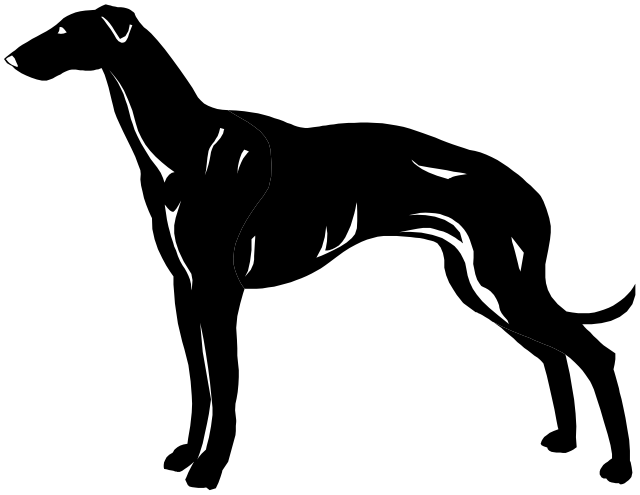
Greyhound
Medical Idiosyncrasies



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Please save a copy for your records and feel free to share a copy with your veterinarian as well.
This packet is made available through Greyhound Adoption of Ohio, Inc. by William E. Feeman III, DVM.
www.greyhoundadoptionofoh.org
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www.greythealth.com
www.grassmere-animal-hospital.com/greyhounds.htm
March 1, 2016

Congratulations on the adoption of your new Greyhound. If this is your first… you will soon see why people who are owned by Greyhounds rave about them so frequently. Provide a Greyhound a home and they will live in your heart.

Greyhounds have a unique physiology that can largely be attributed to their breed history as sighthounds and as a racing breed. They have developed enlarged muscle mass, hemoconcentrated blood, lengthened carpal/tarsal and metacarpal/metatarsal bones, and a heightened sense of sight to help accommodate these evolutionary challenges. Here are a few of the most common idiosyncrasies that you and your veterinarian should be aware of:

1. **Greyhounds normally have thyroid levels lower than other breeds.** Greyhounds have a normal thyroid level that is lower than the reference ranges used for other breeds. You should not start your Greyhound on supplementation for hypothyroidism unless your Greyhound is showing clinical signs of the disease, for example hair loss, lethargy, or weight gain (despite exercise and appropriate feeding) and a full thyroid panel has been run (T4, fT4 by equilibrium dialysis, TSH, etc.; I recommend using the lab at Michigan State for all Greyhound thyroid testing). The lack of hair on Greyhound thighs may be misinterpreted as a clinical sign of hypothyroidism. This hair loss is not caused by hypothyroidism (although hair may grow with supplementation). If thyroid supplementation is recommended for your Greyhound, be sure that they have read or are aware of the journal articles listed at the end of this packet and that the appropriate clinical signs of hypothyroidism are truly present. There are some truly hypothyroid Greyhounds out there… just not very many!

2. Greyhound Bloodwork I: **Greyhounds can have high normal or mildly elevated BUN, creatinine, and AST levels.** These changes may be falsely interpreted as early kidney disease. *If your Greyhound has high normal or just above normal kidney values… ask your veterinarian to run a urinalysis*. A urine specific gravity that is >1.030 likely indicates that the blood levels are normal for the breed and not likely caused by kidney disease. Diet, especially raw feeding, may also elevate the BUN and creatinine. This can be screened for by fasting your Greyhound for 12-18 hours before the blood draw. A new kidney screening test called an SDMA was released in July of 2016 and is supposed to detect kidney disease much earlier than other forms of testing. Although the company that makes the test did not identify any breed related increases, it has been my experience that some "normal" Greyhounds may have mildly increased levels with no other signs of kidney disease. The significance of the increased levels in these patients is not yet known.

   http://www.medinavets.com/wp-content/uploads/2014/02/GreyhoundKidney.pdf

3. Greyhound Bloodwork II: **Greyhounds can have low platelets** (as low as 80,000) and still be normal. Tick borne diseases would be a primary differential for a low platelet count, therefore, running tick titers on levels <100,000 could be justified.

4. Greyhound Bloodwork III: **Greyhounds normally have a higher than normal number of red blood cells (PCV, Hct) and a low normal number of white blood cells (WBCs) in their blood**. The PCV/Hct of normal Greyhounds can frequently be over 60% and potentially as high as 70% whereas non-Greyhound dogs rarely exceed 45% to 50%. The neutrophils and lymphocytes (both white blood cells) of Greyhounds very commonly are mildly decreased or are on the low end of normal. Total WBC counts of 3.0-10.0 are

common and an Auburn study of 50 retired racers (March 2000 Compendium) showed ranges of 1.8 to 14.6. Greyhound eosinophils (another type of white blood cell) frequently lack the typical orange granules seen in other breeds. The eosinophils instead have empty granules which may be confused for "toxic neutrophils" (a type of white blood cell seen in overwhelming infections).

5. Greyhounds are exposed to many **tick borne diseases (TBD)** while they are racing. If your dog is experiencing any neck or back pain of unknown cause or a low platelet count (lower than 100,000) you should request that your dog be tested for TBDs. Other potential clinical signs associated with tick borne diseases include: high fever, depression or lethargy, anorexia, anemia, diarrhea or constipation, weight loss, vomiting, nose bleeds, skin hemorrhage or any other unusual bleeding, swollen legs or lymph nodes, nervous system disorders, such as stiff gait, head tilt, seizures or twitching, and pale gums and/or inner eye membranes. It can take as long as five to seven years for clinical signs to develop from Ehrlichiosis after a tick bite, so even if you do not have TBDs in your area, they are still worth testing for. Treatment for Greyhounds who have positive tick borne disease titers without supportive clinical signs is controversial.

6. **Greyhounds are overly represented in cases of osteosarcoma** (a form of cancer that attacks the bone) (ACVIM 2005). It is most commonly found toward the shoulder in a front leg or toward the knee in a back leg but can occur in other places (such as the ankle/distal radius). *If your Greyhound shows signs of significant lameness, an x-ray should be taken to rule this out as a possible cause*. A diagnosis of a "sprain" or "strain" should not be made without an x-ray.

   http://www.medinavets.com/wp-content/uploads/2014/02/Osteosarcoma.pdf

7. **Greyhounds commonly suffer from dental disease**. You will need to clean their teeth at home and either use gels or medicated chews to help keep the teeth as clean as possible. Products that have the Veterinary Oral Health Council (VOHC) seal of approval are most ideal (http://www.vohc.org/accepted_products.htm). Your Greyhound will also likely need periodic dental cleanings requiring anesthesia. Some facilities may perform "standing dentals" or "anesthetic free teeth cleanings". Although this treatment sounds appealing, it does not allow for thorough cleaning of the tartar under the gums which is the most critical area. This treatment provides little more than the equivalent of a human teeth whitening procedure.
   http://avdc.org/Dental_Scaling_Without_Anesthesia.pdf

8. **Greyhounds can have a lesion on their pads called "corns" which very often cause lameness (classically they are more painful on hard surfaces as compared to soft surfaces)**. My treatment of choice for corns is a technique known as "hulling". The technique is described in the website below and has been published in a peer reviewed veterinary journal. These can be surgically removed but surgery is controversial as these lesions can reoccur after surgery and the recovery is painful and can be prolonged. Other treatment options include use of anti-viral medications and application of a small circle of duct tape over the corn which will need to be changed every 2-3 days. Be sure to have your veterinarian examine the pads of your Greyhound if they become lame.
   http://www.grassmere-animal-hospital.com/corn_hulling.htm

9. **Greyhounds can have a form of skin acne on their chests (most commonly where the chest rubs on the floor)**. This form of skin acne has the appearance of little black heads. If treatment is needed, a benzoyl peroxide containing product (e.g. Pyoben gel, Sulfoxydex shampoo) are generally used. This is largely only a cosmetic problem.

10. **Some racing greyhounds have had old racing injuries that can flare up from time to time.** One of the most common injuries is a fractured central tarsal bone. This will present as a swelling just below the right ankle (hock). This condition is normally chronic and by the time they reach a pet home there is little that can be done to correct the problem. These dogs may benefit from Glucosamine/Chondroitin supplementation but may need stronger medications in some circumstances to keep them comfortable. "Hock warmers" which can be purchased on-line can also benefit some Greyhounds over the colder months.

11. **Some Greyhounds can do an activity known as "trancing."** This is often seen as a dog that will appear to be in a trance. They may stand under an object that is able to touch or brush along their backs. This is not indicative of a seizure disorder and can be normal in the breed.

