

INTRODUCTION TO HISTOPATHOLOGY

TYPES OF PATHOLOGY SAMPLES

- 1) Gross specimen: organ or part of an organ (removed during surgery (biopsy) or at autopsy)
- 2) Microscopic sample
 - a- **Tissue sample for histopathologic examination** usually 1-2 cms (examination of material containing cells + tissue). Source of tissue
 - Living patient during surgery is called biopsy
 - Dead body from postmortem or autopsy material to determine cause of death & diagnosis in cases of sudden uninvestigated death
 - b- **Electron microscopy** sample may be a or b & should not exceed 1mm³ for examination of cell organelles or fibers & vascular tissue
 - c- **Fluid / needle aspirate for cytological examination** (examination of material containing mostly cells)
 - Fluids: Effusions (pleural, pericardial ascitis & joints) & gastric / bronchial lavage samples
 - Discharges : nipple discharge
 - Fine needle aspirates (FNAC) aspiration from superficial tumor masses or cysts
 - Brush smears, scraping & PAP smears for cervical screening

SAMPLE PRESERVATION

A- Routine histopathology samples are fixed in 10% buffered formalin (certain tissues or special techniques like electron microscopy will require other types of fixatives)

B- Cytology samples: may not need fixation if worked on immediately or are fixed in ethanol or special alcohol based cytofix spray

SAMPLE PREPARATION

	Histopathology	EM	Cytology
Fixation	Formalin	Glutraldehyde & osmium tetraoxide	Air dried or alcohol fixed
Processing	Paraffin wax processing to form solid blocks containing the tissue in the middle	Epon: a resin material to form solid blocks	-Fluids are centrifuged & sediment taken to be spread on slides -Others are directly smeared on slides
Microtomy	5-7u thick are	ultrathin	

	cut from block & applied to slide	sections	
Staining	Routine hematoxylin & eosin Special histochemical & immunohistochemical stains	Contrast used is lead acetate	Routine: Papanicolaou stain (PAP)-Giemsa & modified giemsa (MGG)
Mounting	DPX / Canada balsam + coverslip	Section placed directly on a grid	DPX / Canada balsam + cover slip or no mount material just a drop of water

HOW TO EXAMINE & COMMENT ON A HISTOPATHOLOGY SLIDE

A) **Naked eye** (NE) examination of the slide before looking into microscope

1. Hollow structures are tubular organs of small diameter e.g. appendix & blood vessel
2. Strip or ribbon like sections are usually obtained from hollow structures of large dimensions as a longitudinal cut involving all layers inner & outer e.g. urinary bladder & large intestine
3. Solid section : most glands & solid organs are represented as solid rectangular tissue on slide: liver-kidney-spleen-lung (but appears spongy)-lymph node and tumors
4. Small fragments: polyp/papilloma-endometrium-vesicular molar tissue

B) **Low power** (LP) examination to identify tissue type & site of the pathology

- 1- scan starting from topmost corner on the right , move horizontally 1 LP field at a time until you reach the left corner then go down 1 field & move towards the right repeat until all the slide is seen
- 2- Focus on the pathologic lesion for:
 - Pattern
 - Cells
 - Connective tissue: fibers + BV
 - Special features: ova, granuloma
 - etc.. i.e. the basic reaction (BR) of the disease

C) **High power** of the pathological area to determine specific features of nucleus, cell cytoplasm or surrounding tissue

D) **Comment & diagnosis:**

- 1- Section in -----organ (histological type of tissue e.g. liver, spleen...)
- 2- Showing a focal or diffuse lesion characterized by (describe the 4 items of the lesion i.e. the basic reaction for the pathologic lesion BR)
- 3- Diagnosis : pathologic lesion e.g. fatty change + organ e.g. liver

BASIC REACTIONS (BR):

Such features are common to particular groups of disorders & should be included in your comment in addition to the special features of a particular disease

1- Acute inflammation:

- Pattern diffuse or localized if an abscess
- Cells (polymorphs + macrophages +/- pus cells if a suppurative type)
- CT= dilated congested blood vessels + edema & fibrin (fibrin is lysed in suppurative inflammation)

2- Chronic inflammation

- Pattern usually diffuse but may be localized in chronic abscess or granuloma
- Cells : lymphocytes , plasma cells , macrophages
- CT : endarteritis obliterans of blood vessel & tissues of healing (fibrous tissue i.e. collagen & fibroblasts)
GRANULOMAS: are localized collections of chronic inflammatory cells with specific features e.g. giant cells, epithelioid cells , ova or caseation etc..
Tubercle of TB= lymphocytes, plasma cells, epithelioid macrophages, Langhan giant cells & central caseation necrosis
Bilharzial granuloma= lymphocytes, plasma cells, eosinophils, some neutrophils, foreign body giant cells & ova

3- Necrosis:

- Coagulative necrosis as in infarction & tumor necrosis(duct carcinoma breast): Pink granular remnants of cells with nuclear debris, cell outlines are hazy . Dying & dead cells show swollen cytoplasm, loss of nuclear membrane , karyorrhexis, karyolysis or karyopyknosis & ghosts of resistant connective tissue remain

NB when describing an infarction describe area of necrosis then the zone of acute inflammation between the infarct & the rest of the organ tissue

- Caseation necrosis in TB : homogenous pink material with no details of previous tissue or cells (Miliary TB & TB lymphadenitis)

4- Tissue of repair

- Granulation tissue : dilated congested capillaries + fibroblasts
- Fibrous tissue : dilated blood vessels + fibroblasts + collagen fibers (myocardial scarring)
- Scar tissue : few fibroblasts + increased amounts of hyalinized pink fibrous tissue (myocardial scarring)

5- Benign tumors

- Pattern : capsulated well defined
 - Cells : similar to parent cells but increased in number
- NB** non-capsulated lesions : leiomyoma- papilloma – adenoma – hemangioma

6- Malignant tumors

- Pattern: non capsulated with irregular invasive borders destroying normal surrounding tissue
- Cells : Pleomorphism in size & shape
 - Hypercellularity & over crowding
 - Nuclear hyperchromasia & pleomorphism & prominent nucleoli
 - Mitotic figures increased & abnormal

IMPORTANT TYPES OF CELLS

Neutrophil

- 1- Eosinophils
- 2- Lymphocyte
- 3- Plasma cell
- 4- Giant cells (refer to Pathology text & draw cells)
 - Are very large cells with multiple nuclei due to fusion of several macrophages or amitotic division of the nucleus of a macrophage or tumor cell
 - TB Langhan giant cell
 - Foreign body giant cell
 - Hodgkin giant cell
 - Giant cell tumor giant cells
- 5- Fibroblast
- 6- Muscle fiber cardiac & skeletal