Feedback Survey: https://forms.gle/sc1ddQvPZmkScYZVA

Eating & Eliminating WORKSHEET:

GOAL of WORKSHEET: organization of TOPIC sequence with (1) disciplines, (2) preparation for active learning, (3) active learning and labs, (4) Formative & summative assessments.

Module Learning Outcomes:

1. **Oral Cavity and Dentition:**
    a. Describe the location, organization, development, and main purposes of the structures involved in oral cavity function.
    b. Sequence the biochemical, neural, and mechanical events involved in mastication and swallowing.
    c. Explain how the oral cavity and dentition participate in regulatory processes that maintain the overall function of the body.
2. **Gastrointestinal Tract:**
    a. Describe the location, organization, development, and main purpose of the structures involved in gastrointestinal function.
    b. Trace the journey of nutrients from bolus to waste feces through the gastrointestinal tract.
    c. Sequence then biochemical, neural, and mechanical events within the gastrointestinal tract involved in digestion, absorption, secretion, and defecation.
    d. Explain how the gastrointestinal tract participates in regulatory processes that maintain the overall function of the body.
3. **Liver, Gallbladder, and Pancreas:**
    a. Describe the location, organization, development, and main purposes of the structures involved in liver, gallbladder, and pancreatic function.
    b. Sequence the exocrine and endocrine chemical, neural, and mechanical events involved in digestion, absorption, secretion, and energy production.
    c. Explain how the liver, gallbladder, and pancreas contribute to the regulatory processes that maintain the overall function of the body.
4. **Kidneys and Urinary Tract:**
    a. Describe the location, organization, development, and structure-function relationships of kidney and urinary tract.
    b. Sequence the structural, biochemical, neural, and mechanical events involved in renal filtration and reabsorption.
    c. Sequence the biochemical, neural, and mechanical events involved in micturition.
    d. Explain how the kidneys and urinary tract participate in regulatory processes that maintain the overall function of the body.
    e. Sequence the biochemical, neural, and mechanical events involved in regulatory events involved in body homeostasis.

Unit Learning Outcomes

1. **Oral Cavity and Dentition**

    a. Identify structures of the oral cavity and explain their role in prehension, mastication and swallowing, comparing species differences, grossly, histologically and with diagnostic imaging.
    b. Describe normal developmental stages of dental structures and the oral cavity and its association with aging patients in select species, grossly, histologically, and radiographically.

2. **Gastrointestinal Tract**

    a. Identify and describe the function of gastrointestinal tract structures, comparing species differences, grossly, histologically and with diagnostic imaging.
    b. Describe normal developmental stages of the gastrointestinal system in select species, grossly, histologically, and radiographically
    c. Describe the digestive importance of the gastrointestinal microbiota.
    d. Describe the basic principles of mucosal defense and immune mechanisms in the GI tract.
    e. List the macro- and micronutrients that are common to all species for maintaining health through all life stages, describe their primary function, and where and how they are absorbed.
    f. Describe the homeostatic neurologic and endocrine control of GI tract function and feedback mechanisms.

3. **Liver, Gallbladder, and Pancreas**

    a. Identify and describe the function of the liver, gallbladder, and pancreas, comparing species differences, grossly, histologically and with diagnostic imaging.
    b. Describe normal developmental stages of the liver, gallbladder and pancreas in select species, grossly, histologically, and radiographically
    c. Describe the biochemical metabolites, substances and enzymes analyzed in blood and urine that are used to assess these organs in health and disease.
    d. Describe the homeostatic neurological and endocrine control of the hepatic, biliary, and pancreatic systems and their feedback mechanisms.
    e. Describe the substances produced by the liver and pancreas, and their role in digestion, assimilation, and distribution of nutrients.

4. **Kidneys and Urinary Tract**

a. Identify and describe the function of kidney and urinary tract structures, comparing species differences, grossly, histologically and with diagnostic imaging.
b. Describe normal developmental stages of the kidney and urinary tract, grossly, histologically, and radiographically.
c. List and explain blood and urine measures of renal excretory and metabolic function.
d. Describe the homeostatic neurological and endocrine regulation of the urinary tract (micturition) and kidneys (excretory and homeostasis) and feedback mechanisms.