12. **Greyhounds are predisposed to an ocular condition known as "pannus."** This presents as a pigmented lesion that starts on the outside part of the eye and spreads across the cornea. This is an immune mediated disease and eye drops (topical cyclosporine and/or corticosteroids) are needed to treat the condition. Some animals need to wear a dog form of goggles when they go outside as UV light can aggravate the condition. www.doggles.com

13. **Greyhounds commonly have a condition termed Greyhound bald thigh syndrome**. You will note this on your Greyhound by the lack of hair on the backs of both hind legs (some Greyhound reunions will have a "best buns" competition to highlight some of the bald thighs). Some Greyhounds are more severely affected than others. This is largely only a cosmetic condition and sometimes resolves once the dog retires and a good diet is started. This condition is very rarely caused by a low thyroid level (hypothyroidism).

14. **Female greyhounds commonly are affected by a condition known as clitoral hypertrophy**. This is an enlargement of the clitoris that is a result of testosterone supplementation. Most female greyhounds receive testosterone supplementation on the track to block their heat cycle. This condition should not affect their neutering and should resolve over time once the testosterone supplementation is stopped. Some greyhounds with this condition may be confused for "hermaphrodites."

15. **Many Greyhounds can have mild heart enlargement and a mild heart murmur that can be normal**. If your veterinarian hears a heart murmur, a chest x-ray may be recommended. If there is some left atrial enlargement (a chamber of the heart) then an ultrasound of the heart (echocardiogram) would be necessary and should ideally be conducted by a cardiologist. If only mild generalized heart enlargement is noted, then it is likely normal for the breed and additional testing may not be necessary. The heart murmur can be described as systolic (not holosystolic), loudest over the left base, and likely a grade I or grade II.

16. **Most Greyhounds will commonly have, for lack of a better word, a "dent" at the transition from their thoracic to lumbar vertebrae (back bones)**. You will notice this

dent along the back midline just beyond the shoulders and is a completely normal finding in the breed. Explanations for this such as "it's a genetic anomaly" and "it looks like he was hit with some kind of metal bar" have been given in some instances. This is not a significant abnormality.

17. **Many Greyhounds may have scars from their racing days**. These are very rarely evidence of abuse at the track. As you will soon learn, Greyhounds have paper thin skin and will cut themselves very easily. Some injuries that would be minor scratches in other breeds are significant tears in Greyhounds and require sutures and can leave scars. It is truly the exception to the rule if the scars seen on your Greyhound are actually the result of abuse while on the track.

18. **Greyhounds are a breed which have been noted to develop malignant hyperthermia (MH)**. This condition is a type of reaction to anesthesia in which the Greyhound will spike a very high temperature (>106) in response to exposure to the anesthesia. This condition is very rare and as your Greyhound most likely arrived to you already spayed or neutered, this is unlikely to be a concern. MH is a genetic condition which should result in the same reaction to inhalant anesthesia every time. Therefore if a dog has had a previous anesthesia without incident, MH should not be a factor. Some Greyhounds can spike very high temperatures in recovery from muscle fasciculations but this is not MH. MH is most commonly a reaction to gas anesthesia and is over-diagnosed in the breed (if your dog recovers from a high temperature without treatment with a drug called *Dantrolene*, it was most likely not MH).

    http://www.medinavets.com/wp-content/uploads/2014/02/Anesthetic-Malignant-Hyperthermia.pdf

19. **Greyhounds are very sensitive and sometimes will not eat in the hospital**. Once a Greyhound retires and leaves the racetrack… they can quickly become very attached to their new family and may not eat well in a hospital setting. **Failure to eat while in the hospital alone is not a reason to keep a Greyhound in the hospital**. If your Greyhound is not eating well, ask your veterinarian if you could take your Greyhound home for the night and return for a recheck the next day.

20. **Greyhounds can be affected by a condition known as Lumbosacral Stenosis (Cauda Equina) which may be misdiagnosed as "hip dysplasia"**. These dogs normally present as weak, wobbly, or painful in the rear end. It is caused by a narrowing of the end of the spinal cord which results in compression of the nerve roots. This can be difficult to diagnose as it may not be apparent on x-ray and will likely require advanced imaging (CT, MRI, etc). This condition will be unlikely to respond to NSAIDs (e.g. Rimadyl) or oral steroids. **Remember that hip dysplasia is very rare in Greyhounds. There is controversy regarding the significance/relevance/frequency/treatment of this disease in Greyhounds amongst specialists**.
    http://www.greythealth.com/lumbosacral.html

21. **Many Greyhounds are very temperature sensitive**. You will find that your Greyhound will very likely not want to spend very much time outside when it is very cold and will quickly heat up in the hot summer weather as well. You will need to closely monitor your Greyhound in any extreme of temperature.

22. **Idiopathic cutaneous and renal glomerular disease ("Alabama rot") is a rare disease that can be seen in Greyhounds**. Should your Greyhound develop ulcerative lesions on their legs (rear>front) this condition should be considered. It can be potentially fatal as 25% of Greyhounds will develop kidney failure with this condition. There is no specific treatment for this disease. The ulcers should be flushed daily with an anti-bacterial agent and antibiotics should be started if infection is present. Recovery should occur in two to three weeks in Greyhounds with no kidney damage. **This condition is very rare**.

23. **The most common cause of multiple toe nail loss from multiple feet in Greyhounds is symmetrical lupoid onchodystrophy (SLO)**. Some older Greyhound references may also refer to this condition as Pemphigus, however, SLO is the actual diagnosis. This condition may initially thought to be a bacterial or fungal infection. Greyhounds can have infections but those not responding well to appropriate treatments should be considered strong suspects for SLO. Definitive diagnosis requires a biopsy (amputation of a toe) which is rarely recommended due to the classic presentation of the disease and the aggressiveness of the biopsy. Treatment will consist of appropriate anti-microbials, high doses of fatty acids, tetracycline and niacinamide (be sure that you are given Niacinamide and not Niacin). Steroids and anti-histamines may be necessary in some cases. Tetracycline is becoming harder to find and Doxycycline or Minocycline may be substituted.

24. **Male Greyhounds can suffer from a condition known as Dysuria or "tying up.**" This condition is more common in active racers but can occasionally carry over into pethood. The clinical signs seen with this condition are normally associated with some stressful event (hospitalization, anesthesia, a long haul, over-exercise) and consist of urethral spasms which prevent the dog from urinating normally. Greyhounds suffering from dysuria will strain to urinate with only drops coming out. Some of these dogs may also continue to leak urine slowly over an extended period. Treatment consists of catheterization three times daily as needed and drug therapy (typically some form of a muscle relaxer). The condition often takes 2-5 days to resolve.

25. **Greyhounds can suffer from muscle cramps.** This condition is more common in colder weather. Their leg muscles stiffen which causes them to awkwardly hike up their legs frequently vocalizing. This condition should be treated by warming the dog up and applying a warm (not hot) compress. If you look up these dogs racing records you may find several "OOPS" where they did not finish the race due to cramping. If this is a chronic problem, potassium supplementation may be beneficial.

26. **Greyhound strokes are not typically steroid responsive.** The majority are caused by blood clots and steroids are known to increase blood clotting potentially increasing the risk for additional strokes. Greyhounds with confirmed strokes on MRI or Greyhounds that are highly suspected of having a stroke should be treated with low doses (blood thinning) of aspirin.

27. Greyhounds are a breed that can be effected by **hypertension** (high blood pressure). This is a challenging diagnosis in Greyhounds as a published study showed many Greyhounds that had high blood pressures in the hospital had normal blood pressures when they were measured at home. If your Greyhound is found to have hypertension, you should have a urinalysis checked as hypertension is often linked with proteinuria (excessive protein levels in the urine). Conveniently, both hypertension and protein in the urine can often be treated with an oral medication called an Ace Inhibitor (e.g. Enalapril).

28. A rare cause of lameness in Greyhounds can be an arterial thrombus (blood clot) that restricts blood flow to one or both back legs resulting in consistent or intermittent discomfort depending on the size and location of the clot. The most consistent finding on exam, other than pain, would be a "pulse deficit" in the effected leg. An ultrasound can be used to confirm the clot and patients are most commonly treated initially with aspirin (Plavix another drug used in similar cases seemed to have no effect on platelet function in one unpublished study). A blood pressure can also be taken and is typically found to be lower in the effected limb (a pressure change of 30 mmHg between limbs is highly suggestive of a clot). Some cases can be progressive in spite of therapy and result in euthanasia while others may be managed for extended periods with only aspirin. Stronger "clot busting" drugs have not shown to be of much benefit in limited cases.

