

Question

A 5-year old male castrated domestic short haired cat presents for pollakiuria, hematuria, and dysuria. Which of the following is the least likely differential diagnosis in this cat?

- Pyelonephritis
- Feline lower urinary tract disease
- Cystitis
- Urethral obstruction by uroliths

Explanation - The correct answer is pyelonephritis. Pollakiuria and dysuria are lower urinary tract signs that are not consistent with pyelonephritis alone. Pyelonephritis causes systemic signs such as fever, anorexia, and depression.

Pollakiuria is abnormally frequent passage of relatively small quantities of urine while Dysuria means painful or difficult urination.

Question

A 4-year old male castrated domestic short haired cat presents for dysuria and pollakiuria. Physical exam and diagnostic tests suggest the cat has feline lower urinary tract disease with no evidence of crystalluria or urolithiasis. One week later, the FLUTD resolves and you discharge the cat to go home. What should you tell the owner?

- There are no surgical treatment options for the cat if he becomes obstructed again in the future
- FLUTD is unlikely to recur in the future
- FLUTD predisposes cats to formation of cystic calculi
- FLUTD is likely to recur again in the future

Explanation - The correct answer is **FLUTD is likely to recur again in the future**. FLUTD, also known as FUS (**feline urologic syndrome**), is a group of clinical signs that occur with lower urinary tract obstruction. There are multiple possible etiologies including urolithiasis, mucous plugs, bacterial infection, etc. After treating the patient, the owner should be notified that the obstruction can recur, **particularly if the cat is stressed**. Cystic calculi may be a cause for FLUTD, but the animal is not predisposed to their formation because of the FLUTD. Surgical treatment for animals that obstruct repeatedly involves a **urethrostomy**.

Question

A 7-year old female spayed Persian cat presents for polyuria, polydipsia, lethargy, vomiting, and anorexia. The cat is euthanized and a post-mortem exam reveals kidneys that are shown in the picture below. How is this disease usually treated?



- Ampicillin and enrofloxacin antibiotics
- Lithotripsy
- Surgical excision
- Cyclophosphamide, doxorubicin, vincristine, and prednisone
- Fluids, low protein diet, and gastric protectants

Explanation - The image shows polycystic kidneys. This is an **inherited disease** that most commonly affects **Persian cats**. Other breeds such as Himalayans and British shorthairs are occasionally affected as well. The responsible gene is autosomal dominant. The homozygous form is lethal in utero and all affected living cats are heterozygotes.

The disease is diagnosed most reliably by ultrasound and treatment is similar to that of other causes of chronic renal disease with **fluids**, a **low protein diet**, **gastric protectants** (such as famotidine), **Antiemetic** (maropitant), and **appetite stimulants** (Mirtazapine).

Cyclophosphamide, doxorubicin, vincristine, and prednisone are treatments for lymphoma, which can also affect kidneys bilaterally, but generally the lesions would not be cystic in appearance such as those in the picture.

Typically, the cysts are diffuse throughout both kidneys so surgical excision is not an option.

Antibiotics such as ampicillin and enrofloxacin are not usually necessary unless a concurrent infection is found.

Lithotripsy is a form of treatment used to break up urinary calculi which is not commonly employed in animals.

Question

Which of the following is not a component of therapy for chronic renal failure?

- Glucocorticoids
- H₂ receptor antagonists
- Oral phosphate binding agents
- Calcium channel blocking agents
- Restricted dietary protein

Explanation - The correct answer is glucocorticoids.

- **Restriction of dietary protein** decreases the formation of nitrogenous wastes and helps to palliate hyperphosphatemia.
- **Phosphate binding agents** prevent the absorption of phosphorus from the intestines.
- **H₂ blockers** decrease gastric acid secretion helping to prevent vomiting and the formation of gastric ulcers.
- **Calcium channel blockers**, like amlodipine, are used to palliate hypertension.
- Glucocorticoids are not usually indicated in chronic renal failure patients.

