Lab 1  Muscle tissue overview
   Structure and function of skeletal muscles
   Muscles of facial expression

Lab Materials

• Prepared microscope slides of skeletal, smooth, and cardiac muscle tissue
• Muscle models and cadaver (if available)

Lab Objectives

1. Name and describe the locations, microscopic appearance, and control of the three muscle tissue types.

2. Describe the organ and tissue level structure of skeletal muscle, including associated connective tissues. (The detailed structure of muscle fibers and the sliding filament mechanism are discussed in lecture.)

3. Define origin, insertion, and action. Describe the functions of agonist (prime mover), antagonist, and synergist (including fixator) muscles.

4. Describe the functional arrangements of lever systems (effort, load, fulcrum) in relation to musculoskeletal structures. Compare the advantages (balance, power, or range of motion) of the three classes of levers.

5. Cite criteria used in naming skeletal muscles. Describe the importance of fascicle arrangement to force.

6. Name, locate, and state the actions of: muscles of facial expression. Define the actions of these muscles, and identify or demonstrate the movements. (Name origins and insertions as required by instructor.)
Lab 2  
Synovial joint structure and movements at synovial joints  
Muscles that move the mandible and hyoid bone  
Muscles that move the head, vertebral column, scapula and abdominal wall

Lab Materials

• Muscle models and cadaver (if available)
• Articulated human skeleton, vertebral column model

Lab Objectives

1. Describe the general structure of a synovial joint, and compare the mobility of synovial joints to cartilagenous and fibrous joints. Name, define, recognize and demonstrate the movements possible at synovial joints.

2. Name, locate, and state the actions of: muscles that move the mandible and hyoid bone. Discuss moving the mandible in terms of mastication, and how moving the hyoid bone facilitates swallowing. Define the actions of these muscles, and identify or demonstrate the movements. (Name origins and insertions as required by instructor.)

3. Name, locate, and state the actions of: muscles that move the head, vertebral column, scapula, and abdominal wall. Define the actions of these muscles, and identify or demonstrate the movements. (Name origins and insertions as required by instructor.)
Lab 3  Muscles that move the upper and lower limbs

Lab Materials

• Muscle models and cadaver (if available)
• Articulated human skeleton

Lab Objectives

1. Name, locate, and state the actions of: muscles that move the upper and lower limbs. Define the actions of these muscles, and identify or demonstrate the movements. (Name origins and insertions as required by instructor.)
Lab 4  Hematology

Lab Materials

• Prepared slides of Wright’s stained human blood smears
• Alcohol swabs, lancets, autolets, Sharps container, autoclave bags for other used blood materials, 10% bleach
• Hemoglobin scale booklets
• For hematocrits: Heparinized microcapillary tubes, clay sealant, centrifuge, rulers
• For blood typing: plasma-free, pooled human blood samples, blood type antisera (anti-A, anti-B, and anti-Rh), blood typing cards, toothpicks

Lab Objectives

1. Describe the functions of blood

2. Name the two main components of heparinized, centrifuged blood, and state their average percentages in whole blood. Distinguish between plasma and serum.

3. Describe plasma as a solution, and state the functional importance of its constituents.

4. Describe the structures and functions of: red blood cells, white blood cells, and platelets.

5. Identify red blood cells, neutrophils, lymphocytes, monocytes, eosinophils, basophils, and platelets on a prepared microscope slide and/or photograph or diagram.

6. Describe the information and its significance provided by a complete blood count (CBC).

7. Describe the ABO and Rh blood groups. Explain the basis of the blood typing reaction. Discuss the reason for transfusion reactions resulting from the administration of mismatched blood. Discuss hemolytic disease of the newborn.

8. Conduct the following blood tests and state the importance of each test: hematocrit, hemoglobin concentration, ABO and Rh blood typing.
Lab 5  Anatomy of the heart  
Function of the heart as a pump

Lab Materials

- Fresh pig hearts, dissection pans and tools
- Prepared microscope slides of cardiac muscle
- Cadaver and human heart model (if available)

