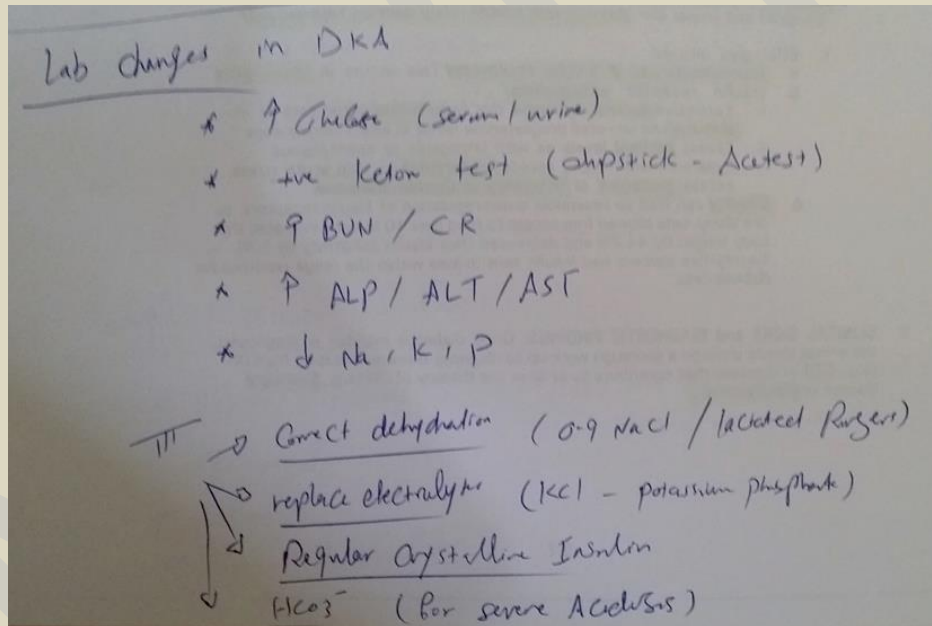


Question

What is the primary goal in the initial treatment of diabetic ketoacidotic dogs?

- Getting the animal to eat
- Correction of acidosis, electrolyte abnormalities, and hyperosmolality
- Controlling obesity or concurrent disorders causing insulin resistance
- Lowering the elevated blood glucose

Explanation - The correct answer is correction of acidosis, electrolyte abnormalities, and hyperosmolality. Initial treatment of DKA patients is aimed at correcting acidosis by administering bicarbonate (if the total bicarbonate is markedly low), correcting electrolyte abnormalities with IV fluids, potassium and phosphorus supplementation, and correction of hyperosmolality. Regulating blood glucose, getting the animal to eat, controlling obesity and concurrent disease should be addressed after immediate life-threatening issues are resolved.



Question

A 6-year old male castrated Borzoi dog presents to you with a one-year history of polyuria and polydipsia with no other clinical signs. A urinalysis confirms a specific gravity of 1.003 and no other abnormalities. Serum chemistry shows Ca=10.1 mg/dL, P=3.2 mg/dL, bilirubin=0.1 mg/dL, albumin=2.9 g/dL, globulin=2.5 g/dL, ALT=40 IU/L, glucose=104 mg/dL, BUN=8 mg/dL, Creatinine=0.6 mg/dL, and cholesterol=120 mg/dL.

You tentatively diagnose central diabetes insipidus and elect to try the dog on desmopressin (DDAVP) to see if the PU/PD resolves. Which of the following reasons best explains why you might not see a response within the first 24-48 hours, even if your diagnosis is correct?

- It may take up to 3 days to overcome medullary washout from being polyuric and polydipsic
- It may take up to 3 days to reactivate the antidiuretic hormone (ADH) receptors in the kidneys
- It takes a few days for the hypothalamus to respond to DDAVP and to start making antidiuretic hormone (ADH)
- Trauma to the hypothalamus or pituitary causing CDI will never respond to antidiuretic hormone (ADH)

Explanation - The correct answer is it may take up to 3 days to overcome medullary washout from being polyuric and polydipsic. DDAVP is a synthetic ADH used to replace the lacking endogenous hormone. DDAVP does not induce the hypothalamus to make ADH. Medullary washout commonly occurs with CDI from prolonged PU and PD. It may take up to 3 days to get the medullary sodium concentration and concentrating mechanisms back in order. ADH receptors in the kidneys are not affected in CDI.

Question

A 6-year old female spayed English Pointer presents for lethargy and weight gain. The owner notes that the dog is eating and drinking a normal amount, but the dog is still gaining weight. A physical exam reveals weak pelvic limbs, facial nerve paralysis, a symmetrically patchy haircoat, and seborrhea. Lab work reveals a normocytic, normochromic anemia with a PCV of 29%, lipemic serum, and cholesterol of 1090 mg/dl. What is the most likely diagnosis?

- Adrenal dependent hyperadrenocorticism
- Pituitary dependent hyperadrenocorticism
- Hyperthyroidism
- Hypothyroidism

Explanation - The correct answer is hypothyroidism. The clinical signs, physical exam findings, and lab work abnormalities are classical for hypothyroidism. Other common abnormalities seen with hypothyroidism include pyoderma, neuromuscular signs (ataxia, knuckling, vestibular signs, etc), markedly elevated triglycerides, and a mild normocytic, normochromic anemia. Hyperthyroidism rarely occurs in dogs. You would expect to see polyuria, polydipsia, and polyphagia with hyperadrenocorticism.