29. **Some Greyhounds suffer from excessive bleeding following surgical procedures or trauma.** Most standard tests (OSPT, APTT, fibrinogen concentration, VWF activity and function, etc.) done to evaluate clotting function in veterinary medicine have been normal in these dogs (therefore prescreening your dog will not be helpful). Current research suggests that the "bleeders" fail to develop as strong of a clot as quickly as normal dogs. The procoagulant, Aminocaproic acid (ACA) is being used to help prevent problems in patients undergoing invasive procedures or to treat bleeding once it has developed. The ACA can be started orally post-operatively the night of surgery as it has a rapid onset of action and the bleeding is not seen for 1-4 days following the procedure/trauma. The dose of ACA is 500-1000mg orally every 8 hours for 5 days (Greyhounds <75 lbs should receive 500mg and Greyhounds >75 lbs. should receive 1000mg). Transfusions of fresh frozen plasma or whole blood have also been effective but are no longer the treatment of choice if significant anemia is not present. Tranexamic acid 20-25mg/kg orally every 8 hours for 5 days can be substituted if ACA is unavailable.

30. **Greyhounds have lower vitamin B12 (cyanocobalamin) levels than other breeds.** The significance of this is unknown and treatment is controversial. This test is generally performed in dogs with persistent diarrhea, soft stools, or weight loss. If your Greyhound is diagnosed with a low cobalamin level, you have the option of supplementing them with cobalamin or checking their methylmalonic acid (MMA) level. If the MMA level is normal, then supplementation with cobalamin is not necessary. If the level is above normal then cobalamin supplementation should be started.

31. **There are rare anecdotal reports from anesthesiologists (Nancy Brock, DVM, ACVAA; www.nancybrockvetservices.com) of some Greyhounds developing a dangerously low and irregular heart rate during anesthesia due to high blood potassium levels.** Pre-anesthetic bloodwork was normal so this complication could not be predicted but appears to be exceptionally rare. Ideally Greyhounds would be monitored with an EKG while under anesthesia (this is a common feature on many anesthetic monitoring machines) as seeing the EKG is critical in determining if a slow heart rate may be due to a high potassium level or something else. Emergency treatment would initially consist of intravenous calcium gluconate and may need to be started before a high potassium level could be confirmed on bloodwork. https://greytarticles.wordpress.com/medical-first-aid/anesthesia-surgical/high-potassium-during-anesthesia-causes-greyhound-sudden-death/

Greyhound Anesthesia

Some veterinarians and some Greyhound rescue groups make specific recommendations in regards to a "Greyhound anesthetic protocol" because they believe a specific drug is safer than another. In my opinion, any drug is only safe if the person using it is comfortable with it. A number of anesthetics are suitable to be used in Greyhounds and depending on which your veterinarian is most familiar with will dictate which would be the safest. No specific protocol will be cited in this packet; however, some general guidelines will be listed to help reduce the risk associated with anesthesia.

1. Never use thiobarbiturate anesthetics in Greyhounds. Never never never! Oh yeah and did I say never? Some specialists believe that a one time only dose of a thiobarbituate in a Greyhound is acceptable; however, there are many other safer options!
2. **Premedications**: these medications provide sedation, analgesia (pain relieving properties) and allow a lower dose of an anesthetic to be used. The most commonly used premedications include sedatives (Acepromazine, Medetomidine), opioids (Torbugesic, Butorphonal, Buprenorphine, Morphine, etc.) and anti-cholinergics (atropine and glycopyrollate). The anti-cholinergics are used to prevent a low heart rate sometimes associated with anesthesia. These medications may be used in various combinations. Some veterinarians believe that caution should be used when dosing Greyhounds with the premedication, **Acepromazine,** as they can be more sensitive to its effects and may require lower dosing.
3. **Induction agents**: Telazol, Propofol, Amidate, Alfaxan and Ketamine/Valium are all appropriate anesthetics for Greyhounds. I would recommend using whichever your veterinarian is most familiar with… just remember no thiobarbiturates (Thiopenthol).
4. **Gas anesthesia**: Isoflurane and Sevoflurane are both acceptable and there is no significant clinical difference between the two in their use in general practice in most cases.
5. **Intravenous catheters**: An intravenous catheter should be placed prior to surgery. This gives the surgeon instant venous access in case of an emergency and allows your Greyhound to receive fluids during surgery which help in maintaining normal blood flow and blood pressure.
6. **Presurgical bloodwork**: Presurgical bloodwork done should be checked prior to anesthesia. The bloodwork allows for a quick check of liver and kidney functions among other things which may influence which anesthetics are used or if surgery should even be performed. The bloodwork should ideally be drawn within four weeks of the anesthetic event and in some cases can be done the same morning of anesthesia.
7. **Temperatures**: ask to have your Greyhound's temperature monitored periodically during and after surgery. In rare instances, Greyhounds have been known to have a reaction to an anesthetic or muscle fasciculations which allowed their body temperatures to climb in excess of 106 degrees. Monitoring of the patient allows for quick recognition and treatment of this problem.
8. **Drug Metabolism**: Greyhounds have lower concentrations of the drug metabolizing enzyme hepatic cytochrome P-450 (CYP) in the liver, which can cause an erratic metabolism of certain medications. This is of importance with anesthesia as a patient taking a medication that is metabolized by CYP enzymes may take longer to recover from it. For example, a Greyhound receiving the antibiotic Chloramphenicol may take hours instead of minutes to recover from the anesthetic Propofol.

Thyroid Function Testing in Greyhounds

Sm Anim Clin Endocrinol 12[1]:4 Jan-Apr'02 Review Article 0 Refs

C.B. Chastain, DVM, MS, Dipl. ACVIM (Editor) & Dave Panciera, DVM, MS, Dipl. ACVIM (Assoc. Editor) Sm An Clin Endo

Gaughan KR, Bruyette DS.; Am J Vet Res 2001; 62:1130-1133

BACKGROUND: Thyroid function tests are frequently evaluated in greyhounds because of alopecia, infertility, and poor race performance. In most cases, hypothyroidism is not present, despite the finding of decreased serum total thyroxine (T4) concentrations. Sight hounds, including greyhounds and Scottish deerhounds are known to have serum T4 concentrations lower than other breeds of dogs. This can result in an erroneous diagnosis of hypothyroidism.

SUMMARY: Basal serum T4, free T4 (fT4), and the serum T4 and fT4 response to thyroid-stimulating hormone (TSH) administration were evaluated in a group of healthy pet dogs and in two groups of healthy greyhounds. All pet dogs and 56 greyhounds had serum T4 and fT4 response to thyrotropin-releasing hormone (TRH) administration evaluated. Serum concentration of endogenous canine TSH (cTSH) was measured in 18 pet dogs and 87 greyhounds. The pet dog group consisted of 19 dogs of various breeds (no greyhounds), with a mean age of 5.2 years. One group of greyhounds consisted of 37 female dogs with a mean age of 1.4 years that were actively racing and currently receiving testosterone for suppression of estrus. The second group of greyhounds consisted of 61 dogs with a mean age of 4.9 years that were not receiving testosterone. Greyhounds receiving testosterone were significantly younger than those not receiving testosterone and pet dogs. Of the greyhounds not receiving testosterone, none of the females (n = 35) were racing, while 10 of the 26 males were actively racing. No dog had received thyroid supplementation, glucocorticoids, or anabolic steroids with the exception of testosterone within 3 months of study. The mean basal serum T4 concentration was significantly lower in the greyhound groups than in the pet dog group. The mean basal serum fT4 concentration was significantly lower in the greyhound groups than in the pet dog group. The mean serum T4 response to TSH was significantly greater in pet dogs than in greyhounds either receiving testosterone or not. Greyhounds receiving testosterone had significantly higher serum T4 concentrations post-TSH than greyhounds not receiving testosterone. While there was no difference between the mean serum fT4 concentration after TSH administration in pet dogs and greyhounds receiving testosterone, the fT4 concentration in greyhounds not treated with testosterone was significantly less than the other groups. The mean serum T4 concentration in response to TRH administration was significantly lower in both groups of greyhounds than in pet dogs. The mean serum fT4 concentration after TRH administration was significantly lower in greyhounds not receiving testosterone than in greyhounds treated with testosterone or pet dogs. Mean serum cTSH concentrations were not significantly different between any of the three groups. The reference ranges for all greyhounds were established as basal concentrations of T4, fT4, and cTSH were 2.1 to 37 nmol/L, 1.3 to 32.2 pmol/L, and 0.03 to 1.3 ng/ml, respectively. The authors concluded that greyhounds have a lower reference range for serum T4 and fT4 concentrations than that of other breeds.