Question

A male neutered domestic short hair cat presents to you with urinary obstruction. Your treatment room diagnostics show a BUN > 140 mg/dL and a K⁺ of 9.0 meq/L. You immediately give the cat dextrose and fluids and successfully unblock your patient. An hour later, you monitor your patient and find him trembling uncontrollably. What should you check first?

- A blood pressure
- An ionized calcium level
- A K⁺ level
- A spot ECG

Explanation - In some cases, during the immediate post-obstructive period, cats will develop **hypocalcemic tetany**. The mechanism is considered to be secondary to laws of mass action that drive down calcium as a result of existing hyperphosphatemia. Judicious use of calcium gluconate can quickly restore their electrolyte balance and prevent further complications such as hypocalcemic seizures.

Question

An 11-year old MN DSH in chronic renal failure has been treated with weekly subcutaneous fluids, a renal diet, an H₂ blocker, and Azodyl. The renal values have remained stable over the past 6

months, but the cat is chronically losing weight. His thyroid tests were all normal, and his serum calcium and phosphorus are normal. The owner has no funds for testing parathyroid levels. Which of the following medications may be of benefit for this patient?

- Pancreazyme powder with A, D, E, K vitamins
- Methimazole
- High-protein supplement for weight gain
- Calcitriol
- Prednisolone

Explanation - An important part of the synthesis of Vitamin D is the kidney's ability to produce calcitriol, or the activated form of Vitamin D. Cats in chronic renal failure lose the ability to make calcitriol because their kidneys are no longer functioning properly. Calcitriol acts as a negative feedback to stop the production of parathyroid hormone (PTH). Thus, when the negative feedback is lost, the parathyroid hormone becomes excessively increased. This can lead to chronic weight loss in these patients.

Methimazole is a medication used to control hyperthyroidism in cats.

Prednisolone, although as a side effect can cause increased appetite, is not used for this purpose and is not a treatment for chronic renal failure.

Pancreazyme powder is used in patients with exocrine pancreatic insufficiency and helps with weight gain in those patients but would not be used in this case.

Cats in chronic renal failure should be placed on diets low in protein and phosphorus, so a high-protein diet or supplement would be contraindicated.

Question

Yogi, a MN 9-year old Siamese, is being treated for chronic renal failure. He presents for his routine examination and bloodwork. His renal panel shows: BUN 48 mg/dL, creatinine 4.0 mg/dL, phosphorus 10.2 mg/dL, calcium 12 mg/dL, albumin 3.5 g/dL, potassium 4.8 mEq/L. USG 1.008, negative sediment, negative urine culture, blood pressure 148/110 mmHg. Which of the following medications would be indicated for this cat?

- RenaKare (potassium supplement)
- Calcitriol (Vitamin D)
- Clavamox (antibiotic)
- Amlodipine (calcium channel blocker)
- Epakitin (calcium based phosphorus binder)
- Aluminum hydroxide (phosphorus binder/antacid)

Explanation - Phosphorus is absorbed in the intestine and stored in bone. Kidneys excrete the excess phosphorus not needed. When renal function is compromised, the kidneys can no longer perform this function, thus leading to hyperphosphatemia. Cats with increasing phosphorus levels

should be placed on a phosphorus binder. If the calcium is also elevated, as is the case with this cat, a non-calcium based binder should be chosen to prevent exacerbation of the hypercalcemia. The most commonly used non-calcium-based binder is **aluminum hydroxide**.

If this cat had normal calcium, Epakitin would also be an acceptable choice.

Many times in CRF, the potassium also starts to decrease and this should be supplemented in those cases. This cat has a normal potassium level.

Amlodipine is indicated in cats with systemic hypertension; this cat has a normal blood pressure.

Clavamox is an antibiotic often chosen for treatment of urinary tract infection if sensitive. This cat had a negative urine culture.

