PTA/OTA 106: Anatomy and Physiology
Study guide Unit #2
Thoracic/Abdominal Regional

Surface anatomy Bones and related structures to review:

See Unit 2 Lab 1 for details. Remember Left and Right!

Muscles to review:

See Unit 2 Lab 2 for detailed information. For each muscle you need to know location, origin, insertion, action and innervation. Because of the way I have structured regional anatomy you will see some of the muscle again in the next unit. Remember Left and Right!

Digestive System structures and functions:

See Unit 2 Lab 6 for detailed information Be able to locate and label the following as well as describe function.

1. **Esophagus:** upper Esophageal Sphincter and Lower Esophageal Sphincter.
2. **General organs**: Stomach, liver, Gallbladder, Pancreas, Duodenum, Jejunum, Ileum, Cecum, Appendix, Ascending colon, Transverse colon, Descending colon, Sigmoid colon, Rectum, Anus

Respiratory System structures and functions:

1. Be able to identify the following structures of the respiratory system. Also understand the relationship between these structures. *Also review Lab 5 for more detail.*

    a. **Bronchi:** (left and right for all) primary bronchi, secondary bronchi (lobar), tertiary bronchi (segmental), bronchioles, terminal bronchioles, respiratory bronchiole, alveolar ducts

    b. **Lungs:** (left and right) external anatomy (base, apex, superior lobe, horizontal fissure, middle lobe, oblique fissure, inferior lobe, hilus, pulmonary arteries, pulmonary veins, visceral pleura, parietal pleura, pleural cavity), internal anatomy (lobules: respiratory bronchioles, alveolar ducts, alveolar sacs, alveolus, pneumocytes (type 1 - squamous pulmonary epithelial cells, type 2 - septal cells, surfactant, alveolar marcophages)

    c. **Blood Vessels:** Pulmonary trunk, L&R Pulmonary arteries, L&R Pulmonary veins

2. Be able to apply the following gas laws and describe how they affect respiration: boyle's law,Dayton's law, Henry's law, bohr effect, haldane effect

3. be able to describe the physiology of pulmonary ventilation, atmospheric pressure, alveolar pressure, intrapleural pressure, costal breathing, diaphragmatic breathing,surface tension, surfactant, compliance.

4. be able to describe the modified respiratory movements and what can cause them: coughing, sneezing, sighting, yawning, sobbing, crying, laughing, hiccuping, valsalva,maneuver

5. Be able to apply the lung volumes and capacities, also how to calculate them. spirometer, tidal volume, anatomic dead space, minute volume of respiration, alveolar ventilation rate, inspiratory reserve volume, expiratory reserve volume, forced expiratory volume in 1 second, residual volume, minimal volume inspiratory capacity, functional residual capacity, vital capacity, total lung capacity.

6. Be able to describe the mechanisms of external respiration, internal respiration, and oxygen transport (gas partial pressure, gas solubility, oxyhemoglobin, affinity, BPG, fetal hemoglobin, hypoxia (hypoxic, anemic, stagnant, histotoxic), carbaminohemoglobin, bicarbonate

Cardiovascular System structures and functions Heart

1. Be able to identify and label the following on human hearts, models and charts. *Also see lab 3 for more details*.
   Mediastium, Fibrous pericardium, Parietal pericardium, Visceral pericardium or epicardium, Myocardium, Endocardium, left and right Atria, left and right Ventricles, Coronary Sulcus, Anterior Interventricular Sulcus, Posterior Interventricular Sulcus, Interatrial Septum, Foramen Ovale in fetal heart, Fossa Ovalis, Trabeculae Carneae, Chordae Tendineae, Papillary muscle, Interventricular septum, Tricuspid Valve, Bicuspid Valve, Pulmonary Semilunar Valve, Aortic Semilunar Valve.

2. Be able to describe blood flow through the Heart. Be able to identify and label all o f the following heart structures on model, and charts. Superior Vena Cava, Inferior Vena Cava, Pulmonary Trunk, left and right Pulmonary Arteries, left and right Pulmonary Veins, Ascending Aorta, Aortic Arch, Thoracic Aorta, Abdominal Aorta, ductus Arteriosus in the Fetal pig, Ligamentum Arteriosum on heart models, and charts

3. Be able to describe blood flow for coronary circulation. Be able to identify and label the following coronary vessels on the models and charts and identify as many as possible on the sheep and cat heart; left Coronary Artery, Anterior Interventricular Artery, Circumflex Artery, right Coronary Artery, Posterior Interventricular Artery, Marginal Artery, Coronary Sinus, Great Cardiac Vein, Middle Cardiac Vein, and Small Cardiac Vein.

4. Be able to describe the conduction and pacemaker system. Be able to identify and label the following structures on the models and charts: SA node, AV node, bundle of His, right and left bundle branches, purkinje fibers.

5. Be able to identify the parts of a EKG and be able to describe the actions of the heart associated with each EKG wave pattern. P wave, QRS wave, T wave, artial and ventricular depolarization, atrial and ventricular repolarization, P-Q interval, S-T segment, Q-T interval, isovolumetric relaxation, end-diastolic volume, rapid

ventricular filling, diastasis, atrial systole, vemtricular systole, isovolumetric contraction, ventricular ejection, when AV and semilunar valves open or close.