CLINICAL IMPACT: This study shows that serum T4 and fT4 concentrations in greyhounds are considerably lower than in non-greyhound dogs and clearly demonstrates the difficulty in diagnosing hypothyroidism in this breed. The lower limit of the reference range for T4 and fT4 concentrations in greyhounds is near the lower sensitivity of the assays. Therefore, it may be impossible to establish a diagnosis of hypothyroidism based solely on these hormones. Because the serum TSH concentration was similar to that of other breeds, an elevated cTSH combined with T4 and fT4 concentrations at the low end of the reference range combined with appropriate clinical signs is necessary to diagnose hypothyroidism in greyhounds. Dynamic testing using TSH or TRH stimulation testing may also be useful, but less practical. Testing when appropriate clinical signs are present is of particular importance in greyhounds. Caudal thigh alopecia, common in greyhounds, is not caused by hypothyroidism, and infertility is likely to be only infrequently caused by hypothyroidism in female dogs. Exogenous testosterone used to suppress the estrous cycle does not appear to alter basal serum concentrations of T4, fT4, or c-TSH, but responses to TSH or TRH stimulation may be increased by testosterone administration.

Thyroid function testing in Greyhounds.

Am J Vet Res 62[7]:1130-3 2001 Jul

Gaughan KR, Bruyette DS

OBJECTIVE: To evaluate thyroid function in healthy Greyhounds, compared with healthy non-Greyhound pet dogs, and to establish appropriate reference range values for Greyhounds.

ANIMALS: 98 clinically normal Greyhounds and 19 clinically normal non-Greyhounds.

PROCEDURES: Greyhounds were in 2 groups as follows: those receiving testosterone for estrus suppression (T-group Greyhounds) and those not receiving estrus suppressive medication (NT-group Greyhounds). Serum thyroxine (T4) and free thyroxine (fT4) concentrations were determined before and after administration of thyroid-stimulating hormone (TSH) and thyroid-releasing hormone (TRH). Basal serum canine thyroid stimulating hormone (cTSH) concentrations were determined on available stored sera.

RESULTS: Basal serum T4 and fT4 concentrations were significantly lower in Greyhounds than in non-Greyhounds. Serum T4 concentrations after TSH and TRH administration were significantly lower in Greyhounds than in non-Greyhounds. Serum fT4 concentrations after TSH and TRH administration were significantly lower in NT-group than T-group Greyhounds and non-Greyhounds. Mean cTSH concentrations were not different between Greyhounds and non-Greyhounds.

CONCLUSIONS AND CLINICAL RELEVANCE: Previously established canine reference range values for basal serum T4 and fT4 may not be appropriate for use in Greyhounds. Greyhound-specific reference range values for basal serum T4 and fT4 concentrations should be applied when evaluating thyroid function in Greyhounds. Basal cTSH concentrations in Greyhounds are similar to non-Greyhound pet dogs.

Thyroid hormone concentrations in young, healthy, pretraining greyhounds

Vet Rec. 2007 Nov; 161 (18): 616-619.

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Total thyroxine (T(4)) concentrations were below the non-breed-specific reference range in 42 of 46 healthy young greyhounds (91.3 per cent) and 16 (34.8 per cent) were at or below the limit of detection of the assay. Free T(4) concentrations were below the standard reference interval in 20.5 per cent of the animals and 13 per cent were at or below the limit of detection of the assay. In contrast, all the dogs' total tri-iodothyronine concentrations were within or above the non-breed-specific reference range and 67 per cent were within the upper half. All the dogs' thyroid stimulating hormone concentrations were within the non-breed-specific reference range. The results show that young greyhounds have markedly lower total and free T(4) concentrations than other breeds, and neither analyte can reliably be used to investigate the hypothyroidism in this breed as values were found below the limit of detection of each respective assay.

Platelet concentration and hemoglobin function in Greyhounds

J Am Vet Med Assoc 205[6]:838-841 Sep 15'94 Clinical Study 16 Refs

*Patrick S. Sullivan, DVM, PhD; Heather L. Evans, DVM; T. P. McDonald, PhD
*Centers for Disease Control and Prevention, Division of HIV/AIDS, 1600 Clifton Rd. Mailstop E-47. Atlanta. GA 30333.

Hematologic characteristics of 36 Greyhounds were studied and compared with characteristics of 22 non-Greyhound controls. Fourteen of the Greyhounds were tested and found to be seronegative for Ehrlichia canis and Babesia canis. Compared with the non-Greyhounds, Greyhounds had higher mean hemoglobin concentration, PCV, mean corpuscular volume, and mean cellular hemoglobin, and lower mean RBC count, hemoglobin P50 value, Hill coefficient, platelet count, and total plasma protein concentration. The lower mean hemoglobin P50 value in Greyhounds suggested that the higher mean hemoglobin concentration and PCV were not solely a result of selective breeding for superior racing abilities, but that Greyhound hemoglobin may have a greater affinity for oxygen than does the hemoglobin of non-Greyhounds.

Hematologic and Serum Biochemical Reference Values in Retired Greyhounds

Compend Contin Educ Pract Vet 22[3]:243-248 Mar'00 Review Article 9 Refs

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Research has indicated that results of blood tests for retired greyhounds may fall outside the established normal ranges for the general canine population and that specific parameters for retired greyhounds may need to be established. Based on the study discussed in this article, the authors determined that hemoglobin, creatinine, sodium, total carbon dioxide, and anion gap tend to be elevated whereas globulin tends to be decreased in healthy retired greyhounds. Practitioners need to be aware of these breed-specific differences in order to make accurate diagnoses in greyhounds.

Bald Thigh Syndrome of Greyhound Dogs: Gross and Microscopic Findings

Vet Dermatol 11[1]:49-51 Mar'00 Short Communication 6 Refs

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Bald thigh syndrome (BTS) is a disease limited to Greyhound dogs. It is characterized clinically and grossly by bilateral hair loss on the lateral and caudal thighs. The cause of BTS is unknown but may be associated with hypothyroidism or hyperadrenocorticism. Samples of skin, thyroid glands, and adrenal glands from 43 Greyhound dogs with BTS were examined microscopically. Microscopic changes were characterized by dilatation of follicular infundibula, presence of catagen follicles and epidermal hyperplasia. Changes in the skin from these Greyhound dogs suggest an endocrinopathy as the cause; however, we were unable to confirm which one.

Skin Diseases in Greyhounds

Vet Med 95[2]:115-124 Feb'00 Review Article 15 Refs

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A Comparison Of Echocardiographic Indices Of The Nonracing, Healthy Greyhound To Reference Values From Other Breeds

Vet Radiol 36[5]:387-392 Sep/Oct'95 Review Article 25 Refs

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Echocardiographic evaluation of healthy, nonexercising, awake greyhounds revealed substantial differences in left ventricular cavity dimensions, wall thickness, systolic time intervals and fractional shortening as compared to previously reported normal echocardiographic values obtained from mongrels and various other dog breeds. Despite corrections for body surface area and body weight, these differences remained, suggesting that breed and body conformation should be considered when interpreting echocardiographic studies in the dog.

Metabolic and physiologic effects of athletic competition in the Greyhound

Companion Anim Pract 2[8]:7-11 Aug'88 20 Refs

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Review article examining the peculiarities of the greyhound, a sprint racer.
Racing greyhounds in the US run counterclockwise, on an oval track 5/16 to 3/8 mile long, and the typical race lasts around 45 seconds. Track surfaces, maintenance, length and banking of turns are extremely variable, as are the conditions of temperature and humidity under which races are run.

GREYHOUNDS DIFFER from other dogs in many respects. Compared to other dogs, their hearts are larger, stronger, and slower [resting heart rate 30 - 50 bpm], and they have a higher mean arterial pressure and lower peripheral resistance. The lower resting heart rate is at least partially a training effect; retired greyhounds have resting heart-rates closer to the average. Because they redistribute blood poorly, they compensate poorly for heat stress. They also have a greater muscle mass than the average dog.

LABORATORY FINDINGS. Compared with other breeds, greyhounds have higher PCVs and larger erythrocytes, larger total red cell counts, and higher hemoglobin values. These values are presented in a table.