Question

A 7-year old female spayed Golden Retriever that you suspect has Addison's disease has bloody diarrhea, inappetance, and is dehydrated. What should be your next step?

- Give Lysodren

- Give IV dexamethasone and subcutaneous fluids
- Run a chemistry panel and perform an abdominal ultrasound.
- Start aggressive IV fluid therapy and run a chemistry panel

Explanation - The correct answer is start aggressive IV fluid therapy and run a chemistry panel. Addisonian patients often present in hypovolemic shock, so the first step to treating this dog is to restore vascular volume with IV fluids and to run a chemistry panel to check the extent of electrolyte abnormalities (**hyponatremia, hyperkalemia, and elevated BUN**). IV dexamethasone would not take precedence over restoring vascular volume, and subcutaneous fluid treatment is not aggressive enough for treatment of hypovolemia. Abdominal ultrasound would not be a priority in this case but could eventually be helpful in ruling in/out other differentials.

Lysodren is used for treating hyperadrenocorticism. One possible complication of Lysodren treatment is to make a dog Addisonian, which often causes the animal to present with the signs described as in the question.

Question

Which of the following are Addisonian dogs usually deficient in?

- Glucocorticoids only
- Estradiol only
- Epinephrine only
- Mineralocorticoids only
- Both glucocorticoids and mineralocorticoids
- Epinephrine and estradiol

Explanation - Primary hypoadrenocorticism is caused by destruction or atrophy of all layers of the adrenal cortex, causing a deficiency in both types of corticosteroids. Remember, mineralocorticoids come from the zona glomerulosa, and glucocorticoids come from both the zona fasciculata and zona reticularis.

The less common form of hypoadrenocorticism is caused by inadequate ACTH production by the pituitary and results in a deficiency of glucocorticoids only.

Question

A 5-year old female Golden Retriever presents for lethargy, dark runny stool, and dehydration. Bloodwork from yesterday showed markedly elevated plasma endogenous ACTH levels, $K^+ = 6.2$, $Na^+ = 135$, $BUN = 62$ mg/dl. Long-term maintenance therapy for this patient should most likely include:

- Mineralocorticoid, glucocorticoid, and NaCl supplementation
- IV fluids and daily doses of IV dexamethasone sodium phosphate
- Supplementation with physiologic doses of prednisone
- Mineralocorticoid supplementation alone

Explanation - The correct answer is mineralocorticoid, glucocorticoid, and NaCl supplementation. This dog has hypoadrenocorticism which is usually a deficiency in both glucocorticoids and mineralocorticoids. Elevated endogenous plasma ACTH concentrations with hypoadrenocorticism means the disease is due to **primary adrenocortical insufficiency** and failure to produce both types of corticosteroids (as opposed to secondary adrenocortical insufficiency, when Decreased ACTH production leads to a deficiency in cortisol secretion but not mineralocorticoid secretion). Maintenance treatment of this disease includes supplementation with mineralocorticoids (e.g. Fludrocortisone acetate), glucocorticoids (e.g. Prednisone), and sodium chloride in the diet. IV fluids and dexamethasone sodium phosphate is used in an acute crisis.

Question

What is the average water intake of a normal dog versus a dog with Cushing's?

- Normal: 10-60 ml/kg/day; Cushing's: 80-100 ml/kg/day
- Normal: 100-115 ml/kg/day; Cushing's: 120-145 ml/kg/day
- Normal: 50-75 ml/kg/day; Cushing's: 150-200 ml/kg/day
- Normal: 20-40 ml/kg/day; Cushing's: 50-60 ml/kg/day

Explanation - The correct answer is Normal: 10-60 ml/kg/day. Cushing's: 80-100 ml/kg/day. Water intake can be highly variable in both normal and dogs with Cushing's. There may be some overlap in what is considered normal and what is considered polydipsic.

Question

Which of the following tests can be used to differentiate pituitary-dependent hyperadrenocorticism from an adrenal tumor causing hyperadrenocorticism in dogs?

- Low-dose dexamethasone suppression test
- Resting cortisol level
- Urine cortisol:creatinine
- ACTH stimulation test

Explanation - The correct answer is low-dose dexamethasone suppression test. Tests used to try to differentiate PDH from an adrenal tumor include LDDST, HDDST, abdominal ultrasound, and

endogenous plasma ACTH assay. With hyperadrenocorticism patients, LDDST and HDDST results show elevated cortisol levels at the 8-hour post-dexamethasone administration sample (normal animals would show suppressed cortisol levels at the 8-hour sample). PDH patients will show brief cortisol suppression at the 4-hour post-dexamethasone sample on some LDDST and HDDST tests. Patients with adrenal tumors causing Cushing's will not exhibit suppression of cortisol levels at the 4-hour post-sample. Although no patients with adrenal tumors should show suppression at the 4-hour post-sample, some PDH patients will not show cortisol suppression at the 4-hour post-sample either. Just as a recap, you look at the 8-hour post-dexamethasone sample to determine if the patient has Cushing's or not (should be elevated with Cushing's), and you look at the 4-hour post-sample to try and differentiate if the patient has PDH (will show cortisol suppression) or if you cannot determine if the patient has PDH or an adrenal tumor (no cortisol suppression).

Question

What are the most common clinical signs seen with canine hypothyroidism? What is the prognosis?