Calcitriol is recommended for some cats in CRF due to the inability of the kidneys to activate Vitamin D. **Calcitriol should not be used until the phosphorus is less than 6 mg/dL and used with extreme caution in cases where calcium is already elevated**. In such cases, the best indication for use of calcitriol is an elevated parathyroid hormone level, which could be elevated from secondary renal hyperparathyroidism.

Question

A 3-year old, male castrated domestic short-hair cat is presented to you for hematuria, strangiuria, and pollakiuria of 3 days duration. The cat has no other historical medical problems. What is the most likely diagnosis?

- Feline idiopathic cystitis (FIC)
- Transitional cell carcinoma
- Fanconi syndrome
- Bladder stones
- Bacterial urinary tract infection

Explanation - Also known as **FLUTD** or **FUS, FIC** is the most common cause of signs referable to the lower urinary tract in young, otherwise healthy cats. **Psychological stressors** and environmental factors play an important role in the pathophysiology of this disease.

Less than 2% of otherwise healthy cats under the age of 10 with lower urinary tract signs have primary bacterial UTI. Bladder stones are possible, but not nearly as common as FIC. While TCC is the most common bladder cancer seen in cats, it is still rare, and chiefly occurs in geriatric cats. Fanconi syndrome is a proximal tubular disease (most often seen in Basenjis) that does not cause lower-tract signs.

Question

A two-year old, castrated male, outdoor mixed-breed cat presented because he would posture to urinate and could not pass urine. The owners reported that the cat had vomited yellow foam twice in the last 2 hours. He had not eaten since he fell from the top of the refrigerator about 12 hours ago. Physical examination revealed a temperature of 97.8 F, weak femoral pulses and HR 140 bpm. The cat was estimated to be 8% dehydrated. There was a large subcutaneous hematoma throughout the inguinal and perineal area (see image). Urethral catheterization was unsuccessful. The urinary bladder was palpable, approximately half full with fluid. Radiographic examination of the abdomen found good abdominal contrast and a fluid-filled urinary bladder. Initial blood tests found:

BUN -120 mg/dl

Creatinine -8.0 mg/dl

K+ - 8.0 mEq/l

Na+ - 145 mEq/l

Venous blood gas: pH- 7.15; HCO₃⁻ 12 mEq/l; PCO₂ - 45 mmHg

Which of the following additional diagnostic tests are all indicated?



- Arterial blood pressure, urine culture, serum protein electrophoresis
- Electrocardiogram, retrograde urethrogram, coagulation panel
- Thoracic radiographs, blood glucose levels, thyroid hormone levels
- Intravenous pyelogram, urinalysis, bile acids levels
- Abdominal ultrasound, reticulocyte count, platelet count

Explanation - The cat's inability to urinate, severe azotemia, hyperkalemia and metabolic acidosis suggest a post-renal urinary tract obstruction. The retained urine in the bladder and unsuccessful catheterization as well as inguinal and perineal hematomas suggest urethral blockage or rupture rather than a bladder problem.

An electrocardiogram is indicated based on the cat's hyperkalemia and bradycardia to assess for arrhythmias. If present, the cat could be treated with either calcium gluconate or with regular insulin followed by glucose. Arterial blood pressure measurement is valid consideration as well.

A retrograde urethrogram with water soluble contrast media would outline a urethral stricture, rupture or blockage. If this does not reveal an abnormality, an intravenous pyelogram would highlight the urinary tract bilaterally. An ultrasound would direct further investigation into the kidneys, urinary bladder and other abdominal organs.

Assessment of the cat's coagulation profile is indicated due to the skin hematoma.

There is no indication in the cat's findings for a reticulocyte count, bile acids levels, thyroid hormone levels, or serum-protein electrophoresis.

Question

An 8-year old cat presents with lethargy, vomiting, fever, and decreased appetite. The owner states the cat has been drinking a lot of water the last 2 days. The bloodwork and urinalysis show the following:

ALT 28, BUN 68, creatinine 6.2, Phosphorus 7.0
urinalysis: USG 1.018, 3+ blood, 40+ leukocytes/hpf, 2+ rods

An ultrasound of the kidneys revealed decreased corticomedullary differentiation bilaterally; a 1mm hyperechoic region was identified on the left kidney at the level of the pelvis. There was moderate pyelectasia of the right kidney along with moderate hydronephrosis of the proximal ureter.

