

Anatomy Lab Activities

Introductory Terminology

Table 1.1 - Orientation & Directional Terms - *be able to use these terms, practice by picking 2 body parts and choose a term to describe their relationship* [if using handout instead of text, p. 4 section on body orientation/direction]

Figures

- 1.3 - Anatomical position and body regions – *all* [1.1, 1.2]
- 1.4 - Planes of the body- *all except MRI* [1.4]
- 1.6 - Body cavities- *all* [1.6]
- 1.7 - Serous cavities- *all, think about how a serous membrane folds on itself to make the two layers* [1.8]
- 1.8 - Abdominal regions and quadrants- *all, know which organs are in each region or quadrant* [1.7]

Use torso models with fig. 1.8 - *what organs are in each region/quadrant? Use figure on back of microscope handout and/or your text for help (note that regions/quadrants are relevant to abdominopelvic cavity only, not thoracic!)*

The Microscope (handout)

Identify parts of the microscope first, then work through the other activities in order to fill out the Summary Chart. We will do the part on calculating field size as a class. Do not do any oil immersion. You will learn about oil immersion later in the semester.

Anatomy Lab Activities

Tissues

Figures

- 4.3 a,b,c,d,e,h - Epithelial tissues
- 4.10 b,c,d,e,f,h,i,j,k,l - Connective tissues
- 4.13 a,b,c - Muscle tissue
- 4.14 - Nervous tissue

Be able to ID tissues under the microscope, know 2 functions and 2 locations for each tissue. If there is only one function or location listed, know that one. Be careful when simplifying functions/locations – be sure it still makes sense!

Important points:

- Use the slides toward the front of the box, some individual slides may be better than others
- Take only 2-3 slides at a time, we have limited numbers
- Focus on 10x and then move up to 40x
- Pay attention to the tissue names **on the blue cards**
- A slide may have many different things on it – part of the learning process is to find what you need to see
- These slides are a selection of the major tissues of the body
- We will stop in the middle of class to do sketches on the board and talk more about tissues
- By the end of the day, you should recognize the four major types of tissue
- Clean the slides with lens paper
- For better contrast close iris and turn up the light at the source
- Turn of scopes when you are away more than a few minutes

Anatomy Lab Activities

Mitosis Review

We will watch a short video to see mitosis in action

Bone & Skeletal Tissues, The Skeleton

Review slides of cartilage and bone

Figures

- 6.1 - Cartilages- *which types are found where?*
- 6.3 - Classification of bones based on shape- *be able to apply to real bones*
- 6.4 - Structure of long bones- *all*
- 6.7 - Microscopic structure of bone- *all*
- 7.1- The human skeleton- *use to guide you with naming the basic bones as you begin*

Cut long bone- *ID diaphysis, epiphyses, medullary cavity, spongy bone/trabeculae, compact bone, epiphyseal line, where are the red and yellow marrow found?*

Microscopic structure of bone model- *ID osteon, lamellae, interstitial lamellae, central canal, osteocyte, lacunae, canaliculi*

Table 6.1 - Bone markings- *know which markings are for muscle/ligament attachment, which form joints, which are depressions/openings allowing blood vessels and nerves to pass*

Bone handout- *know everything on the handout, be able to spell terms, locate bones and markings on figures, bones from bone boxes, articulated skeletons, plain and colored skulls, Beauchene skull, male vs. female pelvis*

Joint handout- *understand how the bones fit together and which type of joint is formed at each location*

Films of skeleton

Important points:

- You only need to know the material *on your bone handout*
- Feel the bones and bone markings on your own body
- Start with something easier (for example, most students think the bones of the limbs are easier to start with than the skull)
- Become comfortable naming all the bones in the box before working on the detailed markings

We will be doing this lab over three weeks...

Week 1: name the basic bones; learn Table 6.1 basics of bone markings (what is the difference between a *bone* and a *bone marking*?)