- PU/PD, weight loss, increased appetite, hyperactivity. Prognosis fair, continued therapy needed.
- Weight gain, alopecia, pyoderma, lethargy. Prognosis good, continued therapy required.
- PU/PD, weight gain, alopecia, pendulous abdomen. Prognosis poor, continued therapy required.
- Lethargy, panting, weight gain, alopecia. Prognosis excellent, medications needed short term.

Explanation - Loss of thyroid hormone affects a wide range of systemic physiology, but clinical manifestations most commonly include weight gain due to slower metabolism, skin diseases ranging from alopecia to pyoderma, hyperkeratosis, and lethargy due to decreased energy levels.

Remember: with hypothyroidism dogs become fat, lazy, heat seeking missiles of skin disease.

Prognosis is very good for hypothyroidism as long as owners are compliant. Supplementing with levothyroxine orally for the rest of the animal's life is necessary, with periodic monitoring of serum thyroid levels.

Question

Which value is not usually increased in canine hyperadrenocorticism?

- SAP (serum alkaline phosphatase)
- ALT (alanine amino transferase)
- Blood urea nitrogen
- Serum cholesterol

Explanation - The correct answer is blood urea nitrogen (BUN). BUN is usually low in patients with hyperadrenocorticism secondary to the increased diuresis that occurs with elevated cortisol levels. ALT increases due to swelling and death of some hepatocytes. SAP increases due to a steroid induced isoenzyme of SAP from the liver. Mild cholestasis due to swelling of hepatocytes also contributes to a minor part of the increase in SAP. Cholesterol is elevated in up to 90% of hyperadrenocorticism cases.

Question

Which is not a consequence of insulin deficiency in diabetes mellitus in a dog?

- Weight gain leading to obesity
- Hepatic lipidosis and ketosis
- Increased mobilization of fat
- Increased hepatic gluconeogenesis
- Impaired energy utilization

Explanation - The correct answer is weight gain leading to obesity. Insulin deficiency causes weight loss, not weight gain. An insulin-deficient dog is essentially starving the cells of its body. Its energy utilization is impaired because it can't import glucose into its cells. In response to the decreased energy in the body's cells, the liver upregulates gluconeogenesis and glycogenolysis, exacerbating the hyperglycemia. The mobilization of fat is increased to supply the body with an alternative energy source. As adipocytes are broken down, the resulting free fatty acids are imported to the liver where they are converted to energy, triglycerides (which are stored in the liver causing hepatic lipidosis), and ketones (causing ketosis).

Question

A 7-year old, male, castrated shepherd mix presents for polyuria and polydipsia. The physical exam reveals a body condition score of 4/9 and 5% dehydration. The urine specific gravity is 1.006. The urinalysis, chemistry panel, and CBC are otherwise unremarkable. Which of the following is the most likely diagnosis?

- Chronic renal failure
- Fanconi syndrome
- Diabetes mellitus
- Central diabetes insipidus

Explanation - The correct answer is central diabetes insipidus.

Diabetes mellitus is ruled out with normal blood glucose on the chemistry panel and lack of glucose in the urine on the urinalysis. Chronic renal failure is ruled out because there is no azotemia on the chemistry panel. Fanconi syndrome usually occurs in Basenjis and is ruled out because there is no glucose in the urine.

Question

A 9-year old male neutered American Eskimo presents for progressive hair loss along his sides. The areas of alopecia are smooth with no crusts or scales and he is not pruritic. You performed an ACTH stimulation test and did an adrenal sex profile both of which were normal. Thyroid tests were also normal. The owners declined a skin biopsy. You suspect Alopecia X in this patient. The owner would like to know if there is an over-the-counter medication that may potentially help with hair regrowth. You suggest that she could try which of the following supplements?



- Milk thistle
- Zinc
- Melatonin
- Vitamin A

Explanation - It is unknown what exactly causes Alopecia X, but it has been shown to be genetic. Nordic breeds and Pomeranians are most commonly affected. Alopecia X causes an arrest of the hair cycle. Some dogs will regrow hair following neutering of the male dog or spaying of the female dog thus named (**Castration-Responsive Alopecia**). Therefore, this is usually recommended first. You need to give the coat a few months to see if it will regrow before proceeding with other treatments. Another treatment that works in about 30-40% of dogs is **oral melatonin**. This can be purchased over-the-counter.

Husky dogs can get zinc responsive dermatosis, which would be treated with zinc. Milk thistle is used as a supplement for dogs with liver disease. Hypovitaminosis A is more common in birds fed a seed only diet and can cause lesions in the eyes and mouth and may cause respiratory symptoms.

Question

Which of the following is true of canine hypothyroidism?

- It more commonly occurs in older, large breed dogs
- It causes a voracious appetite leading to weight gain
- It can cause calcinosis cutis
- It causes thinning and increased fragility of skin

Explanation - The correct answer is it more commonly occurs in older, large breed dogs. Canine hypothyroidism can cause many skin changes including hyperpigmentation, alopecia, pyoderma, and seborrhea, but thinning and increased fragility of the skin does not occur. This is more consistent with hyperadrenocorticism, or Cushing's disease. Calcinosis cutis is also a clinical sign of Cushing's disease. Weight gain does occur with hypothyroidism due to a slower metabolism. Affected animals usually do not have a voracious appetite.

Question

You suspect a canine patient to be hypothyroid. The total T4 levels are equivocal for hypothyroidism. Which test should you perform next?