POST-EXERCISE CHANGES measured after racing demonstrate transient increases in WBC counts, RBC counts, PCV, and hemoglobin levels. Proteinuria has been documented; myoglobinuria is reported, but has not been extensively studied. A dramatic increase in lactic acid levels is seen, from 7.97 +/- 0.04 mg/dl to 221.7 +/- 7.44mg/dl, followed by a rapid return to normal levels within 1 hour. Greyhounds are usually hyperthermic, as well as tachypneic after a race.

ANAEROBIC METABOLISM in greyhounds is the primary source of energy during racing. Studies have shown that energy requirements in sprinters may increase 20 times over resting levels, and only 5% of the energy used in a greyhound race comes from aerobic metabolism. Part of the greyhound's efficiency in using anaerobic metabolism is the result of a higher than average proportion of Type II muscle fibers, which use anaerobic metabolism to generate energy.
A discussion of aerobic and anaerobic glycolysis and oxygen debt is illustrated by diagrams.

Hematologic Values in Mongrel and Greyhound Dogs Being Screened for Research Use

J Am Vet Med Assoc 1971 Dec 1; 159(11): 1603-6

Porter, JA Jr and Canaday, WR Jr.

Hematologic and blood chemistry data were collected from Greyhounds and from mongrel dogs. Data were distributed according to sex and, in the case of the mongrels, according to weight. The Greyhounds' mean values for red blood cell (RBC) counts, for packed cell volume (PCV), and hemoglobin (Hb) determinations were greater than those of the mongrels, in most cases significantly so ($P<0.01$). The mongrel dogs, on the other hand, had higher mean values than Greyhounds in reference to the white blood cell (WBC) counts and relative percentage of eosinophils. The serum sodium, chlorides, bilirubin, and glutamic oxaloacetic transaminase values were greater, and in most cases significantly so, for the Greyhounds in comparison to the mongrels. The mongrel dogs had a higher total serum protein and a lower serum albumin content than did the Greyhounds. The female Greyhounds had a significantly higher blood urea nitrogen value than did the mongrels. The mean alkaline phosphatase activity values were significantly higher for male mongrels weighing less than 15kg than for male Greyhounds.

Fractures and Dislocations of the Racing Greyhound_Part I

Compend Contin Educ Pract Vet 17[6]:779-786 Jun'95 Review Article 25 Refs

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-Greyhounds sustain many fractures and dislocations that are uncommon in other breeds of dogs. The counter-clockwise direction of racing, the repetitive nature of racing, and track conditions predispose greyhounds to many atypical injuries. Most injuries that occur as a result of racing involve, or are distal to, the carpus and tarsus. The repetitive nature of racing predisposes greyhounds to stress fractures that are not seen routinely in nonworking dogs. A better understanding of injuries sustained by racing greyhounds gives the practitioner an appreciation of the unique nature of these injuries and how they affect the dogs that participate in this increasingly popular sport.

Fractures and Dislocations of the Racing Greyhound_Part II

Compend Contin Educ Pract Vet 17[7]:899-909 Jul'95 Review Article 24 Refs

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Most pelvic limb injuries sustained by racing greyhounds are a result of the counterclockwise direction of racing. The central tarsal bone is one of the most frequently fractured bones in the pelvic limb because of the high compressive forces that are placed on the medial surface of the tarsus during racing. Central tarsal bone fractures lead to a loss of integrity of the medial buttress of the tarsus, which predisposes the other tarsal bones to injury. Similar to injuries of the thoracic limb, most pelvic limb injuries are distal to and include the tarsus. Because most injuries sustained by greyhounds are uncommon in other breeds, the orthopedic surgeon must have a good understanding of the anatomy of greyhounds and techniques used to repair pelvic limb injuries. Tarsal bone injuries as well as metatarsal and phalangeal injuries, which are commonly seen in the pelvic limb, are described. In addition, several unique as well as less common orthopedic injuries sustained by racing greyhounds and methods for repair of the various fractures are reviewed.

Induction of anesthesia with diazepam-ketamine and midazolam-ketamine in greyhounds.

Vet Surg 20[2]:143-7 1991 Mar-Apr

Hellyer PW ; Freeman LC ; Hubbell JA

Anesthesia was induced in 14 greyhounds with a mixture of diazepam or midazolam (0.28 mg/kg) and ketamine (5.5 mg/kg), and maintained with halothane. There were no significant differences in weight, age, or duration of anesthesia between the treatment groups. Time to intubation with diazepam-ketamine (4.07 +/- 1.43 min) was significantly longer than with midazolam-ketamine (2.73 +/- 0.84 min). Heart rate, respiratory rate, PaCO2, and arterial pH did not vary significantly during anesthesia in either treatment group. Arterial blood pressures, PaO2, halothane vaporizer setting, and body temperature changed significantly from baseline values in both treatment groups during anesthesia. Times to sternal recumbency and times to standing were not significantly different. These data suggest that both diazepam-ketamine and midazolam-ketamine are useful anesthetic combinations in greyhounds. In combination with ketamine, midazolam offers little advantage over diazepam.

Anesthesia of the Sighthound

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The sighthounds are an ancient group of dog breeds that have been selectively bred for high-speed pursuit of pretty by sight. Probably as a consequence of this selection process, these dogs have a number of idiosyncrasies that can potentially adversely affect their anesthetic management. These include (1) nervous demeanor which can lead to stress-induced clinical complications, such as hyperthermia; (2) lean body conformation with high surface-area-to-volume ratio, which predisposes these dogs to hypothermia during anesthesia; (3) hematological differences such as a higher packed cell volume and lower serum protein compared with other dog breeds which may complicate interpretation of preanesthetic blood work; (4) Impaired biotransformation of drugs by the liver resulting in prolonged recovery from certain intravenous anesthetics, especially thiopental; and increased risks of drug interactions. Safe anesthetic management of sighthounds should include sedative premedications and appropriate use of analgesic drugs to minimize perioperative stress. Thiopental, or any other thiobarbiturate, should not be used in these dogs. Propofol, ketamine/diazepam combination, and methohexital are recommended alternative intravenous anesthetics. Avoid coadministration of agents that inhibit drug biotransformation, such as chloramphenicol. Inhalation anesthesia using isoflurane is the preferred anesthetic maintenance technique. Core body temperature should be monitored closely and techniques to minimize hypothermia should be employed both during anesthesia and into the recovery period.

Serum creatinine concentrations in retired racing Greyhounds.

Vet Clin Pathol 2003; 32(1): 40-2

Feeman WE 3rd, Couto CG, Gray TL.

BACKGROUND: Greyhounds frequently have laboratory values that are outside reference intervals established for dogs. Our recognition of increased serum creatinine concentrations in several Greyhounds posed a problem when evaluating a Greyhound with suspected renal disease.
OBJECTIVE: The purpose of this study was to compare serum creatinine concentrations between Greyhound and non-Greyhound dogs.
METHODS: Thirty retired racing Greyhounds and 30 age- and gender-matched control non-Greyhound dogs were evaluated. Serum creatinine concentrations in both groups were measured using a standard biochemical method and compared statistically using a Kruskal-Wallis test.
RESULTS: Creatinine concentration was significantly higher in the Greyhounds ($P < .01$) than in the control group.
CONCLUSION: Greyhounds have a higher serum creatinine concentration than do non-Greyhound dogs. This idiosyncrasy should be taken into account when evaluating healthy Greyhounds and those with suspected renal disease.

Morphologic Characterization of Specific Granules in Greyhound Eosinophils.

Vet Clin Pathol 2005; 34 (2): 140-143

Cline Iazbik MC, Couto CG.

BACKGROUND: "Vacuolated" eosinophils (ie, eosinophils with empty, nonstaining granules) have been described previously in normal Greyhounds. However, to our knowledge, detailed studies of granules in vacuolated and normal eosinophils in this breed have not been performed.
OBJECTIVE: The objective of this prospective study was to characterize some of the morphologic, ultrastructural, and cytochemical staining features of specific (primary) granules in both normal and vacuolated eosinophils in Greyhound blood.
METHODS: Morphologic features of eosinophils in Wright's- and Diff-Quik-stained peripheral blood smears from 49 Greyhounds were compared with 200 blood smears from non-Greyhound dogs. Transmission electron microscopy was done on blood from 3 Greyhounds with vacuolated eosinophils and 3 with normal eosinophil granules. Blood smears from 4 of these dogs also were stained cytochemically with alkaline phosphatase (AP), chloracetate esterase (CAE), and alpha naphthyl butyrate esterase (ANBE). The morphologic features and tinctorial properties of vacuolated and normal eosinophils were compared.
RESULTS: Twenty-six Greyhounds (53%) had vacuolated eosinophils and 23 (47%) had normal granulated eosinophils in smears stained with Wright's stain. Only 1% of eosinophils were vacuolated in non-Greyhound dogs. Twenty of the 23 (85%) Greyhounds with normal granulated eosinophils on Wright's-stained smears had vacuolated eosinophils in smears stained with Diff-Quik. Ultrastructurally, no morphologic differences were observed between granules of vacuolated and normal eosinophils. Both vacuolated and normal eosinophils in Greyhounds were positive for AP and negative for CAE and ANBE, as expected for normal dogs.
CONCLUSION: Vacuolated eosinophils in Greyhounds likely reflect, at least in part, differential staining properties of the specific granules with different hematologic stains. Ultrastuctural and cytochemical features of eosinophil granules were similar in normal and vacuolated eosinophils from Greyhounds.