Week 2: more with bones, plus bone markings

Week 3: right vs. left on bones, joints

Anatomy Lab Activities

Muscle Tissue & Muscles

Review slides of 3 types of muscle tissue

Figures

- 10.1a - Connective Tissue in Skeletal Muscles- *all*
- 10.4 - Microscopic anatomy of a muscle fiber (arrangement of filaments)- *understand arrangement of myofibrils in a skeletal muscle cell, understand arrangement of thick and thin filaments, why do we see striations?*
- 10.7 & 10.8 - Sliding filaments- *understand how thick filaments pull thin filaments to center of sarcomere*
- 10.6 - Sarcoplasmic reticulum & T tubules- *ID myofibrils, T tubules, sarcoplasmic reticulum, terminal cisternae*
- 11.1 - Arrangements of fascicles - *all*
- 11.30-33, 35-37, 38, 39 - Surface anatomy of muscles- *note muscles and other structures you have learned in regard to surface anatomy*

Muscle handouts (list and table)- *be able to spell names, recognize muscles from figures and models, know at least one action for each muscle*

Cadaver

We will be doing this lab over three weeks...

Week 1: names and locations of muscles (models and figures)

Week 2: muscles plus action(s); one side of cadaver

Week 3: continue with muscles plus action(s); other side of cadaver; choose a few activities (e.g., walking, lifting, climbing stairs) and identify the movements involved and which muscles do the movements

Anatomy Lab Activities

Nervous Tissue

Figures

- 12.4 - Typical neuron- *ID dendrites, cell body, axon hillock, axon, myelin sheath, Schwann cells, nodes, terminal branches, axon terminals*
- Table 12.2 - Neuron structural classification- *recognize structural types*
- 12.8 - Relationship between sensory & motor neurons- *all*
- 12.6 - Supporting cells- *all*
- 12.9 - Nerve structure- *all*
- 12.10, 12.11 - Reflex arcs- *all*

Slides: pyramidal cells of cerebrum, Purkinje cells of cerebellum (see Table 12.2 and demo scopes)

CNS

Figures

- 13.24 - Spinal cord- *all*
- 13.26 - Spinal cord- *all*
- 13.4 - Ventricles- *ID lateral ventricles, 3rd & 4th ventricles, interventricular foramina, cerebral aqueduct, median & lateral apertures, central canal*
- 13.9a - Brain, sagittal section- *all*
- 13.6 - Diencephalon- *note relationships between diencephalon and other structures*
- 13.11 - Lobes- *name the lobes*
- 13.18 - Basal nuclei, etc.- *note basal nuclei (basal ganglia) and position relative to other structures*
- 13.17 - Basal nuclei, etc.- *note fiber tracts and relationships among basal nuclei, thalamus and ventricles*
- 13.19 - Limbic system- *broad overview, don't need to name specific structures*
- 13.21 - Meninges- *all*
- 13.23 - Circulation of CSF- *understand circulation of CSF*

Slides of spinal cord (gray vs. white matter, horns of gray matter)

Preserved brain slices (coronal sections)

Brain models- *ID cerebrum, gyri, sulci, cerebellum, thalamus, hypothalamus, pituitary, brain stem, midbrain, pons, medulla, corpus callosum, ventricles*

Spinal cord models- *gray matter (dorsal, ventral, lateral horns), white matter, dorsal & ventral roots, dorsal root ganglion, spinal nerves, gray commissure, what microscopic structures are found in each of the structures?*

Human brains- will be used for demonstration during the second week of the CNS lab

Anatomy Lab Activities

PNS

Figures

- 10.8 - Neuromuscular junction- *note how neuron meets a skeletal muscle fiber*
- 14.4 - Cranial nerves- *all 12 cranial nerves*
- 14.5 - Spinal nerves & plexuses- *all*
- 14.9a, 14.11 - Major nerves of upper limb- *radial, musculocutaneous, ulnar, median*
- 14.12 - Major nerves of lower limb, lumbar plexus- *femoral, lateral femoral cutaneous, obturator, saphenous*
- 14.14c - Major nerves of lower limb, sacral plexus- *sciatic, posterior femoral cutaneous*
- 14.10, 14.13 - Innervation of upper and lower limbs- *note muscular and cutaneous innervation*

Look up clinical applications of injury to the brachial plexus and median, ulnar, radial and sciatic nerves.