- Free T4 by equilibrium dialysis
- Thyroid biopsy
- T3
- Free T4 by radioimmunoassay
- Reverse T3

Explanation - The correct answer is **free T4 by equilibrium dialysis**. Free T4 is the thyroid hormone not bound to plasma proteins and can enter cells. Its measurement gives a more consistent assessment of thyroid function than total T4. The equilibrium dialysis method of measuring free T4 is more accurate than radioimmunoassay. Measurement of T3 in hypothyroid dogs can often be high, low, or normal, and thus difficult to interpret.

Question

You perform a low-dose dexamethasone suppression test on a dog you suspect has Cushing's syndrome. The 4-hour blood cortisol level and 8-hour blood cortisol level are approximately equally elevated above the normal range. What can you conclude from this information?

- The dog has pituitary-dependent hyperadrenocorticism
- The dog has a cortisol-secreting adrenal tumor
- The dog has iatrogenic Cushing's syndrome

- A high-dose dexamethasone suppression test could help differentiate pituitary vs. adrenal dependent hyperadrenocorticism

Explanation - The correct answer is you should run a high-dose dexamethasone suppression test. Elevated blood cortisol concentration 4 hours and 8 hours post low-dose dexamethasone administration does not allow differentiation between PDH and a cortisol secreting adrenal tumor. Dexamethasone is more rapidly metabolized in dogs with either type of hyperadrenocorticism (approximately 4 hours to metabolize as opposed to 30 hours in normal dogs). In PDH animals, the 4-hour post-cortisol concentration may sometimes be suppressed, whereas cortisol from adrenal tumors will not be suppressed after administration of a low dose of dexamethasone. A high-dose dexamethasone test will suppress a larger percentage of PDH patients (up to 75% will be suppressed, showing a decrease in cortisol after 4 hours). Less reliable tests to differentiate PDH from an adrenal tumor include endogenous plasma ACTH concentration or abdominal ultrasound.

Question

Which of the following is not a classic bloodwork finding for a dog with hypoadrenocorticism?

- Anemia
- Hyponatremia
- Azotemia
- Hypoglycemia
- Hyperkalemia

Explanation - The correct answer is hypernatremia. The classic laboratory finding for an Addisonian includes hyponatremia, hyperkalemia, azotemia, anemia, acidosis, hypoglycemia, and of course a low resting cortisol level or low ACTH stimulation test result.

Question

Which is not a common treatment option for dogs with hyperadrenocorticism?

- Pituitary surgery
- Adrenalectomy
- Ketoconazole
- o,p'-DDD (Lysodren or Mitotane)

Explanation - The correct answer is pituitary surgery. Pituitary surgery is the most common mode of treatment in humans with hyperadrenocorticism, but it is rarely performed in dogs. Adrenalectomy is a dangerous surgery, but it is often performed with adrenal tumors causing adrenal dependent hyperadrenocorticism. **Lysodren** is essentially the insecticide DDT. It is commonly used to treat PDH and causes selective necrosis of the zona fasciculata and zona

reticularis. **Ketoconazole** inhibits production of all steroids and is used as a medical treatment option for functional adrenal tumors.

Question

The dog in the picture presents with a history of polyuria, polydipsia, weight loss, and the ocular changes seen in the photograph. Which treatment will be most appropriate for the dog's likely underlying disease?



- Insulin
- Methimazole
- 0.9% sodium chloride
- Thyroxine

Explanation - Diabetes mellitus is the most likely diagnosis. The 4 classic signs of DM are polyuria, polydipsia, polyphagia, and weight loss. The dog in this picture has bilateral cataracts. **Diabetic cataracts** will occur in most dogs within 6-12 months of diagnosis of diabetes mellitus despite therapy. Diabetic cataracts do not occur in cats.

Insulin is the best answer for treatment of diabetes as thyroxine and methimazole are treatments for hypothyroidism and hyperthyroidism respectively. A sodium chloride infusion could be indicated for a patient presenting with diabetic ketoacidosis, but based on the history, this appears to be a stable diabetic.

Question

Which of the following statements is true regarding a 6-year old Cocker Spaniel that has polyuria, polydipsia, and blood glucose consistently around 160 mg/dl?

- A urinalysis should be run and will likely show large amounts of glucose and ketones in the urine.

- The dog has diabetes mellitus. The polyuria is caused by osmotic diuresis of glucose spilling into the urine, and the polydipsia is secondary to the polyuria.
- The dog has diabetes mellitus. The polyuria is caused by the kidneys being refractory to antidiuretic hormone. The polydipsia is secondary to the polyuria.
- The polyuria and polydipsia are not likely caused by diabetes mellitus. Further diagnostic tests should be pursued to look for the cause of polyuria and polydipsia.

Explanation - The correct answer is that PU and PD are not likely caused by diabetes mellitus. In a dog with normal kidneys, glucose does not begin to spill into the urine until the blood glucose is around 180 mg/dl. In a cat, glucose does not begin to spill into the urine until the blood glucose reaches between 200-280 mg/dl. Another cause for the PU, PD should be sought in this patient. When the blood glucose is high enough to spill into the urine, the polyuria seen is caused by an osmotic diuresis resulting from the osmotic pull of the glucose in the urine. The kidneys are not refractory to antidiuretic hormone with DM.

Question

Which of the following is not a common problem leading to poor glycemic control in dogs with diabetes mellitus?