What is the most appropriate treatment plan?

- Aggressive IV fluid and antibiotic therapy after obtaining a urine culture
- Long-term administration of subcutaneous fluids at home by the owner and a diet change to a low-protein diet
- Oral antibiotic therapy after receiving urine culture and susceptibility results
- Heavy sedation to pass a urethral catheter to relieve the obstruction

Explanation - The cat's clinical and diagnostic findings are consistent with pyelonephritis of the right kidney. Pyelonephritis is a kidney infection resulting from an ascending urinary tract infection. It typically presents with the above symptoms, and the kidneys can even be painful on palpation. Aggressive IV fluid therapy and antibiotics are indicated as well as a urine culture prior to starting the antibiotics. Pyelonephritis is a very serious and potentially life-threatening infection. Therefore, sending the cat home to wait for culture results with antibiotics or subcutaneous fluids is not appropriate. The cat clearly does not have a urethral obstruction.

Question

A 2-year old MN DSH has recently been treated for a urethral obstruction. He went home last week from the hospital on an acidifying canned diet for this condition. The owner reports he is passing urine in moderate amounts, but he is still straining frequently. You re-examine the cat and find that the bladder is empty on palpation and the wall feels a little thickened. You are confident that

the cat has not re-blocked and the cat's bloodwork shows normal electrolytes and renal values. Which of the following medications may help the cat with this problem?

- Amitriptyline
- Prednisolone
- Phenylpropanolamine
- Methocarbamol
- Phenoxybenzamine

Explanation - This cat is likely suffering from **hypertonicity of urethral muscle**, which was incited from the recent obstruction and urinary catheter. This can cause spasms, which makes urinating painful and not easily controlled. **Phenoxybenzamine** can be used in this case to reduce internal urethral sphincter tone such that the cat may urinate more easily.

Methocarbamol is a muscle relaxant but would not directly help spasms of the urethra.

Prednisolone is not used to help reduce inflammation or spasms in the urethra and may predispose the cat to contracting a urinary infection, especially while his bladder and urethra are compromised. If an anti-inflammatory is warranted for discomfort, Meloxicam would be preferred but used with caution and only in pets with normal renal function.

Phenylpropanolamine is used to treat urinary incontinence from urethral hypotonicity most often in dogs and would be contraindicated in this case.

Amitriptyline is an anti-depressant medication that has been implicated as part of a treatment plan for cats with cystitis, although benefit has never been proven.

Question

Which of the following plants is potentially nephrotoxic to cats?

- Peace lily
- Calla lily
- Poinsettia
- Nasturtium
- Stargazer lily

Explanation - The **Stargazer lily** is a member of the Liliaceae family and is a severe nephrotoxicant in cats; a single exposure can cause severe acute renal failure. All parts of the plant are considered toxic to cats if bitten or ingested.

The toxicity of poinsettias is actually minimal, and is generally limited to oral irritation and/or mild gastrointestinal upset. Peace lily and Calla lily are not true lilies, and are not nephrotoxicants. Nasturtium is a common garden flower and is nontoxic, is actually edible, and has a peppery flavor.



Question

A 12-year-old female spayed domestic short hair cat presents to you for decreased appetite of 2-days duration. The owner reports that the cat is excited to be fed, but only finishes half of her meals. On physical exam, she has a body condition of 5 out of 9 and is 5% dehydrated based on decreased skin turgor. Blood work shows azotemia with a blood urea nitrogen of 120 mg/dL (normal 10-32 mg/dL), creatinine of 6.7 mg/dL (normal 0.5-2.2 mg/dL), and a urine specific gravity of 1.012. You and the owner are concerned about maintaining adequate nutrition in this cat. Besides treating the cat with intravenous fluids and anti-nausea medications, what is the next best step for addressing this cat's nutritional concerns?

