Lab MANUAL

HISTOLOGY

WOMEN MEDICAL COLLEGE

A b b o t t a b a d

WOMEN MEDICAL COLLEGE

ABBOTTABAD

Created by:

Dept. Medical Education & Research (DME&R

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Message of Head of Department

It is my pride to introduce you to the Anatomy Department, which is one of the most integral departments of the Basic Sciences. Our faculty consists of highly competent and experienced teachers. All of our faculty members are dedicated to research, curricular development, and teaching activities for undergraduate MBBS &BDS students.

We follow a modular system of learning that is well-coordinated with other basic science subjects Physiology and Biochemistry. Our department strives to provide the best physical resources. We have a bone bank with about 200 loose bones, a museum containing hundreds of finest quality plastic models, specimens related to gross anatomy, embryology, histology and neuro anatomy and a well-equipped and modern histology lab.

At the Department of Anatomy, our faculty and staff are fully committed to provide an excellent undergraduate teaching and learning experience for our students. We are confident that our students will benefit greatly from our innovative teaching methods and state-of-the-art facilities.

The Manual of Histology Lab

Histology is also known as microscopic anatomy or microanatomy: it is a branch of biological sciences that deals with microscopic study of biological cells or tissues. Histology is microscopic counter part of gross anatomy where larger structures are studied visible to naked eye without any visual aid.

Histology forms the basis of histopathology a science which deals with the microscopic study of diseased tissue. Knowledge of normal histology of multitudes of tissue types with in human body is necessary for recognition and understanding of disease that is why teaching of histology and establishment of histology lab is mandatory in medical education.

It is our sense of achievement that Women Medical College has established an ultra-modern histology lab with state-of-the-art microscopes and variety of histology slides collection.

Our HOD Professor Dr Ashfaq is very peculiar & determined regarding upgradation of the latest equipment & learning material for students.

Location of Anatomy Histology Lab:

It is situated on the 1st floor of college within the premises of the anatomy department. It is a big space covering area 37.4 * 32.6 as per PMDC requirement fully aerated & well illuminated.

Other room associated with the histology lab is computer operator room.

SOPs for Anatomy Histology Lab:

- All teaching slides are placed in systematic order in well protected wooden cases to avoid unnecessary damage and artifacts. These cases are kept in locker under custody of lab assistant.
- As compound (binocular) microscopes are very delicate instruments, and must be handled with extreme caution.
- They must be switched on only when being used otherwise they must be switched off and they must be plugged out.
- They must be covered with protective coverings all the times while not being used to protect the sensitive equipment from exposure to dust to avoid unnecessary artifacts.
- Extra care must be given to multi-head (Penta headed) microscope.
- At the end of every two weeks special inspection would be given to all equipment for necessary repair and replacement by lab Incharge.

Attire:

At a minimum, the following attire must be worn at all times while working in the lab.

- Lab coats (three-quarter length)

SAFETY PRECAUTIONS:

Tissue Slides:

- As tissue slides are very thin, fine and delicate piece of glass, moreover processing of tissue slide is very cumbersome process that is why extra care must be taken while focusing and studying the slides. If desired focus is still not being achieved, student must seek help from instructor or lab assistant.

Microscopes:

- Students are not allowed to move any microscope by themselves, if there is any kind of issue, they must involve the instructor or assistant.
- Multiheaded microscope must be used by the students while being supervised.
- Students are not allowed to take any of the slide or equipment out of the laboratory.
- All the precautionary measures should be mentioned beside the microscopes.

In addition, warning signs near the vicinity of the equipment to warn users for the fragility and delicacy of the equipment.

Catalogue:

The proper catalogue of slides is kept in the record.

Maintenance of Histology Lab:

Every two weeks an inspection of the equipment is done, the slides and equipment are inspected for their performance. If any of the slides or equipment is damaged or working inadequately then Miss Faiza Ilyas will immediately inform Dr Ashiq Hussain for immediate repair or replacement in order to avoid unnecessary delay or hurdle in learning process.