- Concurrent disease such as infections or hormonal disorders
- Inappropriate storage, handling, or administration of insulin
- Hypoglycemia due to owners giving too much insulin, or administering insulin when the animal is not eating
- Continuous deposition of amyloid in pancreatic islets

Explanation - The correct answer is continuous deposition of amyloid in pancreatic islets. **Amyloid deposition is a cause for DM in cats but does not change the effectiveness of insulin therapy.** DM in dogs is not caused by amyloid deposition. Owners will commonly overdose their animals by administering additional insulin than what was prescribed or administering insulin when the animal has not eaten. Improper storage, handling, and administration are other common causes of ineffective insulin therapy. Concurrent diseases such as infection, hyperadrenocorticism, and pancreatitis can commonly cause increased insulin resistance.

Question

A dog presents to you with suspected hyperadrenocorticism. You would like to try to diagnose and differentiate between pituitary dependent and adrenal dependent hyperadrenocorticism with one test. Which of the following tests for hyperadrenocorticism is primarily a screening test, but can also be a differentiating test?

- ACTH stimulation test
- Urine cortisol:creatinine ratio (UCCR)
- Endogenous ACTH level
- High dose dexamethasone suppression test
- Low dose dexamethasone suppression test

Explanation – The correct answer is low dose dexamethasone suppression test. The 8-hour post-dexamethasone sample is used to determine if the pet has hyperadrenocorticism. If the 8-hour sample is above 1.4 ug/dL, the test is diagnostic for hyperadrenocorticism (either pituitary dependent or adrenal dependent). If the 4-hour sample is below 1.4 ug/dL or less than half of the baseline value, it is diagnostic for pituitary dependent hyperadrenocorticism.

The UCCR is a screening test to rule out hyperadrenocorticism, if it is normal. The endogenous ACTH level and high dose dexamethasone suppression tests are differentiating tests only. An ACTH stimulation test is a screening test but cannot differentiate pituitary versus adrenal dependent hyperadrenocorticism.

Question

What test should be run to monitor the efficacy of treatment for an Addisonian dog being treated with supplemental mineralocorticoids and glucocorticoids?

- Urine cortisol creatinine ratio
- Serum chloride and phosphorus
- Serum sodium and potassium
- ACTH stimulation test
- Resting cortisol level

Explanation - The correct answer is serum sodium and potassium. Addisonian patients deficient in mineralocorticoids will usually exhibit the classic findings of hyponatremia and hyperkalemia. Monitoring serum sodium and potassium concentration while treating with exogenous mineralocorticoids is the best way to determine if the level and frequency of dosage is adequate for the patient.

An ACTH stimulation test can be used to monitor the efficacy of treatment of a patient with Cushing's disease, but does nothing for an Addisonian.

Question

An 8 year old, 5kg, female spayed West Highland Terrier has presented to your hospital with a history of right hind limb lameness. Previously she had a left extracapsular repair performed on her left stifle. The owners note that she was playing with their new dog and then yelped and has now been limping without major improvement for the past 3 weeks. She is also Addisonian. She receives an injection every 28 days (owners can't remember medication name) and she is also on 1.25 mg of prednisone once per day.

On examination there is tibial thrust and cranial drawer elicited on the right hind limb. The owners have consented to surgical repair this afternoon. What is the best method of dealing with her Addison's disease given that she is going to have surgery?

- Give a dose of dexamethasone SP that is equivalent to 1mg/kg of prednisone prior to surgery followed by a dose of dexamethasone SP that is equivalent to 0.5mg/kg of prednisone the following day
- Give a dose of flucortisone (Florinef) prior to surgery and monitor electrolytes perioperatively
- Give a dose of dexamethasone SP that is approximately 5 times the physiologic dose of prednisone before surgery followed by twice the regular dose of prednisone the following day
- Beginning the day of surgery wean the patient off of prednisone until the patient is two weeks out from surgery

Explanation - Patients with Addison's disease have hypoadrenocorticism. This means that the patient is not producing an adequate amount of glucocorticoids. During times of stress Addisonian patients require additional amounts of glucocorticoids or else they are at risk of going into a crisis. The exact amount of additional glucocorticoid to administer is not known but it is generally accepted that patients should receive 2-10 times a physiologic dose of prednisone. The physiologic dose of prednisone is considered by many to be 0.1 mg/kg/day but there is some variation depending on the source. Therefore the best answer is to give a dose of dexamethasone that is approximately 5 times the physiologic dose of prednisone followed by twice the regular dose of prednisone the following day.

Question

Which of the following is true about post-operative care in a dog that had a parathyroid adenoma removed?

- The patient is less likely to be hypocalcemic post-operatively if the patient's pre-operative serum calcium is markedly high.
- Serum calcium post-operatively should be kept below the normal range to stimulate the production of PTH from the atrophied chief cells of the normal parathyroid tissue.

- Post-operative care is minimal and requires checking serum calcium once a week for one month.
- The patient's serum calcium should be monitored daily for about a week to check for the development of hypocalcemia.
- It is most important to monitor serum calcium post-operatively to make sure the patient does not continue to be hypercalcemic.

Explanation - The correct answer is the patient's serum calcium should be monitored daily for about a week to check for the development of hypocalcemia. Post-operatively, it is important to monitor for hypocalcemia daily for the first seven days regardless of the absence of clinical signs for hypocalcemia. The higher the pre-operative serum calcium concentration, the more likely the patient will become hypocalcemic post-operatively. Post-operative monitoring of serum calcium should be **daily for the first seven days, then weekly for 4 weeks**. Vitamin D and calcium supplementation should be given accordingly. Serum calcium concentration should be maintained in the low normal range, not below normal, to stimulate production of PTH by the parathyroid cells.