Eating and Eliminating					
Week #	**Disciplines** Anatomy Radiology/US? Developmental Histology Tissue Cellular Physiology Mechanical Cellular Chemical Electrical Neurologic Exocrine Endocrine Pre-pathology as fits	**Topics**	**Asynchronous: Prepare for In-Class Active Learning (Up to 12 hours per week)**	**In-class Active learning Activities (6-10 hours per week)**	**Laboratories (n=2 x2 hours per week):**

1		Oral cavity through stomach. Mastication through swallowing. Species variations in dentition, +/- forestomachs.	• Histology of the oral cavity (mouth, tongue and teeth)- currently 60 min async. briefly covers relevant developmental stages of tooth, covers GALT (JR)
			• Histology of the salivary glands (20 min asynch) (JR for LA)
			• Anatomy FPVA- muscles of mastication, swallowing and extrinsic muscles of the tongue (25 min async) (JR for Masa Suzuki)
			• Anatomy FPVA- teeth and oral cavity (terminology, function and innervation, dental formula, naming) 25 min async. (JR for Mac Gunderson)
			• Anatomy FPVA-salivary glands (8 min async.) (JR)
			• Anatomy LA- Neck and head (50 min async) (JR)
			  • esophagus
			  • muscles of mastication (JR)
			  • Pharynx
				• Histology- enamel hypoplasia case based learning(JR)
				• Histology- dentistry case based learning (tooth resorption, tooth fracture)- (JR for LJ)
				• Anatomy FPVA- dental charting with Dentistry service (30 min repeated for each ⅓ of class) (JR for Gunderson)
				• Anatomy FPVA- swallowing pathway activity (30 min repeated for each ⅓ of class) (JR for Suzuki)
				• Anatomy FPVA- comparative dentistry with (done by Dr. Mans for FPVA)(30 min repeated for each ⅓ of class) (JR)
				Anatomy LA- passing a nasogastric tube in horse/orogastric tube in ox (model activity) (20 min repeated for small groups,
					• Histology of mouth/tongue/teeth & esophagus (JR)
					• histology of the salivary glands (JR for LA)
					• Anatomy FPVA- Dissection of the head (oral cavity, pharynx, salivary glands, muscles of mastication) (2 hours) (JR & KH)
					• Anatomy LA- prosections of equine and ox head and neck structures (1 hour) (JR & KH)
					• Esophagus studied regionally with neck/thorax). (JR)
					• Prosection of canine head

			(Hershberger) • Teeth (Gunderson) • Radiographic anatomy of the head (most important structures including teeth, palate; across species) (30-60 min–several short videos); include directional terms (e.g., mesial, distal) • Vasculature of the head (make sure vasculature of the neck is covered somewhere/another module?)	~1/9 of class) (JR for Gunderson) • Anatomy LA- equine dentition (aging and oral exam), build an equine incisor (model) (1 hr repeated for each ⅓ of class) (JR for Gunderson) • Radiographs of the head/skull, teeth (30 min); integrate with histology (lamina dura, periodontal ligament, adjacent structures–vessels & nerves; TMJ)	
2		Stomach through ileum, pancreas, liver, biliary. Acid-exocrine digestion and small intestinal absorption of proteins, CHO, fats, and micronutrients.	• Histology of the gastrointestinal tract (3 part async, lecture series)- esophagus, simple stomach/ruminant stomach, intestines, covers GALT and enteric nervous system (JR) • Histology of the liver (includes biliary system) (50 min) (JR for LA)	• Histology- hepatotoxins case based learning (JR for Lisa Arendt) • Histology- viral intestinal disease case based learning (scours, parvo, panleuk, TGE) (JR for Lisa Arendt) • Histology- pancreatitis case	• Histology of the gastrointestinal tract (monogastric and ruminant)(JR) • Liver histology (JR for LA) • Pancreatic Histology (LJ for LA) • Anatomy FPVA- Dissection of the abdominal serous membranes and viscera (includes stomach/intestinal tract,