Idiosyncrasies in Greyhounds that can affect their medical care

Vet Med 100[8]:592-600 2005 August

Feeman, WE 3rd

These athletes have been bred for speed and an even temper. But some irregularities in greyhounds will affect how to clinically assess and treat these dogs. Make sure you're prepared for the next greyhound that visits your practice.

Rooting Out the Cause of a Greyhound's Bad Breath

Vet Med 97[2]:86-91 Feb'02 Dental Corner 2 Refs

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Chronic ulcerative paradental stomatitis appears as marked ulceration of the buccal mucosa adjacent to calculus- and plaque-laden teeth. Bilateral lesions are common. Affected animals may have a hyperimmune response to plaque and calculus. Affected patients should be evaluated medically; the evaluation should include a complete blood count, serum chemistry profile, and urinalysis. Initial care involves teeth cleaning and polishing followed by an intraoral radiographic examination and probing. Extract teeth affected by stage 4 periodontal disease. Also extract stage 3 affected teeth if the owner cannot provide strict home care. Antibiotics are indicated to help control infection. Clindamycin has been shown to interrupt the glycocalix, which provides a foundation for plaque to attach to the tooth surface. Pain medication is also indicated. If initial therapy of teeth cleaning and home care is not effective, extraction of the chafing tooth is usually curative, because the local irritants are removed.

I frequently find periodontal disease when examining adopted greyhounds. A raw meat diet, a lack of tooth brushing during their early racing careers, stress (increased serum cortisol concentrations), and breed predisposition are implicated for periodontal disease occurrence.
This dog was treated with multiple extractions and doxycycline gel because of the extent of oral disease. Doxycycline gel is indicated for treating and controlling periodontal disease in dogs. In clinical trials, patients treated with Doxirobe exhibited attachment level gains because of reattachment of functional epithelium, periodontal pocket depth reductions, and improved gingival health, as long as the owner performed home care

Left Basilar Systolic Murmur in Retired Racing Greyhounds

J Vet Intern Med. 2006 Jan-Feb; 20 (1): 78-82.

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Nineteen of 28 (67%) Greyhounds enrolled in the Blood Donor Program at The Veterinary Teaching Hospital, The Ohio State University (Columbus, OH), had a left basilar systolic murmur. Ten Greyhounds with murmurs and 9 without murmurs were evaluated to gain knowledge about the pathogenesis of this murmur. Echocardiograms were performed without sedation by means of a GE Vivid 7 Echocardiographic System with a continuous ECG; systolic arterial blood pressure (SABP) was measured with an Ultrasonic Doppler Flow detector model 811-B. The mean peak aortic velocity in the Greyhounds with murmurs (2.15 m/s; range, 1.8-2.2 m/s) was significantly higher than in the Greyhounds without murmurs (1.89 m/s; range, 1.6-2.0 m/s) (P < .001); there were no significant differences between groups for aortic valve or annulus diameter, fractional shortening, pulmonic velocity, SABP, hematocrit, serum protein concentration, or red blood cell counts. In this study, Greyhounds with soft, left basilar systolic murmurs had mildly (but significantly) higher mean peak aortic velocities than similar dogs without murmurs. In the dogs with murmurs (and higher velocities), we could not identify structural abnormalities, such as valvular lesions or other congenital defects. There was no inverse correlation between the systolic murmur and the higher hematocrit and red blood cell counts observed in this breed. This 1-2/6 basilar systolic murmur is common in Greyhounds, and it does not appear to be of any clinical consequence.

Comparison of glomerular filtration rate between greyhounds and non-greyhound dogs

J Vet Intern Med. 2006 May-Jun; 20 (3): 544-546.

Wm Tod Drost[1], C Guillermo Couto, Anthony J Fischetti, John S Mattoon, Cristina Iazbik
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Greyhounds have significantly higher serum creatinine (SCr) concentration than do non-Greyhound dogs that may be attributable to differences in glomerular filtration rate (GFR). By means of plasma clearance of technetium Tc 99m diethylenetriaminepentaacetic acid, GFR was measured in 10 Greyhounds and 10 non-Greyhound dogs with normal findings of physical examination, CBC, serum biochemical analysis, and urinalysis. Dogs were fed the same diet for a minimum of 6 weeks before GFR data collection. Greyhounds had significantly higher mean +/- SD GFR (3.0 +/- 0.1 vs 2.5 +/- 0.2 ml/min/ kg; P = .01) and SCr concentration (1.8 +/- 0.1 vs 1.5 +/- 0.1 mg/dL; P = .03) than did non-Greyhound dogs, but the serum urea nitrogen (SUN) concentration was not significantly different (18 +/- 1 vs 18 +/- 2 mg/dL; P = .8). Therefore, the higher SCr concentration in Greyhounds is not attributable to decreased GFR, and may be associated with the high muscle mass in the breed. Healthy Greyhounds have higher GFR than do non-Greyhound dogs.

Vertebral heart size in retired racing greyhounds

Vet Radiol Ultrasound. 2007 Jul-Aug; 48 (4): 332-334.

Liliana M Marin, Jamie Brown, Chas McBrien, Ryan Baumwart, Valerie F Samii, C Guillermo Couto

The vertebral heart size (VHS) is used to objectively assess cardiac dimensions on thoracic radiographs. A high VHS suggest the presence of cardiac pathology, such as dilated cardiomyopathy, degenerative atrioventricular valvular disease, pericardial effusion, pericardioperitoneal diaphragmatic hernia, tricuspid dysplasia, ventricular septal defect, or patent ductus arteriosus, among others. However, breed or body conformation can influence the VHS. Because Greyhounds have a high prevalence of physiologic systolic murmurs associated with high aortic velocity, and large cardiac dimensions when compared with dogs of similar size, they are frequently suspected of having heart disease. The purpose of this study was to compare the VHS in normal Greyhounds with those in Rottweilers, and a group of dogs from various other breeds using both analog and digital radiology. The VHS was significantly higher in Greyhounds (P< 0.0001), when compared with Rottweilers and to other dog breeds. The mean VHS on lateral radiographs for Greyhounds was 10.5 +/- 0.1, for Rottweilers it was 9.8 +/- 0.1, and for mixed breed dogs it was 10.1 +/- 0.2. This study confirms that the relative cardiomegaly reported in necropsy and echocardiographic studies in Greyhounds is easily detected using plain radiography and the VHS.

Postoperative bleeding in retired racing greyhounds

J Vet Intern Med. 2008 May-Jun; 22 (3): 525-533.

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BACKGROUND: Some retired racing Greyhounds (RRG) that undergo surgery bleed excessively.
Hypothesis: Greyhounds that bleed excessively will have one or more preoperative hemostatic abnormalities that can be used to predict the risk and severity of postoperative bleeding.
ANIMALS: Eighty-eight RRG undergoing ovariohysterectomy or castration.
METHODS: All dogs were evaluated preoperatively with a physical exam, CBC, platelet count, OSPT, APTT, platelet function with PFA-100(a); fibrinogen, d-dimer, plasminogen (Plmg), antiplasmin (AP), antithrombin (AT), and vWF concentration (vWF:Ag); vWF collagen binding assay (vWF:CBA), and Factor XIII assay. Assays were repeated in the dogs that bled, and in an age- and sex-matched control group of RRG.
RESULTS: Twenty-six percent of the dogs had bleeding 36-48 hours after surgery. AP (P <.0001) and AT concentration (P= .007) were significantly lower, and vWF:CBA (P= .0284) was higher preoperatively in the dogs with excessive hemorrhage. A lower platelet count (P= .001) and hematocrit (P= .002), shorter OSPT (P= .0002) and higher plasma fibrinogen (P <.0001), and AP (P= .001) concentration were detected at the time of bleeding compared with preoperative values in the dogs that bled excessively. The same findings were observed postoperatively for the control group, except for the decrease in hematocrit.
CONCLUSIONS AND CLINICAL IMPORTANCE: The results indicate that this excessive postoperative bleeding is not attributable to a primary or secondary hemostatic defect, but could result from altered fibrinolysis.