Once in a week cleaning is done with all hygienic protection. Also, every two-week round is taken by HOD & senior staff

Lists of Slides in Collection:

For the purpose of studying Histology, we have categorized the subjects into systems. Hence slides are also arranged system wise and they are listed as follows

Cell:	1
Mitochondria	1
Golgi Apparatus	1
Human Chromosome female	1
Human Chromosome male	1
Connective Tissue:	1
Adipose Tissue	1
Loose connective Tissue	1
Dense connective Tissue	1
Elastic Tissue LS	2
Muscle Tendon	1
Areolar Tissue	1
Reticular Tissue Sec	1
Mucous Tissue Cs	1
Tendon	1
Adipose Tissue Human Sec	1
Epithelium:	
Columnar epithelium section human.	1
Epithelium cell human	1
Strat Squamous Epithelium sec human	1
Simple Squamous Epithelium	1
Pseudostrat ciliated col. Epithelium	1
Cuboidal Epithelium sec	1
Ciliary Epithelium sec	1
Keratinized Epithelium	1
Epithelium Strat.Squamous Human Sec	1
Epithelium Glandular Human Sec	1
Epithelium Simple Cuboidal Human Sec	1
Epithelium Simple Ciliated Columnar Human sec	1
Epithelium Squamous Sec	1
Epithelium Stratified Squamous Sec	1
Epithelium Pseudo stratified ciliated columnar sec	1

Bone and cartilage:	
Ground bone Cs	1
Ground bone L.S	1
Decalcified bone C.S	1
Decalcified bone L.S	1
Hyaline Cartilage sec	1
Elastic Cartilage sec	1
Cartilage Elastic Sec	1
Hyaline Cartilage Sec	1
Fibro Cartilage Sec	1
Intercalated Discs Sec	1
Bone Marrow Sec	1
Bone Compact Ground Sec	1
Bond Compact CS	1
Bone Development Membrane Sec	1
Bone Compact LS	1
Circulatory System and Blood:	1
Atrial wall sec	1
Ventricular wall sec	1
Frog blood smear	1
Pigeon blood smear	1
Rabbit blood smear	1
Red bone marrow	1
Artery Cs	1
Veins Cs	1
Artery and Vein	1
Human blood smear	1
Vena Cava Human Sec	1
Blood Human H&E Smear	1
Aorta Human HE S	1
Artery CS	1
Artery and Vein CS	1
Human blood smear	1
Red bone marrow sec	1
Red bone marrow sec	1
Muscles:	1
Skeletal muscle Cs	1
Skeletal muscle Ls	1
Skeletal muscle Cs and Ls	1
Smooth muscle Ls	1
Smooth Muscle Cs	1
Separated Smooth Muscle	1

Cardiac Muscle sec	1
Cardiac Muscle Ls	1
Cardiac Muscles Human Sec	1
Skeletal Muscle Sec	1
Smooth Muscle CS	1
Skeletal Muscle Human CS & LS	1
Nervous System:	1
Spinal Cord Ls	1
Motor Neuron	1
Motor Neuron Ending	1
Nerve Ls	1
Spinal Ganglion Ls	1
Nerve Cs	1
Cerebrum sec	1
Cerebellum	1
Cerebrum sec	1
Meissner's corpuscles	1
Spinal cord human	1
Spinal cord Cs	1
Pascinian corpuscles	1
Nerve mylinated Ls	1
Mylinated and unmylinated nerve	1
Nervous tissue	1
Nerve mylinated showing bundles	1
Sympathetic Ganglion	1
Spinal Ganglion	1
Medulla Oblongata	1
Brain whole mouse Ls	1
Nerve and nerve bundles	1
Spinal cord	1
Motor Nerve ending	1
Nerve fiber osmium stained	1
Nerve mylinated	1
Cow nerve	1
Spinal cord frog	1
Cerebral Cortex Sec (Damaged)	1
Spinal Cord Silver CS	1
Cerebellum Human H&E CS	1
Cerebrum H&E Sec	1
Spinal Ganglion and Nerve LS	1
Neuron Motor Nerve Cells Smear	1
Nerve Human CS & LS	1

