Week 3

ANATOMY: DIGESTIVE SYSTEM 2

Liver, Gallbladder & Pancreas S'14
1. Describe the location, anatomy, histology and function of the liver and gallbladder.
2. Describe the location, anatomy, histology and function of the pancreas.
3. Describe the blood supply of the foregut and spleen.
4. Describe the blood supply of the midgut.
5. Describe the blood supply of the hindgut.
6. Describe the hepatic portal system and major veins of the digestive system.
7. Describe the location, anatomy, histology and function of the large intestine.

BIOCHEMISTRY: DIGESTIVE SYSTEM

Digestive
1. Describe protein digestion in the stomach and small intestine
2. Indicate the digestive enzymes in the stomach (pepsin, trypsin, chymotrypsin)
3. Describe absorption of amino acids in the intestine
4. Indicate the major zymogens released from the pancreas and how they are activated
5. Indicate the molecules found in the portal vein following digestion
6. Describe the primary cellular roles of dietary proteins
7. Indicate the possible fate of dietary amino acids
8. Indicate the major site of protein digestion
9. Describe the transamination reaction: substrates, products, coenzyme.
10. Describe the ALT and the AST reactions, their products and coenzymes
11. Describe the role of glutamate dehydrogenase in producing free ammonia
12. Indicate the allosteric regulators (ATP, ADP, GTP, GDP) of glutamate dehydrogenase and how they affect the direction of the reaction
13. Describe the metabolism of D-amino acids and the enzyme and coenzyme required.

PHYSIOLOGY: DIGESTIVE SYSTEM

Gastrointestinal Motility
1. Describe the functions of chewing.
2. Describe the swallowing sequence and identify voluntary and involuntary components.
3. Compare and contrast primary and secondary esophageal peristalsis.
4. Describe the motor patterns of the stomach following ingestion of a meal.
5. Describe the segmenting and peristaltic patterns of motility seen in the small intestine.
6. Describe the basic electrical rhythm (BER) of each region of the GI tract. Explain the role of Interstitial Cells of Cajal in the origin and propagation of the BER.
7. Describe the sequence of events occurring during reflexive defecation, differentiating those movements under voluntary control and those under intrinsic control.
8. Discuss the role of other GI reflexes including the gastrocolic, gastroileal and ileogastric reflexes.
9. Contrast patterns of motility in the stomach and intestine with that during the fed and fasting states.

Gastric Secretions
1. List the endocrine and exocrine secretions of the stomach, their cells of origin and their functions.
2. Explain how gastric secretion is stimulated during the cephalic, gastric and intestinal phases.
3. Describe the various mechanisms that inhibit secretion of gastric acid.
4. Describe how pepsinogen secretion is controlled and what factors are important for its conversion to pepsin.
5. Explain what is meant by the “gastric mucosal barrier” and indicate the main agents known to disrupt it.

ANATOMY: CARDIOVASCULAR

Anatomy of the Circulatory System S'14
1. Explain the pulmonary and systemic circulation
2. Explain which blood vessel carries venous blood from the heart to the lungs
3. Explain which vessel carries oxygenated blood from the lungs to the heart
4. Explain the vessels that return venous blood to the heart
5. State the number of pulmonary veins entering the heart
6. State the functions of coronary circulation
7. State the functions of hepatic portal circulation
8. State the functions of cerebral circulation
9. Identify major branches from the arch of the aorta
10. Identify the major branches from the abdominal aorta
11. Identify terminal branches of the abdominal aorta
12. Identify the major arteries of upper limb and the regions supplied by them
13. Identify the major vessels supplying the head and neck
14. Major vessels of the lower limb and regions supplied by them
15. Explain the formation of portal vein
16. Explain the dual blood supply of the liver and its significance
17. State the major vessels supplying the brain
18. State the vessels contributing to the formation of the Circle of Willis in the brain
19. State the regions supplied by external carotid artery
20. Explain the significance of feeling for radial pulse at the wrist
21. Identify the location of median cubital vein
22. State the importance of median cubital vein
23. Name the regions / sections of aorta
24. State the importance of the location and palpation of dorsalis pedis artery
25. Explain the formation and drainage of great saphenous vein
The Heart S'14

1. Describe the location of the heart in the mediastinum.
2. List the pericardial coverings of the heart.
3. Describe the extent and attachments of the fibrous pericardium (pericardial sac).
4. List the surfaces and margins of the heart and the chambers/structures that contribute to them.
5. Describe the anatomy of the heart chambers and their relationships to one another and to adjacent structures.
6. Describe the arterial supply and venous drainage of the heart.
7. Describe the pattern of the venous blood flow from the upper limb to the right atrium.
8. Describe the innervation of the heart.
9. Describe the course of the pain fibers from the heart to the CNS. (check autonemics lecture)
10. Differentiate between the pathways used by the two types of visceral afferent fibers (carrying pain versus physiologic sensation) from the heart to the CNS. (check autonemics lecture)
11. Describe the surface projections of the heart and the heart valves.
12. Identify the auscultation sites for heart valve sounds and explain why these auscultation points differ from the anatomical location of the valves.
13. Describe the path of blood flow through the heart.
14. Explain which part of the myocardium will be affected if any of the coronary arteries is occluded.
15. Differentiate between the systemic and the pulmonary circulation.
16. Identify the major anatomical features of the heart and great vessels in radiographic images, CT and MRI.
17. Describe pericardial effusions.
18. Describe the conduction system of the heart.
19. Describe the differences between atrioventricular and semilunar valves.
20. Describe the subdivisions of the mediastinum and their boundaries.

