

Instructional Objectives / Learning Outcomes
DMP 775, Veterinary Clinical Pathology
Department of Diagnostic Medicine/Pathobiology
College of Veterinary Medicine, Kansas State University

Chapter 8: Urinary system

135. If given serum concentrations of urea or creatinine (increased or decreased), urinalysis results, and pertinent patient information,
 - a. List or classify abnormalities using appropriate terms.
 - b. Propose appropriate ideas or conclusions (i.e., diseases, syndromes, or pathologic states) that might cause the defined abnormalities.
 - c. Based on your conclusions or ideas, explain the pathogenesis of each defined abnormality if the abnormality could be caused by the disorder.
136. Explain the pathogeneses of the following in an animal with chronic renal insufficiency or renal failure.
 - a. Azotemia
 - b. USG_{ref} near 1.010
 - c. Polyuria
 - d. Oliguria
137. Explain the pathogeneses of the following in an animal in acute renal failure.
 - a. Azotemia
 - b. Oliguria
138. List the 2 major processes that produce azotemia. For the one that relates to the urinary system, explain how the 3 types produce azotemia. For each, list major pathologic states that produce azotemia.
139. List the criteria that are used to differentiate pre-renal, renal, and post-renal azotemia; appropriately classify azotemias using these criteria.
140. List the major processes that produce decreased serum urea (or UN) concentrations. List disorders that produce low serum urea concentrations via those processes.
141. Compare and contrast the pathophysiologic processes that may result in concurrent increases in serum urea and creatinine concentrations or increases in one but not the other.
142. Explain what a decreased creatinine clearance tells us about an animal. Explain why it does or does not help differentiate pre-renal, renal, or post-renal disorders.
143. Explain why concentrations or activities of the following serum analytes may become abnormal if a decreased GFR is caused by acute or chronic renal diseases (note major species differences): UN, creatinine, inorganic phosphorus, total calcium, potassium, hydrogen, amylase, lipase.
144. If given an animal's hydration status and its USG_{ref} value, state if the USG_{ref} is an expected physiologic response or a pathologic state and explain the basis of your conclusion.
145. Explain why USG_{ref} is typically an excellent method of estimating urine solute concentration. List the situations when it is not.
146. Explain the clinical significance of the following urine abnormalities (i.e., what do the data tell you about the animal?):
 - a. Appearance: cloudy, red, orange, brown, black
 - b. Chemical features: aciduria, alkalinuria, proteinuria, glucosuria, bilirubinuria, ketonuria, positive heme reaction

- c. Sediment findings: pyuria, hematuria, cylindruria, bacteriuria, crystalluria (phosphate or struvite, calcium oxalate dihydrate, calcium oxalate monohydrate, calcium carbonate, ammonium biurate, urate, bilirubin).
For each, explain the possible pathogenesis(es) of the abnormality and state disorders (diseases, pathophysiologic states) which could cause the abnormality.
147. Explain the conditions and name the animal in which the detection of protein and bilirubin in urine are not considered abnormal findings.
 148. For each of the semi-quantitative chemical procedures on a UA reagent strip, state the substance(s) that the assay is designed to detect.
 149. Recognize which of the following proteins (or protein groups) are detected by the urine protein reagent-strip assay (Ames type): albumin, α -globulins, β -globulin, γ -globulins, kappa or lambda chains, hemoglobin. State why the reagent-strip assay does not accurately measure the concentrations of all urine proteins.
 150. Explain the possible advantage(s) of the sulfosalicylic acid procedure over the reagent pad method.
 151. State the pathologic states which might give an increased urinary protein:creatinine ratio and explain the pathogenesis of the proteinuria for each state.
 152. Explain why a urine protein concentration of 50 mg/dL may be strong evidence of a proteinuria in one dog, but in another case be considered an expected finding in a healthy dog.
 153. List the 4 types of proteinuria. Given appropriate data, differentiate them.
 154. List the 2 types of glucosuria. Given appropriate data, differentiate them.
 155. List the 3 types of positive heme reaction. Given appropriate data, differentiate them.
 156. List the 2 basic pathophysiologic processes that produce bilirubinuria. Given appropriate data, differentiate them.
 157. Using urine and serum colors, an animal's Hct, and results of a urine sediment examination, differentiate hematuria, hemoglobinuria, and myoglobinuria.
 158. Explain the pathogeneses of polyuria in the following disorders: renal insufficiency or renal failure, diabetes insipidus, renal diabetes insipidus, diabetes mellitus, hyperadrenocorticism, hypoadrenocorticism, hypercalcemia, hypokalemia, canine pyometra, hepatic insufficiency or failure, psychogenic polydipsia.
 159. Explain why animals in renal failure (acute or chronic) or with hypoadrenocorticism can be either polyuric or oliguric.
 160. Explain how it is possible that the following can occur in animals with renal disease.
 - a. Decreased creatinine clearance and serum [Crt] WRI
 - b. Glomerular proteinuria without azotemia
 - c. Azotemia without glomerular proteinuria
 161. Extra credit material
 - a. UN:Crt ratio (p. 296)
 - b. USG by reagent strip (p. 304)
 - c. Quantitative urinalysis (p. 326-332 except the $(\text{Prot:Crt})_u$ ratio)
 - d. H_2O deprivation and antidiuretic hormone (p. 332-334)