Peripheral Nerve Mylinated CS	1
Cerebrum Silver IMP	1
Cerebellum H&E demonstrating nerve cell and fiber	1
Immune System:	1
Lymph Nodes	1
Thymus gland sec	1
Spleen sec	1
Thymus section	1
Spleen Human H&E Sec	1
Lymph Node Sec	1
Tonsil Palatine Human Sec	1
Thymus Fetal Human Sec	1
Integumentary system:	
Scalp Bald Human Sec	1
Scalp Human	1
Skin Mammal Sec	1
Skin Hair follicle Mammal Sec	1
Skin Showing Sweat glands	1
Skin hair follicle	1
Sweat Gland	1
Human Mammary gland.	1
Scalp Human LS	1
Skin Plantar Human Sec	1
Endocrine system:	
Pituitary gland.	2
Thyroid gland.	5
Adrenal Gland.	4
Sublingual gland.	3
Submandibular gland.	1
Respiratory System:	
Lungs Human	1
Epiglottis Human Sec	1
Trachea CS	1
Mucous Tissue	1
Lungs sec	1
Trachea sec	1
Branches sec	1
Lung Artery injection	1
Gastrointestinal Tract:	
Tongue filiform papilla.	1
Tongue fungiform papilla.	1

Esophagus.	2
Stomach.	3
Duodenum.	3
Jejunum.	4
Ileum.	3
Cecum.	1
Appendix.	1
Colon.	5
Anus.	1
Pancreas.	4
Liver.	10
Esophagus Cs	1
Esophagus Stomach Junction	1
Gastric wall sec	1
Pyloric Stomach sec	1
Duodenum Cs	1
Jejunum Sec	1
Ileum Ls	1
Colon Ls	1
Rectum Ls	1
Cecum sec	1
Liver sec	1
Gall bladder sec	1
Bile Duct sec	1
Pancreas sec	1
Small intestine	1
Human Appendix	1
Parotid gland sec	1
Sublingual gland sec	1
Submandibular gland sec	1
Taste buds sec	1
Tongue Ls	1
Renal System:	1
Kidney.	5
Ureter.	1
Urinary bladder.	3
Kidney Cs	1
Kidney Ls	1
Urinary bladder sec	1
Ureter Cs	1
Seminal Vesicle Ls	1
Fallopian Tube Ls	1

Ovary Ls	1
Uterus Sec	1
Testis sec	1
Uterine Neck sec	1
Vagina Sec	1
Spermatozoa Smear	1
Penis Ls	1
Prostate Cs	1
Kidney artery injection	1
Human Epidydmus sec	1
Human Testes sec	1
Adrenal Gland	1
Reproductive System	
Graffian Follicle Sec	1
Uterus Progravid H&E Sec	1
Vagina Human H&E	1
Testes Sec	1
Epidydmus Sec	1
Testicle.	2
Epidydmus.	1
Ductus Deferense.	3
Ovary.	3
Uterus.	1
Cervix with uterus.	1
Uterine tube.	3
Mammary gland.	1
Special senses	
Cochlea	1
Lacrimal gland	1
Eye lid human	1
Retina	1
Eye tadpole	1
Optic nerve	1

Slide Issuance Protocols:

Students are not allowed to take slides or microscopes outside lab; if they want to study it within lab, they can get slides issued in their names on their college cards. All the records of issued and returned slides is maintained in its register.

Overall the department of the Anatomy of Women medical college is a modern, updated, excellent, highly professional & well managed department that teaches more than 100 students of MBBS and 50 students of BDS every year.

Curriculum of Undergraduate Students

1st Year MBBS

1. Foundation Module (6 Weeks)

S.No	Topic	Learning outcomes	Teaching Hours	Teaching Strategy	Assessment Tool
1.	**The Microscope**	Identify parts of microscope. Demonstrate operation of microscope. Describe the method of focusing slide at different magnifications. Follow the specified norms of lab work.	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
2.	**Tissue Processing**	Describe the process of tissue processing for histo-pathological examination.	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
3.	**H& E staining**	Perform H & E staining of tissue slides under supervision in the laboratory	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
4.	**Simple Epithelia**	Identify and describe simple epithelia under M/S.	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
5.	**Stratified Epithelia**	Identify and describe stratified epithelia under M/S.	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
6.	**Glands**	Identify different types of glands under M/S.	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
7.	**Smear preparation**	Prepare a blood smear.		Practical Demonstration	OSPE Viva