			• Histology of exocrine pancreas (12 min) (JR for LA)
			• Endocrine pancreas Histology & Physiology (100 min) LJ
			• Anatomy FPVA - Abdominal topography (KH)
			  • GI organs (16 min)
			  • Other Abdominal Viscera - liver, gallbladder, pancreas; kidneys (12 min)
			  • Abdominal serous membranes (20 min)
			• Anatomy FPVA- abdominal neurovasculature (vascular supply, hepatic portal system, ANS and enteric nervous system) 35 min async. (JR)
			• Anatomy LA - Abdomen (KH)
			  • GI organs - horse, ox (& pig) (19 min)
			  • Internal features
				based learning (JR for LJ)
				• Case-based learning: Diabetes, Insulinoma
				• Anatomy FPVA- topography of the abdominal viscera- model building of the GI tract (monogastric)/viscera and follow bolus of food (30 min repeated for each ⅓ of class) (JR for Mac Gunderson)
				• Anatomy FPVA- comparative anatomy sessions on avian GI and rabbit GI tract (done by Drs. Doss and Mans for FPVA) (30 min repeated for each ⅓ of class) (JR)
				• Anatomy FPVA- Abdominal topography in imaging (ultrasound) (30 min repeated for each ⅓ of class) (JR)
					liver, GB, spleen, pancreas, kidneys, and ureters.system in the dog (3 hours) (JR & KH)
					• Anatomy FPVA- dissection of the abdominal blood supply, ANS, and hepatic portal system (3 hours) (JR & KH)
					• Anatomy LA- prosections of equine and bovine GI tracts and abdominal viscera (in situ and on table)(2+ hours) (JR & KH)

			of the ox & horse stomach (23 min) • Abdominal topography & other GI viscera (liver, spleen & kidneys) (14 min)	• Anatomy FPVA- topography of the abdominal viscera- elaborating on GI tract model, adding abdominal viscera & serous membranes (30 min repeated for each ⅓ of class) (JR & KH for Mac Gunderson) • Anatomy FPVA- Abdominal topography lab (cross sectional gross anatomy and imaging) (30 min repeated for each ⅓ of class) (JR) • Anatomy FPVA- trace a drop of blood to the GI & liver KF (30 min repeated for each ⅓ of class) (JR) • Anatomy FPVA- GDV case based learning session (1 hr) (JR) • Anatomy FPVA- Abdominal ANS pathway tracing (30 min repeated for each ⅓ of class) (JR)	

				• Anatomy LA- impaction sites, nephrosplenic entrapment, cross sections (horse GI tract) (20 min repeated for small groups, ~1/9 of class) (JR) • Anatomy LA- traumatic reticulocarditis/peritonitis in ruminant and displaced abomasum (20 min repeated for small groups, ~1/9 of class) (JR)	
3		Liver through rectum. Nutrient assimilation, storage, and redistribution; water & electrolyte reabsorption, defecation & biliary excretion. Liver, large intestine, and biliary.		• Anatomy LA- rectal palpation model (20 min repeated for small groups, ~1/9 of class) (JR)	
4		Ruminant and hindgut fermenters and related digestion variations. Gut microbiome.			

		Kidney structure & function.	1. Renal/urinary system histology (~90 min currently) LJ 2. Major functions of the kidneys 3. Physiological significance of different parts of the nephron 4. Cortical vs. juxtaglomerular nephrons 5. Diagnostic imaging of urinary tract		
5		Kidney as a regulator of water-volume, electrolyte, and acid-base homeostasis. Kidney as endocrine organ.	1. Renal circulation and relationship between cardiac output and urine output 2. Function of glomerulus and Physiological significance of glomerular filtration barrier 3. Regulation of glomerular filtration rate 4. Assessment of renal function (measurement of GFR)	• Histology renal insufficiency case LJ • Histology lower urinary tract case - add in/include clin path LJ • Anatomy FPVA- Urinary tract anatomy in context of U cath/cysto (Note: currently this happens after structures of the external urogenital anatomy are	• Anatomy FPVA - Dissection of the organs in the pelvic cavity - following the urinary tract into pelvis (urethra, prostate, blood supply & innervation) (3 hours) (KH & JR) • Anatomy LA- prosections of pelvic viscera (1 hr) (JR) • Prosection/histology/ radiology/cases • Renal histology (LJ)

