-1
BCC L ALA
DSW 07-31-07



Thank you