Thromboelastographic tracings in retired racing greyhounds and in non-greyhound dogs

J Vet Intern Med. 2008 Mar-Apr; 22 (2): 374-379.

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BACKGROUND: Bleeding disorders in patients with normal coagulation test results are frequently reported in Greyhounds. The purpose of this study was to compare Greyhounds to non-Greyhounds by thromboelastography (TEG).
HYPOTHESIS: TEG parameters in Greyhounds are different from those in non-Greyhounds. ANIMALS: Forty-three healthy dogs (28 Greyhounds and 15 non-Greyhounds) based on the results of physical examination, CBC, activated partial thromboplastin time, prothrombin time, fibrinogen, and platelet count.

MATERIALS AND METHODS: Recalcified citrated native TEGs were performed in both groups; data were compared using Student's, Mann-Whitney, and Pearson's statistical tests.

RESULTS: In Greyhounds, mean +/- SD were as follows: R-time 4.3 +/- 1.7 minutes, K-time 3.8 +/- 1.4 minutes, angle (alpha) 50.0 +/- 8.0 degrees , maximum amplitude (MA) 47.6 +/- 5.6 mm, clot strength (G) 4,647 +/- 1,097 dyn/cm2, and percent lysis at 60 minutes (LY60) 2.8 +/- 5.0%. In the non-Greyhounds they were R-time 3.7 +/- 1.6 minutes, K-time 2.5 +/- 0.9 minutes, angle 59.8 +/- 7.0 degrees , MA 53.1 +/- 5.6 mm, G 5,811 +/- 1,256 dyn/cm2, and LY60 3.1 +/- 2.5%. All parameters were significantly different between the groups, except for R-time and LY60.

CONCLUSION: In Greyhounds, clotting kinetics are slower and clot strength are weaker than in non-Greyhounds, supporting the increased tendency to bleed observed after minor trauma or surgical procedures in the breed. The findings may also be attributed to blood viscosity or to the concentration of citrate in the sample (ie, Greyhounds have higher hematocrit and less plasma per unit volume).

Evidence for Propofol Hydroxylation by Cytochrome P4502B11 in Canine Liver microsomes: breed and gender differences

Xenobiotica. 2000 Jun; 30 (6): 575-588.

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The study aimed to ascertain the enzyme kinetic basis for breed differences in the biotransformation of propofol in dog and to identify the responsible canine cytochrome P450 (CYP) isoenzymes. The NADPH-dependent formation of 4-hydroxypropofol (the rate-limiting biotransformation in dog) was assayed using hepatic microsomes from the male greyhound and beagle, and from both sexes in mixed-breed dogs (five of each). Enzyme kinetic analysis revealed that whereas there were no significant differences in Km, Vmax averaged > 3-fold lower in greyhound compared with beagle ($p = 0.032$). Although average Vmax was > 3-fold higher in the male compared with female mixed-breed dogs, this difference did not achieve statistical significance ($p = 0.095$), probably because of the high variability of data from mixed-breed dogs. Chloramphenicol (a specific CYP2B11 inhibitor) and diethyldithiocarbamate (a non-specific CYP2 inhibitor) inhibited propofol hydroxylation in all microsomes. Quinine (a CYP2D15 inhibitor) was also inhibitory, but only in one-half of the microsomes examined. Immuno-inhibition by anti-CYP2B1 sera resulted in > 50% reduction in metabolite formation in all dogs except mixed-breed females, which showed a 30% reduction. Differences in propofol hydroxylase activity between microsomal preparations were primarily attributed to a component that was sensitive to inhibition by chloramphenicol and anti-CYP2B1 sera. The results indicate that propofol hydroxylation in dog is primarily mediated by CYP2B11 and that breed (and possibly gender) differences in propofol metabolism may result from differences in the liver content of this CYP.

Clinical, histologic, and immunohistochemical characterization of wart-like lesions on the paw pads of dogs: 24 cases (2000-2007).

J Am Vet Med Assoc 2009 June; 234(12): 1555-1558

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OBJECTIVE- To determine clinical, histologic, and immunohistochemical findings for dogs with wart-like lesions involving the paw pads.
DESIGN- Retrospective case series.
ANIMALS- 24 dogs (18 Greyhounds and 6 dogs of other breeds).
PROCEDURES- Medical records were reviewed for information on signalment, physical examination findings, concurrent disease processes, location of all lesions, and, when available, results of histologic examination of biopsy specimens. Available biopsy specimens (n = 11) were submitted for immunohistochemical staining and a PCR assay to identify viral inclusion bodies.
RESULTS- In Greyhounds, most lesions involved the pads of the third and fourth digits, had a consistent histologic appearance without evidence of inflammation, were negative for papillomavirus, and had an unsatisfactory response to treatment. In other breeds, lesions often involved the pads of non-weight-bearing digits, had histologic evidence of inflammation, were positive for papillomavirus, and responded to surgical treatment.
CONCLUSIONS AND CLINICAL RELEVANCE- Results suggested that wart-like lesions involving the paw pads of Greyhounds were a distinct clinical entity with features resembling porokeratosis plantaris discreta in humans. In Greyhounds, these lesions were not associated with an underlying viral etiology and, therefore, should not be considered plantar warts. Alternative treatments should be investigated because current treatments were generally unsuccessful in Greyhounds. Wart-like lesions of the paw pads in other breeds were often associated with papillomavirus, and surgical excision appeared curative.

Using a dental root elevator to remove footpad corns in dogs: Two practitioners' experience

Vet Med. 2006 Dec; 101(12): 778-780.

CL Machery and WE Feeman III

While little is known about footpad corns except that they are painful, varying treatment methods exist. But which one should you use? To help you decide, these practitioners outline the various methods and share a new technique they developed.

Epsilon aminocaproic acid for the prevention of delayed postoperative bleeding in retired racing greyhounds undergoing gonadectomy.

Vet Surg. 2012 Jul:41(5):594-603.

Liliana M. Marin, M Cristina Iazbik, et. al.

OBJECTIVE: To evaluate the effects of epsilon aminocaproic acid (EACA) on the prevalence of postoperative bleeding in retired racing Greyhounds (RRG), and to assess its effects on selected thrombelastography (TEG) and fibrinolysis variables.

STUDY DESIGN:Double-blinded, prospective, randomized study.

METHODS:100 RRG had elective ovariohysterectomy or orchiectomy and were administered EACA or placebo for 3 days after surgery. TEG variables were analyzed preoperatively and 24, 48, and 72 hours after surgery.

RESULTS:Thirty percent (15/50) of RRG in the placebo group had delayed postoperative bleeding starting 36-48 hours after surgery compared with 10% (5/50) in the EACA group (P = .012). On the TEG variables, the slopes for R and K time were significantly different between treatment groups (P <.05); the R and K time decreased over time in the EACA group after surgery whereas they increased in the placebo group. The angle, maximal amplitude (MA), and G slopes were also significantly different between treatment groups (P = .001, .001, and .006, respectively). The angle, MA, and G increased postoperatively over time in the EACA group and decreased in the placebo group. All these changes are supportive of hypercoagulability associated with EACA administration.

CONCLUSION:Postoperative administration of EACA significantly decreased the prevalence of postoperative bleeding in RRG undergoing surgery by increasing the clot strength.

Epsilon aminocaproic acid for the prevention of delayed postoperative bleeding in retired racing greyhounds undergoing gonadectomy.

J Vet Emerg Crit Care (San Antonio) 2012 Jun:22(3):332-40.

Liliana M. Marin, M Cristina Iazbik, et. al.

OBJECTIVES:To determine the frequency of delayed postoperative bleeding in retired racing Greyhounds with appendicular bone tumors undergoing limb amputations. To identify if administration of epsilon-aminocaproic acid (EACA) was effective on the prevention of postoperative bleeding.
DESIGN:Retrospective study from December 2003 to December 2008.
SETTING:Veterinary university teaching hospital.
ANIMALS:Forty-six retired racing Greyhounds (RRGs) diagnosed with primary appendicular bone tumors that underwent limb amputation were included in the study.
MEASUREMENTS AND MAIN RESULTS:Thirteen of 46 RRGs (28%) included in the study had delayed postoperative bleeding starting 48-72 h after surgery. Bleeding episodes included cutaneous, subcutaneous, and external bleeding that extended from the area of the surgical site that became widespread within hours, and that required administration of blood components. A paired t-test suggests that there was a significant decrease in PCV postoperatively for both dogs that bled and dogs that did not bleed ($P < 0.0001$). Forty of 46 RRGs (86%) received either fresh frozen plasma (FFP) or EACA or both, for the prevention of postoperative bleeding. A logistic regression model determined that dogs that did not receive EACA were 5.7 times more likely to bleed than dogs that did receive EACA, when controlling for whether or not they received FFP (95% CI: 1.02-32.15, $P = 0.047$).
CONCLUSION:This retrospective study suggests that preemptive postoperative administration of EACA appears to be efficacious in decreasing the frequency of bleeding in RRGs undergoing limb amputation; however, a prospective study is warranted to corroborate its effectiveness.