			5. Transport through the proximal tubular wall 6. Transport in loops of Henle 7. Transport in distal tubules 8. Transport in collecting tubules 9. Urine specific gravity 10. Hormonal regulation of NaCl and water reabsorption 11. Site of action of diuretics 12. NORMAL Acid-Base Dynamics; drawing and applying the Davenport diagram to explore variable alterations in pH, HCO3-, and PCO2. 13. Physiology/neurology of urination, bladder function	taught) (30 min repeated for each ⅓ of class) (JR) if taught with urinalysis, can add clinical context of sample collection by free catch vs cysto. KF (urine sample collection & basic urinalysis also will be taught in clinical skills KH)	

NEW CONTENT ADDED

Content by Week

Week 1

Oral cavity **and** esophagus. Mastication and swallowing. Species variations in dentition and esophagus anatomy.

Suggest alternative summary of week 1 here:

Topics

1. Anatomy of the oral cavity and relevant head structures
    a. Dental formulae
    b. Muscles of mastication
    c. Tongue
    d. Pharynx
    e. Salivary glands
    f. Innervation **- limited until discuss cranial nerves in Cognition & Senses (KH)**
    g. Vasculature? (GD)
2. Histology of the oral cavity
    a. Mouth
    b. Tongue
    c. Teeth
    d. Tooth development
    e. GALT
3. Cephalic oral and esophageal phases of meal digestion
4. Diagnostic imaging of the oral cavity and relevant head structures

Asynchronous instruction (preparation for active learning/labs) - UP TO 12 hours

1. Histology of the oral cavity (mouth, tongue and teeth)- currently 60 min async. briefly covers relevant developmental stages of tooth, covers GALT (JR)
2. Anatomy and histology of the salivary glands (20 + 8 min asynch) (JR for LA)
3. Anatomy FPVA- muscles of mastication, swallowing and extrinsic muscles of the tongue (25 min async) (JR for Masa Suzuki)
4. Anatomy FPVA- teeth and oral cavity (terminology, function and innervation, dental formula, naming) (25 min async.) (JR for Mac Gunderson)
5. Anatomy LA- Neck and head (~50 min) (JR)

i. Esophagus
ii. muscles of mastication
iii. Pharynx
iv. teeth

6. Cephalic, oral, and esophageal phases of meal digestion. (JM)
7. Radiographic anatomy of the teeth, oral cavity, esophagus, and structures associated with mastication (DY)

Active learning (6-10 hours)

1. Histology- enamel hypoplasia case based learning (20 min) (JR)
2. Histology- dentistry case based learning (tooth resorption, tooth fracture) (50 min)- (JR for LJ)

3. Anatomy FPVA- dental charting with Dentistry service (cadavers and models) (30 min repeated for each ⅓ of class)(JR)
4. Anatomy FPVA- swallowing pathway activity (30 min repeated for each ⅓ of class) (JR)
5. Anatomy FPVA- gross comparative dentistry (cadaver heads) with (30 min repeated for each ⅓ of class) (done by Dr. Mans for FPVA) (JR)

6. Anatomy LA- is the Lab time vs. F2F time (MD2?) passing a nasogastric tube in horse/orogastric tube in ox (model activity) (20 min repeated for small groups, ~1/9 of class)(JR)
7. Anatomy LA- equine dentition (aging and oral exam), build an equine incisor (model) (1 hr repeated for each ⅓ of class)(JR)

Labs (n=2, 2hr labs)

1. Histology of mouth/tongue/teeth (JR)
2. Histology of the salivary glands and exocrine pancreas (JR for LA)
3. Anatomy FPVA- Prosection of the head (oral cavity, pharynx, salivary glands, muscles of mastication, vessels & innervation) (2 hours)(JR)
    a. Esophagus studied regionally with neck/thorax). (JR)
    b. Innervation **limited until discuss cranial nerves in Cognition & Senses (KH)**
4. Anatomy LA- prosections of equine and ox head and neck structures (1 hour) (JR)
5. Radiographic anatomy of the oral cavity, esophagus and structures of mastication (DY)

Week 2

Stomach through ileum, pancreas, liver, biliary. Acid-exocrine digestion and small intestinal absorption of proteins, CHO, fats, and micronutrients.