Cranial nerve model- *ID 12 cranial nerves*

Spinal nerves and plexuses model- *ID cervical, brachial, lumbar and sacral plexuses*

More PNS: Special Senses

Ear model - know structures and functions as in lecture notes: pinna/auricle, external auditory canal, tympanic membrane, ossicles (malleus, incus, stapes), cochlea, vestibule, semicircular canals, pharyngotympanic tube, tensor tympani muscle

Eye model - know structures and functions as in lecture notes: extrinsic eye muscles as in fig. 16.6, lacrimal gland, sclera, cornea, iris, pupil, lens, choroid, ciliary body, ora serrata, retina, optic nerve

Figures

- 16.1 - Tongue and taste buds- *all*
- 16.3 - Olfactory epithelium- *all*
- 16.4 - Accessory structures of eye- *all*
- 16.5 - Lacrimal apparatus- *all*
- 16.6 - Extrinsic eye muscles- *all*
- 16.7a - Eye- *all*
- 16.9a,b - Retina- *note pathway of light to photoreceptors, note lack of photoreceptors at optic disc*
- 16.16 - Ear- *all*
- 16.18 - Inner ear- *note relationships between semicircular canals, vestibule and cochlea*
- 16.19 - Cochlea- *note location of organ of Corti and function of hair cells*
- 16.21 - Maculae- *note location of maculae and function of hair cells*
- 16.22 - Crista ampullaris- *note location of cristae and function of hair cells*

Anatomy Lab Activities

The Heart

Figures

- 19.2c - Location of heart & some major vessels- *all*
- 19.3 - Pericardium & heart wall- *all*
- 19.5b,d,e - Gross anatomy of the heart (terms as in lecture)- *all*
- 19.14 - Conducting system- *all*
- 19.16 - Coronary blood vessels- *all*

Heart models- *use along with fig. 19.5, the basic idea is to name the chambers, valves and major vessels including the coronary vessels; ID atria, ventricles, all 4 valves, chordae tendinae and papillary muscles for AV valves, interventricular septum, SA & AV nodes, fossa ovalis, trabeculae carnae, ligamentum arteriosum, pectinate muscle, aorta (ascending, arch, descending), major systemic branches from aorta (brachiocephalic, L common carotid, L subclavian), superior vena cava, inferior vena cava, pulmonary trunk & arteries, pulmonary veins, vessels of coronary circulation (arteries - R & L coronary, circumflex, anterior interventricular; veins - great, coronary sinus)*

Heart dissection - You must be familiar with the models before beginning. Use one heart per table. Use the gloves you brought. If you do not have any borrow a pair or we may have a few in the lab. Get a heart, dissection tray and instrument kit. Be very careful with instruments! Use scissors, scalpel or razor blades for cutting. Always use the least sharp instrument that will do the job (start with scissors). Use blunt probes to explore the vessels, chambers and valves. When you are done, dispose of the hearts and any pieces of tissue in the specimen disposal bucket, wash with soap and dry dissection tray and instruments and return them. Follow the basic directions below, but ask for help as you begin working. Do not cut anything until your instructor has gone over your heart with your group.

If there is a pericardium observe it and then carefully remove as much of it as you can. Determine left and right on the heart (you need to know anterior from posterior!). Use a blunt probe to explore the vessels and determine which is which. Cut open the heart to observe chambers and valves. You will make "V" flaps through the ventricular walls that you can lift up to observe internal structures. Consult instructor for details.

Arteries & Veins

Handout

slide: artery & vein (compare/contrast)

Anatomy Lab Activities

Blood Cells

on blood slides, ID: RBC, platelets, neutrophil, lymphocyte, monocyte (as in fig. 18.4, see poster)- *look on 10x, then 40x, then ask for help to use oil immersion so you can ID different types of leukocytes*

The Lymphatic System

Figures

21.2 -Lymphatic system- *ID nodes, collecting vessels, cisterna chyli, thoracic duct, right lymphatic duct*

21.3a - Lymph node- *all, know functions of lymphoid tissue vs. sinus*

21.8 - Lymphoid organs- *all*

Respiratory System

slides: trachea (see fig. 22.7b, ID epithelium, submucosa, cartilage), lung (ID bronchiole & alveoli, see figs. 22.8b, 22.9b)

Anatomy Lab Activities

Respiratory System

Figures

- 22.3b - Upper respiratory tract- *nasal cavity, conchae, nostril, posterior nasal aperture, opening of pharyngotympanic tube, tonsils, nasopharynx, oropharynx, laryngopharynx, oral cavity, hard and soft palate, uvula, hyoid bone, epiglottis, larynx, vocal folds, trachea*
- 22.8a - Branches of bronchial tree- *all*
- 22.10a, c - Alveoli and respiratory membrane- *note relationships between capillaries and alveoli*