Question

A 4-year old female Cocker Spaniel presents to you for vomiting. Abdominal radiographs are within normal limits.

A complete blood count and serum chemistry panel shows the following: Hematocrit-49%, White Blood Cell Count- 9,000 cells/uL, 4,000 neutrophils/uL, 3,000 lymphocytes/uL, 500 monocytes/uL, 1,500 eosinophils/uL, 0 basophils/uL, 275,000 platelets/uL. BUN-70 (high), Creatinine-2.9, Na-132 (low), K-6.7 (high), Cl-96 (low), Ca-13.1(high), Phosphorus-5.8, ALT-60, AST-45, ALP-33, Cholesterol-178, Albumin-3.2, Globulin-2.6, Glucose-69. A fecal flotation is negative.

What test would you recommend next?

- Insulin levels
- ACTH stimulation test
- Trypsin-like immunoreactivity
- Low-dose dexamethasone suppression test
- Gastroduodenoscopy and biopsy

Explanation - The correct answer is ACTH stimulation test. The dog described has classic bloodwork findings consistent with hypoadrenocorticism (Addison's disease). She is also **a middle-aged female**, which is the most commonly affected signalment, and has signs consistent with this disease.

The findings of the **absence of a stress leukogram** and an **eosinophilia** are seen due to the lack of cortisol. Hypercalcemia can be seen with Addison's. **Prerenal azotemia** is common.

The **Na:K ratio** is 19.5. Addisonians will typically have ratios of less than about 23. With the negative radiographs and fecal float, Addison's is by far the most likely cause of this dog's signs. An ACTH stimulation test is the gold standard for confirming the diagnosis.

Question

Administration of which of the following would not adversely affect the results of an ACTH stimulation test?

- Cortisone
- Flucortisone acetate
- Prednisone
- Prednisolone
- Dexamethasone

Explanation - The correct answer is dexamethasone. Administration of dexamethasone or desoxycorticosterone acetate (DOCA) prior to ACTH stimulation test does not confound the test results. Administration of prednisone, cortisone, prednisolone, and flucortisone acetate would show false elevations in test results.

Question

You are seeing a dog that you suspect has iatrogenic Cushing's disease from high-dose prednisone administration. What would you expect on blood samples submitted for ACTH and cortisol levels submitted to a commercial lab?

- ACTH high, cortisol high
- ACTH low, cortisol low
- ACTH low, cortisol high
- ACTH high, cortisol low

Explanation - The correct answer is ACTH low, cortisol high. Prednisone is a synthetic corticosteroid that cross reacts with assays measuring endogenous cortisol levels, causing an artificially elevated cortisol measurement on blood tests. The feedback mechanism on the pituitary gland inhibits ACTH production, making it low.

Question

Which of the following can be associated with low calcium on a chemistry panel but does not typically result in clinical signs of hypocalcemia in dogs?

- Renal disease

- Eclampsia
- Phosphate enema toxicity
- Hypoproteinemia

Explanation - The correct answer is **hypoproteinemia**. The calcium measured on a chemistry panel is the protein-bound calcium which will appear low if the animal is hypoproteinemic. The ionized calcium in a hypoproteinemic animal should not be low that clinical signs for hypocalcemia occur. The remaining answer choices cause an actual decrease in ionized calcium, causing clinical signs of hypocalcemia.

Question

Which statement is true regarding vasopressin (anti-diuretic hormone or ADH) and central diabetes insipidus in dogs?

- The patient's urine specific gravity is usually 1.015-1.020.
- The production and release of ADH (vasopressin) is controlled by serum osmolality and blood volume in a normal dog.
- The kidneys are not responsive to ADH.
- The patient's hypothalamus and posterior pituitary produces and releases too much ADH.

Explanation - The correct answer is the production and release of ADH (vasopressin) is controlled by serum osmolality and blood volume in a normal dog. With central diabetes insipidus, the patient has a problem with the function of the hypothalamus (ADH production) and/or neurohypophysis/posterior pituitary (ADH release) so the patient cannot respond to the changes in serum osmolality or blood volume and pressure. The urine specific gravity of a CDI patient is usually 1.001-1.007. The kidneys have no problem responding to ADH in CDI patients. There is a lack of the hormone, not over-abundance.

Question

A 5-year old male mixed breed dog presents with polyuria, polydipsia, polyphagia, and weight loss. The most likely diagnosis is _____.

- Diabetes mellitus
- Hypothyroidism
- Exocrine pancreatic insufficiency
- Hyperadrenocorticism

Explanation - The correct answer is diabetes mellitus. Diabetes mellitus is the most likely diagnosis of those listed above. The 4 classic signs of DM are PU, PD, PP, and weight loss.

EPI patients have PP and weight loss but are not PU and PD. Hyperadrenocorticism patients have PU, PD, and PP, but do not lose weight. None of the clinical signs described are consistent with hypothyroidism in a dog.

Question

You are presented with a 4-year old Springer Spaniel patient with acute onset non-weight-bearing lameness in the right hind limb, and you cannot feel a femoral pulse in that leg. You suspect thromboembolic disease and would like to search for an underlying cause. Which of the following disorders is NOT associated with an increased risk of thromboembolism?