6. Be able to calculate cardiac output (CO). stroke volume, heart rate, and cardiac reserve. Know the factors that can increase or decrease CO.

7. Be able to describe the regulation of Heart Rate. cardiovascular center, proprioceptors, chemoreceptors, baroreceptors, cardiac accelerator nerves, vagus nerves

Cardiovascular System structures and functions Blood vessels and blood pressure:

1. Be able to locate and name the following arteries and veins from your lab sheets. Also know blood flow patterns. (Remember you must label all vessels as left or right). *Also review lab 3 and 4 for more details.*

2. Be able to describe the pattern of vessels in the body: elastic or conducting arteries, muscular or distributing arteries, anatomoses, atrterioles, capillaries, metarteriole, precapillary sphincter, continuous capillaries, fenestrated capillaries, thoroughfare channel, stellate reticuloendothelial cells (Kupffer's),venules, veins, and venous sinus are and what their function is and the relative location

3. Be able to describe the physiology of circulation or hemodynamics. Blood pressure and factors that effect it: Resistance or systemic vascular resistance, blood viscosity, total blood vessel length, blood vessel radius, venous return, skeletal pump, respiratory pump

4. Be able to describe the regulation and control of blood pressure and blood volume.

Endocrine system structures and functions

1. Be able to locate and label the following endocrine glands of the Thorax. Also be able to list hormones produced by each gland. *See lab 4 for details*.

2. Be able to describe Hormone actions and clinical diseases associated with these hormones.
   Adrenal glands Superior to deep) contains three distinct zones:

   1. ***Zona glomerulosa*:** Cells in this zone produce **mineralcorticoids (aldosterone)**
      Cells are tightly packed and arranged in spherical clusters.

   2. ***Zona fasciculata***: Cells in this zone produce **glucocorticoids (cortisol)**
      Widest of the three zones; cells are arranged in long strait cords.

   3. ***Zona reticularis***: Cells in this zone produce **androgens, largely (DHEA)**
      Cells are arranged in branching cords.

   Pancreas (Islets of Langerhans) . *Islet of Langerhans*. Island of cells found within Acinar tissue. Cells within these islands stain lighter pink.

1. ***Alpha cells*** = 20% of the islet cells, located on the outside perimeter of islet, and stain lighter. Alpha cells secrete the **hormone glucagon**
2. ***Beta cells*** = 70% of islet cells, these cells stain darker. Beta cells secrete the **hormone insulin**
   Note: The other 10% of the islet cells are either Delta or F-cells:
3. ***Delta cells*** = secrete **somatostatin** which inhibits the release of both glucagon and insulin and slows absorption of nutrients from the GI tract.
4. ***F cells*** = secrete **pancreatic polypeptide** which inhibits somatostatin secretion, gallbladder contraction, and secretion of pancreatic digestive enzymes.

Testes

Leydig cells Testosterone and Dihydrotestosterone "DHT,"
Sertoli cells Androgen-binding protein "ABP" and Inhibin.

Ovaries

Granulose or follicular cells Estrogen and Progesterone,
Corpus luteum Estrogen, Progesterone, Relaxin, and Inhibin

Spinal Cord, Spinal nerves, Spinal tracts, and reflexes.

See lab 6 for details

1. **Spinal Cord Menings:** Be able to locate and label the following as well as describe function.
   Dura mater Arachnoid mater Subarachnoid space
   Pia mater

2. **External Anatomy of Spinal Cord:** Be able to locate and label the following as well as describe function.
   Ventral root Dorsal root Dorsal root ganglion
   Cervical enlargement Lumbar enlargement
   Conus medullaris Filum terminale Cauda equine

3. **Internal Anatomy of Spinal Cord:** Be able to locate and label the following as well as describe function.
   Ventral horn Dorsal horn Lateral horn
   Dorsal Gray commissure Ventral gray commissure
   Central canal Posterior column Lateral column
   Anterior column Anterior Median Fissure
   Posterior Median Sulcus

4. **Spinal Nerve Plexuses**: Be able to locate and label the following
   Cervical (C1-C5)
   Nerves: Phrenic Nerve *
   Brachial (C5-T1)
   Nerves: Musculocutaneous nerve, Axillary nerve , Median nerve , Radial nerve , Ulnar
   Lumbar (L1-L4
   Nerves: Lateral cutaneous nerve, Obturator nerve, Femoral nerve

Sacral (L4-S4)

Nerves: Superior Gluteal nerve, Inferior Gluteal nerve, Posterior Femoral Cutaneous nerve, Siatic nerve, branches of Siatic nerve: Common Peroneal nerve, Tibial nerve

5. **Spinal tracts:** Be able to locate and label the following as well as describe function.

Ascending Tracts:

Fasciculus Gracilis	Fasciculus Cuneatus
Lateral Spinothalamic	Anterior Spinothalamic
Posterior Spinocerebellar	Anterior Spinocerebellar

Descending Tracts:

Lateral Corticospinal	Anterior Corticospinal
Corticobulbar	Rubrospinal
Tectospinal	Vestibulospinal
Lateral reticulospinal	Medial reticulospinal