Lung model- *ID trachea, primary and secondary bronchi, bronchioles, lungs*

Sagittal section of head- *nasal cavity, conchae, nostril, nasopharynx, oropharynx, laryngopharynx, oral cavity, hard and soft palate, uvula, epiglottis, larynx, vocal folds, trachea, what kinds of epithelium are found in the mucosa of these structures?*

Digestive System

Figures

- 23.1 - Alimentary canal & accessory organs- *all*
- 23.4bcd - Mesenteries- *all*
- 23.7a - Layers of alimentary canal- *all*
- 23.15a - Salivary glands- *note locations of glands*
- 23.21a - Large intestine- *note junction with ileum and parts of the large intestine (cecum, ascending colon, transverse colon, descending colon, sigmoid colon, rectum)*

Torso Models and Digestive System Model - *know major organs (alimentary canal and accessory organs) as in fig. 23.1*

Slides & associated figures (ID the organ and type of epithelium), also use Figure 23.24 Histology of mucosa

- esophagus
- stomach
- duodenum
- colon
- liver, fig. 23.27ab
- pancreas, fig. 23.28b

Anatomy Lab Activities

Urinary System

Figures

- 24.1 -Urinary system- *kidneys, renal artery & vein, ureters, bladder*
- 24.3b, 24.4a - Kidney, frontal section- *all, except branches of arteries & veins*
- 24.7 - Nephron- *Bowman's capsule, glomerulus, PCT, loop of Henle, DCT, collecting duct, note position of nephrons in kidney*
- 24.9a - Nephron & surrounding blood vessels- *note relationship between nephron & blood vessels*

Slides: kidney (glomeruli vs. nephron), bladder (ID epithelium and smooth muscle layers)

Torso model- *kidney, ureter, bladder*

Urinary system model- *kidney, cortex, medulla (pyramids), renal pelvis, ureters, bladder, urethra*

Kidney & nephron model- *capsule, cortex, medulla (pyramids), renal columns, nephron, Bowman's capsule, glomerulus, PCT, loop of Henle, DCT, collecting duct, renal pelvis, ureter*

Kidney dissection - You must be familiar with the models before beginning. Use one kidney per table. Use the gloves you brought. If you do not have any borrow a pair or we may have a few in the lab. Get a kidney, dissection tray and instrument kit. Be very careful with instruments! Use scalpel or razor blades for cutting. Use blunt probes to explore the tissue. When you are done, dispose of the kidney and any pieces of tissue in the specimen disposal bucket, wash with soap and dry dissection tray and instruments and return them. Follow the basic directions below, but ask for help if you need it:

Make a cut for a frontal (longitudinal) section. You will cut the kidney approximately in half. The objective is to get a section that looks similar to the models. Identify the capsule, cortex, medullary pyramids, papillae, renal pelvis and ureter. If you could see the nephrons, what would they look like? Which parts of the nephron are in the cortex? Which parts are in the medulla?

Reproductive System

Figures

- 25.1 - Typical male organs, sagittal section- *penis, corpus spongiosum, corpus cavernosum, scrotum, dartos muscle, cremaster muscle, testis, epididymis, vas deferens (ductus deferens), seminal vesicle, prostate, bulbourethral gland, bladder, urethra*
- 25.2 - Scrotum & internal structures- *spermatic cord & the structures it contains, scrotum, dartos muscle, cremaster muscle, testis, epididymis*
- 25.3a - Testis- *testis, tunica vaginalis, lobule, seminiferous tubules, epididymis, spermatic cord*
- 25.11 - Typical female organs- *bladder, urethra, uterus, cervix, vagina, ovary, fallopian tube (uterine tube, oviduct), clitoris, labia majora, labia minora*
- 25.12 - Typical female organs- *vagina, uterus, cervix, fallopian tubes, ovaries*
- 25.20a - External female structures- *all*
- 25.21 - Breast- *note glandular tissue*

Slides: ovary (see fig. 25.17 step 5, ID egg), testis (see fig. 25.3c, ID seminiferous tubules and interstitial cells)

Typical male models- *penis, corpus spongiosum, corpus cavernosum, scrotum, dartos muscle, cremaster muscle, testis, epididymis, vas deferens, seminal vesicle, prostate, bulbourethral gland, bladder, urethra*

Typical female models- *bladder, urethra, uterus, cervix, vagina, ovary, Fallopian tube, clitoris, labia majora, labia minora*