- Sepsis
- Immune-mediated hemolytic anemia
- Neoplasia
- Hyperadrenocorticism
- Idiopathic epilepsy

Explanation - There has been no association between idiopathic epilepsy and increased risk of thromboembolism. The other 4 disorders listed are associated with an increased risk of thromboembolism. Pulmonary thromboembolism is the most common site for thromboembolic disease. In this patient, the thrombus is likely lodged at the iliac bifurcation, causing obstruction of blood flow distal to the site of impaction.

Question

You have a 6-year old female spayed Golden Retriever patient with inappetence and vomiting. You diagnose diabetic ketoacidosis based on a blood glucose of 641 mg/dL, 3+ glucose and 3+ ketones in the urine, and blood pH of 7.12. You would like to treat with the shortest acting, most potent insulin type. Which of the following would you choose?

- NPH
- Ultralente
- PZI
- Regular
- Lente

Explanation - Listed from shortest acting and most potent to longest acting and least potent: Regular, NPH, Lente, PZI, Ultralente. The treatment of DKA involves IV fluids and regular insulin, given either by CRI or the intermittent IM dosing technique. Regular insulin is continued until the patient is eating well and is hydrated, and can be switched to a longer-acting insulin, to be given SQ at home.

Question

The best diagnostic test to differentiate pituitary dependent hyperadrenocorticism from adrenal dependent hyperadrenocorticism in dogs is which of the following?

- Low-dose dexamethasone suppression test
- Urine cortisol: creatinine ratio
- Serum cortisol
- High-dose dexamethasone suppression test

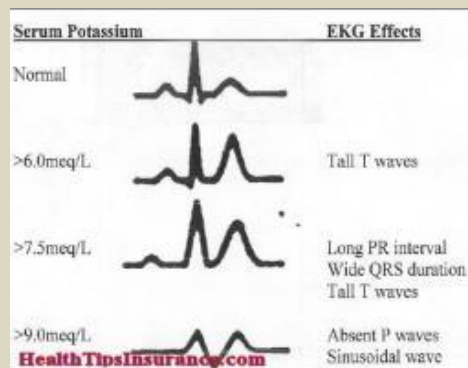
Explanation - The correct answer is high-dose dexamethasone suppression test. HDDST will suppress cortisol secretion in about 75% of PDH patients 3-6 hours post dexamethasone administration. Cortisol secretion does not become suppressed with dexamethasone administration with adrenal dependent hyperadrenocorticism. If cortisol secretion is suppressed with a HDDST, PDH is diagnosed. If cortisol is not suppressed, there is a 50-50 chance that the hyperadrenocorticism is due to PDH or an adrenal tumor.

Question

A 7-year old female Standard Poodle presents to you for acute onset of vomiting and weakness after the owners returned from vacation. On physical exam, you estimate that the dog is 7% dehydrated, has a respiratory rate of 36 breaths per minute, heart rate of 64 beats per minute and temperature of 99 degrees F. You quickly attach ECG leads and expect to see which of the following abnormalities?

- Ventricular tachycardia
- No P waves
- Tall, narrow QRS complexes
- Inverted T waves

Explanation - Based on the history and the physical exam findings of dehydration and bradycardia, you should be concerned about hypoadrenocorticism. Hypoadrenocorticism patients are typically hyperkalemic. ECG abnormalities with hyperkalemia include wide, flat, or absent P waves, widened QRS complexes, tall spiking T waves, and bradycardia.



Question

Which of the following is the least important factor in managing a dog with diabetes mellitus?

- Insulin therapy
- Regular exercise
- Minimizing the amount of insulin antibodies
- High fiber, low calorie diet

Explanation - The correct answer is minimizing the amount of insulin antibodies. The formation of insulin antibodies does not typically occur in dogs and is rare in cats. Insulin therapy is the mainstay for immediate regulation of blood glucose. High-fiber diets delay glucose absorption in the intestines and can increase insulin sensitivity. Low-calorie diets and regular exercise treat obesity and increase insulin sensitivity.

Question

Which of the following is not a treatment option for primary nephrogenic diabetes insipidus in a dog?

- Avoid excess salt
- No treatment other than giving unlimited access to water
- Hydrochlorothiazide
- DDAVP

Explanation - The correct answer is DDAVP. DDAVP is a synthetic antidiuretic hormone used for treating central diabetes insipidus. With nephrogenic diabetes insipidus, there is an adequate amount of ADH, but the ADH receptors in the kidneys do not function properly. Hydrochlorothiazide and avoiding excess salt intake are palliative measures. Doing nothing and giving unlimited access to water prevents the patient from becoming dehydrated.

Question

Pheochromocytomas are not very common in dogs; however, their presence can result in hypertension, tachyarrhythmias, seizures, and collapse. What is the substance secreted by this tumor?

- Cortisol
- Calcium
- Catecholamines
- Aldosterone
- Estrogen

Explanation - A pheochromocytoma is a tumor of the adrenal medulla. To review, the adrenal gland is composed of the adrenal cortex (outer layer) which is divided into the zona glomerulosa, zona fasciculata, and zona reticularis.

The zona glomerulosa is the main site of **aldosterone** production. The zona fasciculata produces **glucocorticoids** (mainly cortisol). The zona reticularis is the site of **androgen** production.

The adrenal medulla is the inner part of the adrenal gland and consists of chromaffin cells. These cells are responsible for making catecholamines (epinephrine and norepinephrine).

Question

A 3-year old female spayed Golden Retriever presents for seborrhea, symmetrical alopecia, and weight gain. A serum T4 is low at 0.4 ug/dl, and a serum cTSH is high at 0.65 ug/dl. What is the treatment for this dog?