Evaluation of serum cobalamin concentrations in dogs of 164 dog breeds (2006-2010).

J Vet Diagn Invest. November 2012:24(6):1105-14.

Niels Grützner[1]; Shannon M Cranford, et. al.

Altered serum cobalamin concentrations have been observed in dogs with gastrointestinal disorders such as exocrine pancreatic insufficiency (EPI) or gastrointestinal inflammation. The aims of the current study were 1) to identify breeds with a higher proportion of dogs with a decreased serum cobalamin concentration, 2) to determine whether dogs with such decreased concentrations tend to have serum canine trypsin-like immunoreactivity (cTLI) concentrations diagnostic for EPI, and 3) to compare the number of submissions for serum cobalamin analysis by breed to the American Kennel Club (AKC) breed ranking list of 2009. In this retrospective study, results of 28,675 cobalamin tests were reviewed. Akitas, Chinese Shar-Peis, German Shepherd Dogs, Greyhounds, and Labrador Retrievers had increased proportions of serum cobalamin concentrations below the lower limit of the reference interval (<251 ng/l; all $P < 0.0001$). Akitas, Chinese Shar-Peis, German Shepherd Dogs, and Border Collies had increased proportions of serum cobalamin concentrations below the detection limit of the assay (<150 ng/l; all $P < 0.0001$). Akitas, Border Collies, and German Shepherd Dogs with serum cobalamin concentrations <150 ng/l were more likely to have a serum cTLI concentration considered diagnostic for EPI (≤2.5 µg/l; all $P \leq 0.001$). The breed with the highest proportion of samples submitted for serum cobalamin analysis in comparison with the AKC ranking list was the Greyhound (odds ratio: 84.6; $P < 0.0001$). In Akitas and Border Collies, further investigations are warranted to clarify if a potentially breed-specific gastrointestinal disorder is responsible for the increased frequency of decreased serum cobalamin and cTLI concentrations.

SERUM HOMOCYSTEINE CONCENTRATIONS IN GREYHOUNDS

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In humans, hyperhomocysteinemia is a multifactorial and incompletely understood condition. Increased serum homocysteine (HCY) concentrations have been associated with cardiovascular disease, peripheral arterial occlusive disease, and venous thrombosis. Recently, cardiovascular/thrombotic disease and hypocobalaminemia have been described in Greyhounds. It was also suggested that hyperhomocysteinemia in Greyhounds with suspected gastrointestinal disease is due to hypocobalaminemia and hypofolatemia. Both conditions have also been linked to hypoalbuminemia, which may affect HCY levels, as shown previously in dogs. However, it is unknown if low levels of both micronutrients (cobalamin and/or folate) are present only in Greyhounds with gastrointestinal disease or also in healthy Greyhounds. Therefore, the aim of this study was to evaluate serum HCY, cobalamin, and folate concentrations in Greyhounds with diarrhea or thrombotic disease as well as in healthy Greyhounds.

Serum samples from healthy Greyhounds (n=16), Greyhounds with diarrhea (n=30), or a history of thrombotic events (n=8) were collected at the Ohio State University and Texas A&M University. Serum HCY concentrations (reference interval [RI]: 5.0-22.1 µmol/L) were measured by gas chromatography/mass spectrometry. Concentrations of cobalamin (RI: 251-908 ng/L) and folate (RI: 7.7-24.4 µg/L) were measured using an automated chemiluminescence assay. Concentration of serum HCY, cobalamin, and folate were compared among the three groups of Greyhounds using an ANOVA or a non-parametric Kruskal-Wallis test, as applicable. Correlation analysis was performed to test for any possible correlation between HYC and the two B vitamins.

Serum HCY concentrations differed among the three groups of Greyhounds (p=0.0012). Healthy Greyhounds had significantly higher serum HCY concentrations (mean ±SD: 65.2 ±24.2 µmol/L) than Greyhounds with diarrhea (39.7 ±21.7 µmol/L; p<0.01) or thrombosis (36.7 ±22.1 µmol/L; p<0.05). All healthy Greyhounds had serum HCY concentrations above the upper limit of the RI. Serum cobalamin and folate concentrations did not differ among the groups of Greyhounds (both: p>0.05). A negative correlation was observed between serum HCY and serum cobalamin (ρ: -0.61; 95%CI: -0.76 to -0.39; p<0.0001) or serum folate concentrations (ρ: -0.28; 95%CI: -0.52 to -0.01; p=0.0386) when analyzing all samples together. However, no correlation was observed when analyzing the three groups of Greyhounds separately (for all:p>0.05).

Healthy Greyhounds had higher serum HCY concentrations than Greyhounds with diarrhea or thrombotic disease. All healthy Greyhounds were hyperhomocysteinemic, which suggests that Greyhounds could serve as a novel canine model to further investigate hyperhomocysteinemia in humans. However, further studies are warranted to characterize this model.

Serum Homocysteine Concentrations in Hypocobalaminemic and Hypofolatemic Greyhounds

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23RD ECVIM-CA CONGRESS, 2013

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A recent search of the gastrointestinal laboratory (GI lab) database showed that hypocobalaminemia is frequently observed in Greyhounds. It is unknown if a malabsorption of cobalamin or other micronutrients (e.g., folate) due to chronic gastrointestinal disease plays a role in the cause for this finding in Greyhounds. Cobalamin and folate are absorbed in the distal and proximal small intestine, respectively. In humans, low serum cobalamin and folate concentrations have been associated with an increase in serum homocysteine (HCY) concentration, which reflects a lack of the intracellular availability of both vitamins. Increased serum HCY concentrations are associated with cardiovascular and thrombotic diseases in humans, and these conditions have also been described in Greyhounds. Therefore, the aims of this study were to evaluate 1) the frequency of hypofolatemia in hypocobalaminemic Greyhounds, and 2) serum HCY concentrations in hypocobalaminemic and hypofolatemic Greyhounds.

Submissions from Greyhounds (n = 423) to the GI lab (2006–2010) for analysis of serum cobalamin and folate concentrations were reviewed. Hypocobalaminemic Greyhounds (serum cobalamin concentrations below the lower limit of the reference interval [RI]: 251–908 ng/L) were identified and investigated for the proportion of dogs with concurrent hypofolatemia (serum folate concentration < 7.7 µg/L, RI: 7.7–24.4 µg/L) by calculating the odds ratio (OR) and 95% confidence interval (CI). Also, serum samples from 44 Greyhounds, submitted to the same laboratory between October 2012 and March 2013, were used to measure serum HCY concentrations (RI: 5.0–22.1 µmol/L) by gas chromatography/mass spectrometry. A Mann-Whitney U test was used to compare serum HCY concentrations in hypocobalaminemic and hypofolatemic Greyhounds with those in normocobalaminemic and normofolatemic Greyhounds. A $p < 0.05$ was considered significant.

In this study, hypofolatemia was more frequently observed in hypocobalaminemic Greyhounds than in normocobalaminemic Greyhounds (OR [CI]: 1.8 [1.2–2.6], $p = 0.0064$). Although not significant, serum HCY concentrations were higher in hypocobalaminemic and hypofolatemic Greyhounds (n = 12, median: 42.7 µmol/L) compared to normocobalaminemic and normofolatemic Greyhounds (n = 32, median: 27.8 µmol/L; $p < 0.0670$). Hyperhomocysteinemia was detected in 11 (92%) hypocobalaminemic and hypofolatemic Greyhounds and 19 (59%) normocobalaminemic and normofolatemic Greyhounds.

Hypocobalaminemia in Greyhounds was associated with hypofolatemia, and increased serum HCY concentrations were observed in hypocobalaminemic and hypofolatemic Greyhounds, but also in Greyhounds with normal serum concentrations of both vitamins, suggesting a lack of these vitamins at the intracellular level. The functional implication of these findings in Greyhounds warrants further studies.