Lab Objectives

1. Describe the location of the heart in the mediastinum.
2. Name and describe the serous membranes associated with the heart. State their importance to heart function.
3. Name, describe, and state the functions of the three layers of the heart wall.
4. Describe the histologic structure of the myocardium. Note the importance of desmosomes and gap junctions. Describe the two spiraling muscle networks of the heart.
5. Name and locate the major heart structures on the dissected heart, diagram, and/or model.
6. Explain how the heart functions as a double pump, and describe the pulmonary and systemic circulations.
7. Trace the flow of blood through the pulmonary and systemic circulations, listing the heart chambers, valves, and vessels attached to the heart.
8. Explain the mechanics of the heart valves.
9. Name and locate the major blood vessels of the coronary circulation.
Lab 6  Heart function: heart sounds, heart rate, pulse
The intrinsic conduction system and electrocardiogram

Lab Materials

- Stethoscopes, alcohol swabs
- For electrocardiogram (EKG): alcohol swabs, electrodes, computer software
- Samples of normal and abnormal EKG recordings (if available)

Lab Objectives

1. Define systole and diastole.

2. Define heart sounds, pulse, and heart rate. Describe their relationship to each other.

3. Auscultate the heart sounds. Determine heart rate and pulse rate on another individual or self. Define tachycardia and bradycardia.

4. Define the cardiac cycle. Discuss length of the cardiac cycle when heart rate changes.

5. Name and locate the structures of the intrinsic conduction system. Describe the initiation of action potentials and their conduction through this system and through the myocardium.

6. Identify the components of a normal Lead II EKG. Describe the association of EKG tracings with electrical events in the heart.

7. Identify normal sinus rhythm, tachycardia, and bradycardia when presented with EKG tracings. Define fibrillation and state its effect on heart function.
Lab 7  Blood vessel structure and function
Blood pressure
Blood vessel identification
Special circulations

Lab Materials

• For blood pressure: sphygmomanometers, stethoscopes, alcohol swabs
• Cadaver (if available)
• Prepared microscope slides of artery, vein, capillaries (if available)

Lab Objectives

1. Compare the structures and functions of arteries, capillaries, and veins. Review the

2. Define blood pressure and describe how it is measured. Relate systolic and diastolic pressures to events in the cardiac cycle.

3. Practice taking blood pressure measurements.

4. Name and locate the major branches of the aorta. State the body region supplied by each.

5. Name and locate the major veins draining into the superior and inferior vena cavae. State the body regions drained by each.

6. Discuss special circulations of the body:
   a) The hepatic portal system and its functions
   b) The arterial supply to the brain and the importance of the cerebral arterial circle
   c) Vascular and cardiac structures unique to the fetus
Lab 8  Lymphatic system structure and function
Cells of the immune system

Lab Materials

• Cadaver (if available)
• Prepared microscope slides of lymph nodes and spleen (if available)

Lab Objectives

1. List the functions of the lymphatic system.

2. Name and locate the organs and tissues of the lymphatic system. List their functions.


4. Describe the lymphatic vessels and the flow of lymph through the body.

5. Describe the anatomy, histology, and function of lymph nodes.

6. Describe the anatomy, histology, and function of the spleen.

7. State the role of stem cells in the red bone marrow to the immune system. Define antibody-mediated and cell-mediated defense.

8. Compare the functions of the two major classes of lymphocytes, B cells and T cells. State where each class becomes immunocompetent, and in which tissues and organs they perform immune functions. Discuss the functions of macrophages in the body.
Lab 9  Respiratory system structure and function

Lab Materials

• Fresh pig lungs-trachea-heart (“pluck”)
• Spirometers, disposable mouthpieces
• Cadaver (if available)
• Prepared microscope slides of lung

Lab Objectives

1. Define pulmonary ventilation, external respiration, and internal respiration.

2. Name and locate the organs of the respiratory system on diagrams and dissection where appropriate.

3. Describe the structure and function of the respiratory system organs.

4. Compare the functions of the conducting and respiratory portions of the respiratory system.

5. Discuss the changes in the walls of the respiratory tract (e.g. epithelium, cartilage, smooth muscle) along the bronchial tree. Explain the significance of these changes to function.

6. Discuss the histology of the respiratory portion as it relates to the function of gas exchange.

7. Explain how changes in thoracic and lung volumes and lung pressures result in pulmonary ventilation. State which muscles are used in quiet inhalation, quiet exhalation, forced inhalation, and forced exhalation.