- Sodium levothyroxine (Soloxine)
- Prednisone
- Methimazole (Tapazole)
- op'-DDD (Mitotane or Lysodren)

Explanation - The correct answer is sodium levothyroxine (Soloxine). Sodium levothyroxine or Soloxine is a synthetic T4 used as the treatment of choice for hypothyroidism. Methimazole is used for treating hyperthyroidism in cats. Mitotane or Lysodren is used to treat hyperadrenocorticism.

Question

Which of the following endocrine imbalances does not commonly cause a dermatosis in dogs?

- Hypothyroidism
- Hyperadrenocorticism
- Central diabetes insipidus
- Sertoli cell tumors

Explanation - The correct answer is central diabetes insipidus. Males with Sertoli cell tumors may develop bilateral alopecia with occasional pruritus and papular eruptions. Hypothyroid dogs often develop alopecia, seborrhea, and pyoderma. Hyperadrenocorticism patients commonly develop hyperpigmentation, alopecia, calcinosis cutis, seborrhea, and pyoderma.

Question

An 8-year old mixed breed male neutered dog presents with a several-month history of lethargy, hair loss, and greasy skin. The patient's face, feet, and tail are not clinically affected and he is not pruritic. What is the most likely cause of the hair loss?



- Flea allergy
- Sarcoptes
- Malignant melanoma
- Endocrinopathy

Explanation - The lesion distribution is most consistent with endocrinopathy; flea allergy and sarcoptic mange would be extremely pruritic in a patient with these lesions. The dark coloration, although alarming to clients, reflects hyperpigmentation associated with inflammation, not neoplasia.

Question

Which of these biochemical profiles are most consistent with the diagnosis of insulinoma in a dog?

- Blood glucose=150 mg/dl, Serum insulin-low
- Blood glucose=150 mg/dl, Serum insulin-high
- Blood glucose=45 mg/dl, Serum insulin-high
- Blood glucose=45 mg/dl, Serum insulin-low

Explanation - The correct answer is blood glucose-45 mg/dl, serum insulin-high. An insulinoma can result in an animal having normal to high insulin levels in the face of low blood glucose levels because the normal controls of insulin secretion are lost.

Question

A 3-year-old neutered male standard poodle presents as an emergency for collapse. The owners had been out of town for the past week and a friend was taking care of the dog. The dog was fed the same food and there was no chance of exposure to medications or toxins. There was no food or garbage that he could have gotten into. The owner mentions that the babysitter said the dog had mild diarrhea occasionally while they were away. The dog is current on preventative vaccines and deworming. He is also on heartworm and flea and tick preventative.

On physical exam, the poodle is laterally recumbent and minimally responsive. His temperature is 100F (normal 100-102.6F). His heart rate is 100 beats per minute (normal 60-160 beats per minute); his respiration rate is 40 breaths per minutes (normal 10-30 breaths per minute). His mucus membranes are pale pink with a capillary refill time of 3 seconds (normal is less than 2 seconds). He is approximately 5% dehydrated. While you begin shock doses of intravenous fluids for cardiovascular collapse, you obtain blood and urine for analysis. His complete blood count is normal with no signs of blood loss and white blood cell counts are within normal ranges. His chemistry panel shows a **potassium of 7 mEq/L** (normal 3.4-5.5 mEq/L), **sodium of 134 mEq/L** (normal 137-155 mEq/L), an **elevated BUN** of 45 mg/dL (normal 10-22 mg/dL), and normal protein levels. Urine specific gravity is 1.020. What medication will you give to help save this animal and what is your next test of choice?

- Give activated charcoal. Measure bile acids.
- Give insulin. Measure fructosamine levels.
- Give dexamethasone. ACTH stimulation test
- Give furosemide. Ethylene glycol byproduct testing.

Explanation - Poodles are the poster children for Addison's disease. Addison's is a tricky disease to diagnose if you are not looking for it. It is also called "the great imitator" as it can look like renal failure, GI disease, or acute collapse. The key signs in this case are the poodle in shock after a stressful event (owners were out of town), low heartbeat with cardiovascular collapse, a lack of stress leukogram in what should clearly be a stressed animal (normal white blood cell count in collapsed shocky patient), and Na:K ratio of less than 30 (hallmark for Addison's), and a USG of less than 1.030.

Addison's disease is due to lack of endogenous steroid and mineralocorticoid production. Endogenous cortisol is needed by every body system for proper function, and higher glucocorticoids as seen in stressed patients typically leads to a stress leukogram. Mineralocorticoid deficiency leads to the inability of the kidneys to retain sodium and secrete potassium. Remember, "water follows salt", which leads to hypotonic dehydration due to excessive sodium losses.

Any emergency with acute cardiovascular collapse should immediately be treated with IV boluses of fluids and should not wait while you perform your diagnostics. Once your tentative diagnosis has been found, supplementing with IV dexamethasone will help restore steroids to the patient while you await for an ACTH stimulation test to confirm your diagnosis. Dexamethasone is considered the glucocorticoid of choice with suspected Addison's, as it will not interfere with confirmatory testing.

This poodle responded within an hour to IV dexamethasone; he was up and alert and responsive.

Cortisol levels pre- and post- ACTH gel administration were both low.

Addison's is a life long disease that is managed with glucocorticoids (typically prednisone after diagnosis) and mineralocorticoids.

MANAGE