				Performance	Practical notebook

Blood& Immunology Module I (5 Weeks)

S.No	Topic	Learning outcomes	Teaching Hours	Teaching Strategy	Assessment Tool
1.	**Histology**	• Identify and describe the microscopic anatomy of lymph node, thymus, bone marrow and spleen under microscope • Compare the histological features of lymph node, thymus and spleen	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook

Musculoskeletal Module (8 Weeks)

S.No	Topic	Learning outcomes	Teaching Hours	Teaching Strategy	Assessment Tool
1.	**Bone histology**	Define and identify compact and spongy bone Describe and identify bone matrix (organic and inorganic component) Describe and identify cells of boney tissue i.e. (osteoprogenitor, osteoblasts, osteoclast, and osteocytes) Describe and identify periosteum and endosteum Describe and identify the microscopic structure of bone i.e. (primary bone, secondary bone and haversian system) Describe Functions of various bone cells Describe important Functions and its role in calcium metabolism	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
2.	**Classification & histology of cartilage**	Identify types of cartilages on microscopy, including distinctive features of each. Describe the structural basis. Classify and distinguish three types of cartilages Describe the microscopic structure of hyaline cartilage Describe the microscopic structure of Elastic cartilage Describe the microscopic structure of fibrous cartilage Describe	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook

		important functional correlates of three types of cartilages			
3.	**Classification & histology of bone**	Recognize bone and its functions and ncomposition. Differentiate between woven bone and lamellar bone. Differentiate between compact bone and spongy bone. Describe the applied aspect of bone	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
4.	**Histology of bone**	Identify three types of bone on microscopy, including distinctive features of each. Describe the structural basis of classification.	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
5.	**Histology of muscles**	Identify three types of muscles on microscopy, including distinctive features of each muscle fiber. Describe the structural basis of muscle striations. Recognize the structural elements that produces muscle contraction and brings the movement of a body part. Recognize the function and organization of the connective tissue in muscle. Classify and distinguish three types of muscles Describe the microscopic structure of skeletal muscle Describe important functional correlates of skeletal, smooth Describe the microscopic structure of smooth muscle Identify/Describe the microscopic structure of cardiac muscle fiber Describe important functional correlates of cardiac muscle fiber	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook

Cardiovascular System (CVS) Module (5 Weeks)

S.No	Topic	Learning outcomes	Teaching Hours	Teaching Strategy	Assessment Tool
1.	**Histology of heart muscles**	Explain the characteristics of cardiac muscle cell. Explain the Structure of Intercalated disc. Define the junctional specializations making up the intercalated disk. Describe identification of different microscopic views of Cardiac muscle and its ultra-structures. Describe identification of different microscopic views of Cardiac muscle and its ultra-structures. Differentiate histologically between cardiac and skeletal muscle and smooth muscles. Enumerate histological layers of heart wall.	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
2.	**Histology of blood vessels**	Describe the histological composition of vessel. Describe the microscopic structure of artery and vein. Differentiate histologically between artery and vein under light microscope. Describe the histological composition of lymphatic channels.	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook

Respiration Module (4 Weeks)

S.No	Topic	Learning outcomes	Teaching Hours	Teaching Strategy	Assessment Tool
1.	**Respiratory epithelium and connective tissues**	Classify the types of epithelia lining the various parts of respiratory system. Differentiate between the histological differences among various parts of respiratory system. Describe the structure of trachea and its layer. Discuss the microscopic picture of respiratory bronchiole, alveolar ducts, alveolar sacs and alveoli. Describe the different types of cells found in alveoli.	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
2.	**Histology of alveoli**	Discuss surfactant, alveolar septum, alveolar pores and alveolar macrophages	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook

2nd Year MBBS

Neurosciences-1AModule (Weeks-6)