Suggest alternative summary of week 2 here:

Topics

1. Anatomy + function of the stomach, forestomachs (ruminants +/- cria), small intestines, exocrine panc., and liver
    a. Cardia, fundus, pyloric and species differences
    b. Reticulum, rumen, omasum, abomasum (+/- C1-C3 for cria)
    c. Duodenum, jejunum, ileum - anatomic landmarks and differences in anatomy and function
    d. Innervation + blood supply + hormonal control of appetite(??)
2. Histology/microanatomy of the organs above
    a. Stomach - different cell types and what they do
    b. Differences in microanatomy between the forestomachs/glandular and squamous portions of horse/pig
    c. Small intestines - kind of all histologically look mostly the same (duodenum +/- submucosal glands' ileum usually ++ GALT) - different cell types and what they do in different parts of the SI
3. Gastric, pancreatic, biliary, small intestinal digestion
4. Diagnostic imaging of the stomach, small intestine, pancreas, liver and biliary tree

Asynchronous instruction (Preparation for active learning/labs) UP TO 12 hours

1. KRF metabolism and function of bile acids, ammonia, and urea; including perspective as CP diagnostic analytes (or in week 3)
2. Anatomy FPVA - Abdominal topography (KH)
    a. GI organs (16 min async) - currently follow the entire pathway of the GI tract
    b. Other Abdominal Viscera - liver, gallbladder, pancreas; kidneys (12 min async) (can sparse apart)
    c. Abdominal serous membranes (20 min async)
3. Histology of exocrine pancreas (12 min async.) (JR for LA)
4. Histology of the gastrointestinal tract (3 part async, lecture series)- esophagus, simple stomach/ruminant stomach, intestines, covers GALT and enteric nervous system (JR)
5. Histology of the liver (50 min async) (JR for LA)
6. Gastric phase of digestion. (JM)
7. Pancreatic and biliary secretion. (JM)
8. Liver exocrine does this mean excretory or exocrine enzymes? KF function. (JM)
9. Digestion and absorption of carbohydrates and proteins. (JM)
10. Digestion and absorption of lipids, Vitamins and Minerals. (JM)

Active learning (6-10 hours)

1. Describe the relevant anatomy involved in common surgical approaches of the gastrointestinal tract.

2. Histology- pancreatitis case based learning (JR for LJ) For Phase 1 would exocrine pancreatic insufficiency be a better functional & histologic example? KF
3. Insulinoma could be used to demonstrate importance of glucose regulation and stress hormone response (e.g. other hormones that regulate glucose). KF
4. Histology- viral intestinal disease case based learning (scours, parvo, panleuk, TGE) (JR for Lisa Arendt)
5. Histology- hepatotoxins case based learning (JR for Lisa Arendt) would hepatic cirrhosis or hepatic atrophy of PVA be a better functional and structural- histological example? PVA is also developmental example KF
6. Anatomy FPVA- topography of the abdominal viscera- model building of the GI tract (monogastric)/viscera and follow bolus of food (30 min repeated for each ⅓ of class) (JR for Mac Gunderson)
7. Anatomy FPVA- Abdominal topography in imaging (ultrasound) (30 min repeated for each ⅓ of class) (JR)
8. Anatomy FPVA- topography of the abdominal viscera- elaborating on GI tract model, adding abdominal viscera & serous membranes (30 min repeated for each ⅓ of class) (JR & KH for Mac Gunderson)
9. Overview of gastrointestinal system; regulation by nerves and hormones. (JM)
10. Physiology - cobalamin and folate deficiency cases (also anatomy of small intestine and pancreas) (KS)
11. Physiology/anatomy/histology - obstructive cholestasis case (e.g., mucocele) (KS) and portosystemic shunt case (KS)
12. Physiology/anatomy - large animal forestomach motility and surgical approaches (KS)

Labs (n=2, 2hr labs)

6. histology of the salivary glands **(with oral cavity? KS)** and exocrine pancreas (JR for LA)
    a. EPI case focusing on the enzymes and what they do - follow-on Qs with regards to overall enzymatic digestion? (KS)
7. Dissection of abdominal serous membranes & viscera (includes stomach/intestinal tract, liver, GB, spleen, pancreas, kidneys, and ureters.system in the dog (3 hours) (JR)
    a. Practice taking GI full thickness biopsies? (KS) - probably would take too long
    b. Anatomy for gastropexy? (KS)

Week 3

Liver through rectum. Nutrient assimilation, storage, and redistribution; water & electrolyte reabsorption, defecation & biliary excretion. Liver, large intestine, and biliary.