- Administer prednisolone as an appetite stimulant
- Administer mirtazapine as an appetite stimulant
- Start partial parenteral nutrition
- Force feed any uneaten food
- Place an esophageal feeding tube

Explanation - Since this cat is still eating some of her meals, the best choice would be to treat the renal failure with **IV fluids, gastric protectants, and an appetite stimulant like mirtazapine**. Mirtazapine works by antagonizing central pre-synaptic alpha-2 receptors. By antagonizing these receptors, the negative feedback loop that inhibits the release of norepinephrine (NE) is shut down causing an increased buildup of NE. Norepinephrine then acts at other receptors to increase appetite. The drug also has antiemetic effects by inhibiting 5HT2 and 5HT3 receptors.

In this case, placement of an E-tube is premature since the cat is still eating. Additionally, the cat is not a good candidate for anesthesia since it is dehydrated and just diagnosed with renal failure.

Prednisolone is less effective as an appetite stimulant in cats relative to dogs. Additionally, since a cause for the renal failure has not been determined, it would be inappropriate to start a steroid without further testing.

Force feedings are not recommended since this cat is still eating part of her meals. Cats also quickly develop aversions to specific types of food when force fed.

Parenteral nutrition is also not indicated in this case since the cat is still eating part of her meals. Additionally, this form of nutrition is usually reserved for animals that will not tolerate being fed through the GI tract.

Question

A 3-year old female Persian cat presents for routine physical exam. The cat seems to be doing well at home and has no clinical signs. Abdominal palpation reveals bilaterally enlarged kidneys. Ultrasound exam shows multiple, large, fluid-filled structures in the parenchyma of the kidneys. What is the most likely diagnosis?

- Amyloidosis
- Polycystic kidneys
- Renal lymphoma
- Hydronephrosis

Explanation - The correct answer is polycystic kidneys. **Persian cats are predisposed to developing polycystic kidneys.** The cat in this question is not yet clinical for the disease. Renal lymphoma and amyloidosis would not typically show fluid-filled structures in the kidneys on ultrasound. Bilateral hydronephrosis would show dilatation of the renal pelves, not fluid-filled structures within the renal parenchyma.

Question

A client calls and says her cat was chewing on her lily plant two days ago and is now acting very sick. You tell her to bring the cat in immediately so that you can perform which of the following?

- BUN and creatinine levels
- Abdominal radiographs to diagnose intestinal obstruction
- ALT, AST, GGT, and total bilirubin levels
- Induce emesis and administer activated charcoal

Explanation - Lily plant toxicosis is extremely serious and can cause rapid and **fatal acute renal failure in cats.** If ingestion is suspected, decontamination and aggressive fluid therapy, and monitoring of renal values are recommended immediately. In this case, since 2 days have passed, inducing emesis and administering activated charcoal would not be helpful. What you can do is check renal values (BUN and creatinine) and treat for acute renal failure.

Ruling out an intestinal obstruction in a cat with this history is reasonable but not the best of the choices given.

Question

Which of the following is seen more commonly with acute renal failure than with chronic renal failure?

- Anemia
- Anuria
- Metabolic acidosis
- Hyperphosphatemia

Explanation - The correct answer is anuria. Hyperphosphatemia occurs in both acute and chronic renal failure. Anemia is seen in chronic renal failure due to decreased erythropoietin, shortened RBC lifespan, uremic inhibition of erythropoiesis, etc. Metabolic acidosis occurs in both acute and chronic renal failure from decreased bicarbonate production by the kidneys and from retention of metabolic acids.

Question

Tommy, a 4-year old male neutered domestic short hair, presents to you for frequent urination. Urinalysis reveals 4+ struvite crystals. An abdominal radiograph shows a 1 cm round calculus in the bladder. Tommy does not have a urethral blockage, and urine culture is negative. The owner says surgery to remove this stone is not an option due to finances. Which of the following would be the most important treatment for Tommy?