Lymphatic System S'14

1. Define lymphatic system.
2. Explain the functions of lymphatic system.
3. Explain what is meant by lacteals.
4. Mention the cells taking part in immune function.
5. Explain the functions of a lymph node.
6. Explain the major components of lymphoid system.
7. Explain the formation of lymph.
8. Mention the constituents of lymph fluid.
9. Differentiate the composition of lymph from tissue fluid.
10. Trace the flow of lymph from tissue to the heart.
11. State the regions of the body that are devoid of lymphatics.
12. Explain the significance of valves in lymphatic vessels
13. Explain the regions drained by right lymphatic duct
14. Explain the regions drained by thoracic duct
15. Distinguish diffuse and nodular lymphoid tissue
16. State 2 examples of primary and secondary lymphoid organs
17. Distinguish primary from secondary lymphatic nodule
18. Identify the location and explain the main function of thymus
19. Explain the major cellular constituents of thymus
20. Explain the major cellular constituents of bone marrow and their function
21. Describe the histological structure of a lymph node
22. Mention the cellular components and explain the functional significance of a lymph node
23. Explain the flow of lymph through a lymph node and its significance
24. Identify the location of spleen and explain its structural components
25. State the components of red and white pulp and explain their function
26. Identify the location of tonsils and describe the histologic structure
27. Explain the lymphatic drainage of head and neck
28. Explain the lymphatic drainage of upper limb
29. Explain the lymphatic drainage of pectoral region
30. Explain the lymphatic drainage of lower limb

**BIOCHEMISTRY: CARDIOVASCULAR**

**Cardiac Biomarkers**

1. Discuss the effects of necrosis and inflammation on serum proteins and enzyme levels
2. Describe isozymes in general
3. Differentiate the isozymes of creatine kinase (CK) and lactate dehydrogenase (LDH) based on tissue location and subunit composition
4. Discuss the utility of serum biomarkers following myocardial infarction
   a. use of serum cardiac troponins I and T as markers
   b. use of CK/CKMB ratio for evaluation of myocardial infarction
   c. Time frame of serum cardiac biomarkers (myoglobin, cardiac troponin, CK-MB).
5. cTnI and cTnT are the new cardiac biomarkers
6. Present information about the medical use of cardiac biomarkers in MI and non-MI situations.

**PHYSIOLOGY: CARDIOVASCULAR**

**Cardiovascular Overview and Blood Pressure Measurement**

1. List the major functions of the cardiovascular system and describe its organization.
2. Define systole and diastole.
3. Define cardiac output and stroke volume. Explain how SV is calculated. Know normal values.
4. Define and be able to calculate, where appropriate, mean arterial pressure, systolic pressure, diastolic pressure and pulse pressure.
5. Understand how increasing stroke volume is likely to increase pulse pressure.
Action Potentials in the Heart Myocytes and Electrical Conducting System

1. Explain the ionic basis of the cardiac action potential recorded from myocytes and from the SA node.
2. Understand the relationship between the electrophysiological and mechanical events in the heart.
3. Explain how the wave of depolarization spreads throughout the heart.
4. Explain the significance of the delay at the AV node.
5. Explain why the SA node is the pacemaker of the heart.
6. Describe how the parasympathetic nervous system decreases heart rate.
7. Describe how the sympathetic nervous system increases heart rate.

Cardiac Cycle and Pressure Volume Relationship

1. Describe the sequence of events that occur during one cardiac cycle. Explain how pressures and volumes within the heart chambers change.
2. Describe the pressure – volume loop.
3. List the approximate values for mean pressures found at various stages of the cardiac cycle.
4. Explain how cardiac valves function in the heart and detail their opening and closing sequence with the cardiac cycle through time, and with the pressure volume relationship.
5. Explain and locate the main phases of the pressure volume relationship: isovolumetric contraction, ejection, isovolumetric relaxation and diastolic filling.
6. Briefly describe Starling’s experiment and state his findings.

Hemodynamics

1. Define the Bulk Flow Law and explain it in terms of the cardiovascular system.
2. Understand the relationship between pressure, flow, resistance, velocity and cross sectional area in the cardiovascular system.
3. Calculate velocity of blood flow. Explain which part of the vascular tree has the fastest and slowest blood flow.
4. Discuss the factors that affect the redistribution of blood.

Regulation of Blood Pressure

1. Define the features of a negative feedback control system and describes how it relates to the baroreceptor reflex.
2. Describe how the baroreceptor reflex works in the short term control of blood pressure.
3. Define the features of a negative feedback control system and describes how it relates to the baroreceptor reflex.

Electrocardiogram (ECG)

1. Define the term dipole, and describe how dipoles generated across the surface of the heart produce the waveforms of the ECG.
2. Describe the various features of a typical bipolar Lead II ECG waveform: the waves, the intervals and the segments, and the electrical state of the heart.