S. No	Topic	Learning outcomes	Teaching Hours	Teaching Strategy	Assessment Tool
1.	**Transverse section of spinal cord (cervical level) -1**	Identify the slide of transverse section of cervical spinal cord under the microscope	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
2.	Spinal cord	Identify the light microscopic transverse section of spinal cord at cervical, thoracic, lumbar and sacral regions. Draw and label the transverse section of spinal cord at different levels.	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
3.	**Transverse section of thoracic segment of spinal cord-2**	Identify the slide of transverse section of thoracic segments of spinal cord under the microscope	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
4.	**Transverse section of lumbar**	Identify the slide of transverse section of Lumbar segment of spinal cord under the microscope.	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook

	spinal cord-3				
5.	**Cerebral cortex**	Identify the cerebral cortex on light microscope	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
6.	**Histology of cerebellum**	Identify the cerebellar cortex on light microscope. Enlist the different histological layers of cerebellar cortex.	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook

Neurosciences-1B module (wees-5)

S. No	Topic	Learning outcomes	Teaching Hours	Teaching Strategy	Assessment Tool
1.	**Parotid glands**	Identify the variety of gland according to nature of its acinus. Discuss the capsular structure and its extensions in the gland. Differentiate between the stroma and parenchyma of parotid gland. Describe the ductal system of the gland and its lining epithelium. Differentiate between the intercalated and striated ducts in intralobular parts of gland. Describe the detailed structure of serous acinus. Discuss the location of stenson,s duct and its structure. Discuss clinical conditions related with parotid gland.	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
2.	**Submandibular and Sublingual Salivary Gland**	Identify the slide of submandibular and sublingual salivary glands under the microscope.	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
3.	**Thyroid gland**	Discuss the structural unit of thyroid gland. Identify the lining epithelium of follicular cells. Discuss the formation and storage of colloid in the lumen of follicular cells. Describe the location and structure of parafollicular cells. Discuss the interfollicular connective tissue.	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
4.	**Tongue**	Identify the slide of tongue under the microscope	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook

Gastrointestinal and Metabolism Module (Nine Weeks)

S. No	Topic	Learning outcomes	Teaching Hours	Teaching Strategy	Assessment Tool
1.	**Lips and tongue**	Identify the histological features of lips and tongue under the microscope	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
2.	**Esophagus**	Identify the histological features of esophagus under the microscope	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
3.	**Stomach**	Identify the histological features of stomach under the microscope	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
4.	**Duodenum**	Identify the histological features of duodenum under the microscope	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
5.	**Liver**	Identify the histological features of liver under the microscope	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
6.	**Gall bladder**	Identify the histological features of gall bladder under the microscope	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
7.	**Jejunum and Ilium**	Identify the histological features of Jejunum and Ilium under the microscope	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook

ENDOCRINE MODULE (weeks-4)

S. No	Topic	Learning outcomes	Teaching Hours	Teaching Strategy	Assessment Tool
1.	**Pituitary glands**	Identify the structure of pituitary gland under microscope	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
2.	**Thyroid gland**	Identify the structure of thyroid gland under microscope	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
3.	**Identify the structure of thyroid gland under microscope**	Identify the structure of adrenal gland under microscope	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook

RENAL MODULE (week-3)

S. No	Topic	Learning outcomes	Teaching Hours	Teaching Strategy	Assessment Tool
1.	**Histologic examination urinary system**	Identify the characteristic microscopic features of the urinary system -Kidney -Ureter -Urinary bladder -Urethra	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook

REPRODUCTION MODULE (week-2)

S. No	Topic	Learning outcomes	Teaching Hours	Teaching Strategy	Assessment Tool
1.	**Ovaries**	Describe the microscopic structure of ovaries under microscope	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
2.	**Fallopian tubes**	Describe the microscopic structure of fallopian tubes under microscope	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
3.	**Uterus**	Describe the microscopic structure of uterus under microscope	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
4.	**Mammary glands**	Describe the microscopic structure of mammary glands under microscope	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook
5.	**Testes and Epididymis**	Describe the microscopic structure of Testes and Epididymis under microscope	1.5 hours	Practical Demonstration Performance	OSPE Viva Practical notebook