8. Define and/or measure and calculate lung volumes and capacities.
Lab 10 Digestive system

Lab Materials

• Cadaver (if available)
• Prepared microscope slides of organs of the GI tract

Lab Objectives

1. State the overall function of the digestive system.

2. Name and locate the organs of the GI tract and the accessory organs associated.

3. Describe the functions of each GI tract and accessory digestive organ.

4. Describe the functions of the following specializations: rugae and muscle layers of the stomach; plicae circulares, villi, microvilli, and Peyer’s patches of the small intestine

4. Describe the layers of the GI tract walls and the peritoneum.

5. Describe the composition and digestive functions of the secretions produced by salivary glands, stomach, small intestine, pancreas, and liver.

6. Recognize the histological structure of the following organs on microscope slides or photographs: salivary glands, stomach, small intestine, liver, pancreas.
Lab 11 Urinary System

Lab Materials

• Fresh pig kidneys, dissection pan and tools
• Cadaver (if available)
• Prepared microscope slides of kidney
• Synthetic normal and abnormal urine samples, chem-strips

Lab Objectives

1. Describe the overall function of the urinary system.

2. Name and locate the organs of the urinary system. Describe the retroperitoneal location of the kidneys.

3. Identify the following structures on a dissected kidney: renal capsule, hilum, cortex, medulla, renal pyramids, renal columns, minor and major calyces, and renal pelvis. Identify the portions of the dissected kidneys where nephrons are located.

4. Trace the blood supply of the kidney from renal artery to renal vein.

5. Describe the structure and function of the nephron. Define glomerular filtration, tubular reabsorption, and tubular secretion. Differentiate between a cortical and juxtamedullary nephron.

6. Trace the flow of fluid in the urinary system, beginning with filtration formation in the nephron to urine elimination from the body.

7. Identify the histological structure of the kidney: renal capsule, cortex, medulla, glomerular capsule, capsular space, glomerulus, renal tubules.

8. Describe the normal characteristics of urine: volume, color, turbidity, odor, pH, and specific gravity. List the primary solutes found in urine.

9. Define urinalysis. List abnormal constituents of urine and the terms used to describe them (ex. glucose, glucosuria).

10. Conduct a partial urinalysis with synthetic urine samples and chem-strips. Discuss the significance of any abnormal results.
Lab 12 Male Reproductive System

Lab Materials

- Cadaver (if available)
- Prepared microscope slides of testis

Lab Objectives

1. Describe the general function of the male reproductive system.

2. Name and locate the structures of the male reproductive system and discuss the function of each.

3. Describe meiosis and compare to mitosis. Define gametogenesis, spermatogenesis, haploid, diploid, and crossing-over.

4. Describe the histological structure of the testis and identify the following: seminiferous tubules, spermatogenic cells, sperm, and interstitial cells.

5. Discuss the composition of semen and name the accessory glands involved in its production. Describe the secretion produced by each accessory gland and its function.

6. Describe the structure of a sperm cell and relate its structure to function.

7. Trace the pathway of sperm from formation to the external environments.

8. Define ejaculation and erection. Discuss the anatomy and function of the penis, including its erectile tissue.
Lab 13 Female Reproductive System

Lab Materials

• Cadaver (if available)
• Prepared microscope slides of ovary

Lab Objectives

1. Describe the general function of the female reproductive system.

2. Name and locate the structures of the female reproductive system and discuss the function of each.

3. Define oogenesis. Describe the histological structure of the ovary and identify the following: primordial follicles, primary follicles, secondary follicles, mature (Graafian) follicle, corpus luteum, and corpus albicans. State the similarities and differences between oogenesis and spermatogenesis.

4. State the hormonal products of the secondary follicles, mature follicle, and corpus luteum.

5. Describe the influences of estrogens and progesterones on the uterine cycle. Discuss release of follicle stimulating hormone (FSH) and luteinizing hormone (LH) from the anterior pituitary and their influence on the ovarian cycle. Discuss the feedback between these anterior pituitary hormones and ovarian hormones.

5. Discuss the structure and function of fimbriae and ciliated epithelium of the uterine tubes.

6. Identify the fundus, body, and cervical regions of the uterus.

7. Identify the two layers of the endometrium. Discuss the changes in the endometrium during the uterine cycle in the reproductive female. Discuss events in the ovarian cycle occurring at the same time.

8. Describe the structure and function of the myometrium and perimetrium.

9. Describe the structures of the female external genitalia.

10. Define: fertilization, zygote, cleavage, blastula, implantation, inner cell mass, trophoblast, chorion, embryo, fetus, and placenta. Discuss the source and physiologic role of human chorionic gonadotropin (hCG).