Suggest alternative summary of week 3 here:

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Topics

Asynchronous instruction (Preparation for active learning/labs) - UP TO 12 hours

1. Electrolyte absorption and secretion; hindgut function. (JM)
2. Mechanisms of diarrheal disease. (JM) Can this aid understanding of GI absorptive and peristaltic function or is it more related to virulence factors of pathogens or both? KF
3. Anatomy FPVA- abdominal neurovasculature (vascular supply, hepatic portal system, ANS and enteric nervous system) 35 min async. (JR)
4. KRF origin and metabolism of bilirubin (preamble to mechanisms of icterus)
5. KRF metabolism and function of bile acids, ammonia, and urea; including perspective as CP diagnostic analytes (or in week 2)

Active learning

8. Anatomy FPVA- trace a drop of blood to the GI & liver KF (30 min repeated for each ⅓ of class) (JR)
9. An activity that explores complete origin and metabolism of bilirubin, ammonia/urea, and maybe bile acids from the primary perspective of the liver and secondarily the kidney. These are important physiologic substances that also play an important role in disease diagnosis. This can be overlaid with some disease mechanisms of icterus. KF

Labs

8. Histology of the (large animal)(GD) gastrointestinal tract (monogastric and ruminant)(JR)
9. Histology of the liver (JR for LA)
10. Anatomy FPVA- dissection of the abdominal blood supply, ANS, and hepatic portal system (3 hours) (JR & KH)
11. Anatomy FPVA- Abdominal topography lab (cross sectional gross anatomy and imaging) (30 min repeated for each ⅓ of class) (JR)
12. Anatomy LA- prosections of pelvic viscera (1 hr) (JR)

Week 4

Fermentation (ruminant, hindgut fermenters, and colon). Gut microbiome. Kidney structure & function.
Suggest alternative summary of week 4 here:

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1.

Topics

Asynchronous instruction (Preparation of active learning/labs) - UP TO 12 hours

8. Histology of the[RUMINANT & EQUINE] gastrointestinal tract (3 part async, lecture series)- esophagus, stomach/ruminant stomach, intestines,

9. Anatomy LA - Abdomen (KH)
    i. GI organs - horse, ox (& pig) (19 min async)
    ii. Internal features of the ox & horse stomach (23 min async)
    iii. Abdominal topography & other GI viscera (liver, spleen & kidneys) (14 min async)
10. GI physiology in ruminants. (JM) what aspects are need to know (all students)and could know (select students) KF
11. Equid and avian GI physiology. (JM) what aspects are need to know (all students)and could know (select students) KF
12. KRF gross and microscopic anatomy and function of kidney (nephron and interstitium) focusing on excretory role and urea and creatinine metabolism, reabsorption, and elimination
13. Major functions of the kidneys
14. Physiological significance of different parts of the nephron
15. Cortical vs. juxtaglomerular nephrons
16. Renal/urinary system histology (~90 min currently) LJ
17. SK - Renal Phys - Major functions of the kidneys
18. SK - Renal Phys - Physiological significance of different parts of the nephron
19. Cortical vs. juxtaglomerular nephrons
20. SK - Renal Phys - Function of glomerulus and Physiological significance of glomerular filtration barrier
21. SK - Renal Phys - Regulation of glomerular filtration rate
22. SK - Renal Phys - Assessment of renal function (measurement of GFR)
23. SK - Renal Phys - Transport through the proximal tubular wall
24. Physiology/neurology of urination, bladder function

Active learning (6-10 hours)

10. Anatomy FPVA- comparative anatomy sessions on avian GI and rabbit GI tract-(done by Drs. Doss and Mans for FPVA) (30 min repeated for each ⅓ of class) (JR)
11. Anatomy LA- impaction sites, nephrosplenic entrapment, cross sections (horse GI tract) (20 min repeated for small groups, ~1/9 of class) (JR)
12. Anatomy LA- traumatic reticulocarditis/peritonitis in ruminant and displaced abomasum (20 min repeated for small groups, ~1/9 of class) (JR)
13. Anatomy LA- rectal palpation model (20 min repeated for small groups, ~1/9 of class) (JR)
14. SK - Renal Phys - Regulation of GFR
15. SK - Renal Phys - Measurement of renal function (equations)
16. SK - Renal Phys - Transports/processes involved in nephron segments
17. SK - Renal Phys - Site of action of diuretics
18. Histology renal insufficiency case LJ
19. Histology lower urinary tract case LJ