- Acidifying diet
- Potassium citrate
- Alkalinizing diet
- Clavamox
- Metacam

Explanation - This cat most likely has a struvite bladder stone. This cannot be determined without a stone analysis, but based on the signalment of the patient, the crystalluria, and the radiograph, this is the most likely type. These types of stones typically form in urine with a high pH. Therefore, an **acidifying diet** would be appropriate for stone dissolution.

Clavamox would only be indicated if this cat had a urinary tract infection sensitive to this antibiotic. This cat had a negative urine culture.

Metacam can be used short-term to help with pain and inflammation associated with the cystitis from this condition. This is not as important as treating the underlying cause of the disease and should be used with caution, since this can lead to renal damage in some cats. The manufacturer of

Potassium citrate is a supplement that can be given in addition to an alkalinizing diet to prevent the formation of calcium oxalate stones. This would be contraindicated in this case.

NB: Cats tend to have only two types of stones:

Calcium Oxalate (60%) (Only surgical management is possible – cannot be dissolved but may be prevented by using alkalinizing diet)

Struvite (40%) (Medical management is possible by acidifying the diet and increase water consumption)

Question

A 4-year old female Abyssinian cat presents to you with a complaint of weight loss and polyuria and polydipsia. On exam, the cat appears slightly underweight, but otherwise there are no significant findings.

You perform a complete blood count, chemistry panel, and urinalysis. The cat has a hematocrit of 27%, white blood cell count of 4,500/uL, and 350,000 platelets/uL. The chemistry panel shows Ca=10.5 mg/dL, P=3.5 mg/dL, bilirubin=0.1 mg/dL, albumin=2.7 g/dL, globulin=2.7 g/dL, ALT=50 IU/L, glucose=104 mg/dL, BUN=59 mg/dL, Creatinine=3.8 mg/dL, and cholesterol= 120 mg/dL. Urinalysis shows a specific gravity of 1.010 with no bilirubin, glucose, or ketones detected and trace protein.

You measure systolic blood pressure of 160 mmHg. Abdominal ultrasound shows subjectively small kidneys with increased renal echogenicity.

Due to the cat's young age and breed, you suspect an underlying hereditary condition to the cat's renal disease. The owner reports that the breeder she obtained the cat from promised her that the line was free of any genetic disorders. You explain to the owner that a kidney biopsy may be the only way to rule in or out this hereditary disease. What specific test should you recommend on the biopsy sample?

- Immunofluorescent staining for immune complexes
- Hematoxylin and eosin staining for polycystic regions
- Silver stain for type III collagen deposition
- Congo red staining for amyloid
- Trichrome staining for connective tissue

Explanation - Of the many forms of amyloidosis, reactive (secondary) systemic amyloidosis is seen in the cat as a familial disorder of the **Abyssinian, Siamese**, and Oriental Shorthair. Amyloid deposition occurs most frequently in the kidney (Abyssinian) and liver (Siamese and Oriental Shorthair) although other sites can be affected. Clinical signs in the Abyssinian are typically those of **chronic renal failure**. Hypertension may be secondary to glomerulotubular disease.

Renal or liver biopsies can confirm the diagnosis but are often unnecessary due to the risk of hemorrhage, and there may only be minimal change to therapeutic decision making. **Congo red** staining of biopsy samples should be requested because hematoxylin and eosin staining do not always show amyloid deposits.

Therapy consists of general management of the renal failure, proteinuria, hepatopathy, and

hypertension if they exist. There are reports of using dimethyl sulfoxide (DMSO) or colchicine for these cats as well.

Obviously, this cat should not be bred.

Question

Which of the following is true about doxorubicin used in cats?

- It causes sterile hemorrhagic cystitis
- It causes renal toxicity
- It causes neurotoxicity
- It commonly causes heart failure

Explanation - In cats, doxorubicin does not cause clinical problems with the heart as commonly as it does in dogs.

Its effects on the kidneys are generally thought to be more of a concern in cats.