Labs (n=2, 2hr labs)

13. Renal histology (LJ)
14. Anatomy FPVA- Dissection of the pelvic viscera (urinary bladder, urethra) (3 hours) (JR)
15. Anatomy LA- prosections of equine and bovine GI tracts and abdominal viscera (in situ and on table) (2+ hours) (JR)

Week 5

Kidney as a regulator of water-volume, electrolyte, and acid-base homeostasis. Kidney as endocrine organ.

Suggest alternative summary of week 5 here:

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Disciplines

2.

Topics

5.

Asynchronous instruction (Preparation for active learning/labs) - UP TO 12 hours

25. SK - Renal Phys - Renal circulation and relationship between cardiac output and urine output
26. SK - Renal Phys - Transport in loops of Henle
27. SK - Renal Phys - Transport in distal tubules
28. SK - Renal Phys - Transport in collecting tubules
29. Urine specific gravity
30. SK - Renal Phys - Hormonal regulation of NaCl and water reabsorption
31. SK - Renal Phys - Site of action of diuretics
32. Compensatory Responses; exploring pH restoration to near normal levels with the Davenport diagram. (JM)
33. Significance of “base excess” in understanding acid-base disturbances. (JM)
34. Time course and mechanism of H+ ion excretion by lungs and kidneys. Advanced? KF
35. Calculating [base]/[acid] ratios, unraveling urinary buffering, predicting urine pH shifts, and analyzing blood-gas values for clinical cases through Davenport diagrams. (JM)
36. water homeostasis (includes electrolytes) and acid-base regulation; Ca/P metabolism
37. Renal circulation and relationship between cardiac output and urine output
38. Function of glomerulus and Physiological significance of glomerular filtration barrier
39. Regulation of glomerular filtration rate
40. Assessment of renal function (measurement of GFR)

41. Transport through the proximal tubular wall
42. Transport in loops of Henle
43. Transport in distal tubules
44. Transport in collecting tubules
45. Urine specific gravity
46. Hormonal regulation of NaCl and water reabsorption
47. Site of action of diuretics
48. NORMAL Acid-Base Dynamics; drawing and applying the Davenport diagram to explore variable alterations in pH, HCO3-, and PCO2.

Active learning (6-10 hours)

20. Active learning in physiology: de-, over- and eu-hydration; salt overload vs. salt depletion; SK
21. Aligns with physiology 34. An activity that fully explores the renal, blood, and urine response to decreased water intake progressing to dehydration (and prerenal azotemia) with resolution by oral intake or IV administration of water. histology can be included by diagramming the locations of actions to prevent water loss. Includes full metabolism of creatinine and urea. KF
22. Liz Jacka: lower urinary tract disease…histo, anatomy,
23. Anatomy FPVA- Urinary tract anatomy in context of U cath/cysto (Note: currently this happens after structures of the external urogenital anatomy are taught) (30 min repeated for each ⅓ of class) (JR)
    a. if taught with urinalysis, can add clinical context of sample collection by free catch vs cysto. KF [clinical skills will teach sample collection & basic urinalysis KH]
24. Renal Phys. Exploring acid-base dynamics by drawing Davenport diagrams to explain mixed processes, compensatory responses, and mechanism of H+ ion excretion. (JM and SK) Renal Phys. Analyzing a clinical case with arterial blood-gas values to illustrate the likely primary and compensatory processes. (JM and SK) see comment
25. +/- an activity that explores the important physiologic role of albumin (perhaps Phase 2). liver and glomerular disease are major causes of hypoalbuminemia in which manifestations of low colloid osmotic pressure are manifest; the hemodynamic effects off hypoalbuminemia are a carry-over from the concepts of fluid balance from RESP-CARDIO. KF

Labs (n=2, 2hr labs)

16. Review anatomy (small and large animal) prior to next week's assessment (2 hr)