Sterile hemorrhagic cystitis is caused by cyclophosphamide in dogs, but not in cats.

5-fluorouracil causes neurotoxicity in cats and should never be used in cats.

Question

You check blood gases on a cat in the intensive care unit with **renal disease**. They read as: PaCO₂= 28 (Normal 37 in dogs and 32 in cats), pH= 7.23, PaO₂=100, Base excess= - 8 (HCO₃ = 12 (Normal 24)). What can you conclude?

- The cat has primary respiratory alkalosis with compensatory metabolic acidosis
- The cat has a mixed respiratory and metabolic acidosis
- The cat has primary metabolic acidosis with compensatory respiratory alkalosis
- The cat has primary metabolic alkalosis with compensatory respiratory acidosis
- The cat has primary respiratory acidosis with compensatory metabolic alkalosis

Explanation - The correct answer is that the cat has primary metabolic acidosis with compensatory respiratory alkalosis. The low pH tells you the cat is acidemic so the primary disorder must be an acidosis because compensatory mechanisms will never overshoot the primary abnormality. In this case, the negative base excess or low HCO₃ tells us there is a metabolic acidosis (renal disease can cause this). The low PaCO₂ tells us there is a respiratory alkalosis or hyperventilation. The primary abnormality must be the metabolic acidosis. The respiratory alkalosis can then be interpreted as compensatory.

Question

A 2-year old indoor only male neutered domestic short haired cat presents for difficulty urinating. He is lethargic, weak, and vocalizing while frequently posturing to urinate. The owner states he has

been doing this since last night, only passing a very tiny amount of urine. Which of the following fluids will you choose once his urethral obstruction is relieved?

- 0.9% Saline with 20 meq/L Potassium supplementation
- Hetastarch
- Lactated ringers with 16 meq/L Potassium supplementation
- 0.9% sodium chloride

Explanation - The most common electrolyte disturbance from a urethral obstruction is **hyperkalemia**. This occurs from an impaired urinary excretion of potassium. This can cause life-threatening arrhythmias and needs to be quickly addressed, especially if potassium exceeds 7 mEq/L. **0.9% Sodium chloride** is the fluid of choice to treat this disturbance. If this fluid is not available, then Lactated Ringer's would be a good alternative due to the low potassium concentration in those fluids. In extreme cases, **dextrose** may need to be added to the fluids because this stimulates **insulin** secretion and helps to move the potassium intracellular. **Sodium bicarbonate** and **calcium gluconate** can also help this shift of potassium in extreme cases.

Question

Which of the following can be treated with enalapril?

- Acute renal failure
- Protein-losing nephropathy
- Hypotension
- Protein losing enteropathy

Explanation - Enalapril is an angiotensin-converting enzyme (ACE) inhibitor used as a vasodilator, antihypertensive agent, and heart failure treatment. It works by preventing the conversion of angiotensin I to angiotensin II, thus reducing aldosterone concentrations and causing diuresis. Its dilatory effects on the efferent arterioles of glomeruli help to palliate **protein losing nephropathies**. It is often used in conjunction with diuretics.

Question

A 3-year old male domestic shorthair cat presents for a two day history of lethargy, vomiting and vocalizing progressing to recumbency. On initial evaluation, heart rate is 100 bpm, pulse quality is poor, mentation is obtunded, and there is a large firm bladder on abdominal palpation. An intravenous catheter is placed. Which of the following is the most immediately life-saving intervention?

- IV administration of calcium gluconate
- IV administration of a balanced electrolyte solution
- IV administration of sodium bicarbonate
- Placing a urinary catheter to relieve urethral obstruction
- IV administration of dextrose

- IV administration of regular insulin

Explanation - **Calcium gluconate** will serve to immediately counter the effects of hyperkalemia-induced bradycardia and cardiovascular collapse in this cat with a most-likely diagnosis of urethral obstruction. The other interventions will help to reduce the level of potassium and could be a part of therapy but may not take effect rapidly enough to address the most life-threatening component of the cat's illness.
