



LIVS IN PLAIN VIEW



**Long Island
Veterinary Specialists**

*Where You Refer Your Patient First
Makes All The Difference*

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Greyhound Corns

*Robert Waddell, DVM, DACVS-SA,
Soft Tissue, Oncologic, Orthopedic,
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Corns, also known as paw pad keratomas or warts, can be an incredibly frustrating condition for both veterinarians and owners. Due to its uncommon clinical nature and the paucity of research available, there is still much to learn about this condition.

Normal Dog Footpad Anatomy (see Fig. 1)

The normal canine footpad is a specialized area of integument characterized by a thick epidermis (mechanical trauma protection) and large fat deposits (shock-absorbing elasticity). There is a large nerve supply and large number of atrichial sweat glands (secretions produced are used for increased foot traction and also for scent marking). The typical epidermis consists of keratinocytes (85%), melanocytes (5%), Langerhans' cells (3 to 8%) and Merkel's cells (2%). The epidermal layers, from inner to outer, are the basal layer (stratum basale), spinous layer (stratum spinosum or prickle cell layer), granular layer (stratum granulosum), clear layer (stratum lucidum or the stratum conjunctum), and horny layer (stratum corneum or the stratum disjunctum). Epidermal thickness of the foot pads measures 1.5 mm (other layers of skin measures 0.1 to 0.5 mm). The canine footpad surface is papillated and irregular normally. Rete ridges (projections of the epidermis into the underlying dermis) are also normally present in footpads.

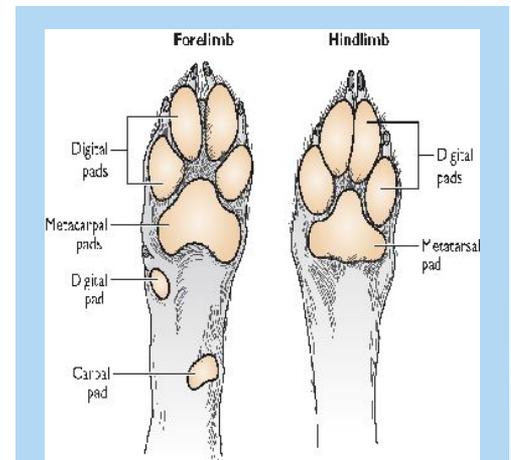
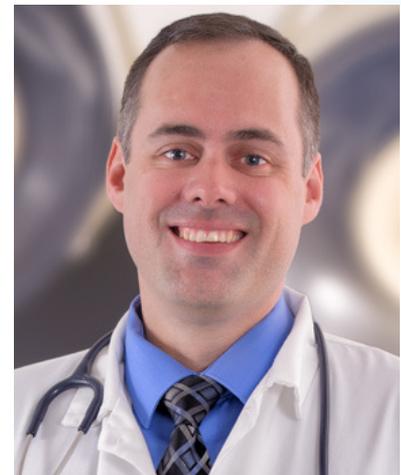


Fig. 1 - Artist rendition of the normal canine paw pad gross anatomy. www.answers.com

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Long Island Veterinary Specialists

Where You Refer Your Patient First Makes All The Difference



Dermatology Department

Who are we?

Our consulting board-certified dermatologists are experts in the diagnosis and treatment of your pets' dermatologic issues. You will receive a timely and accurate diagnosis and speak with specialists who have knowledge in the most up-to-date treatments and procedures. Our Dermatology Team will address all problems associated with your pet's specific skin and/or allergy diagnosis.



Conditions commonly seen by our Dermatology Department:

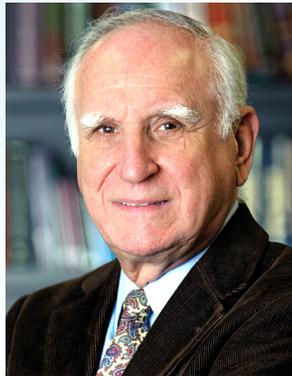
- Adverse drug reactions
- Allergic skin disease (atopy)
- Autoimmune skin disease
- Bacterial skin disease (pyoderma)
- Ear disease (otitis)
- Endocrine dermatoses
- Flea allergy dermatitis
- Foot disease (pododermatitis)
- Fungal skin disease
- Genetic and congenital skin diseases
- Hair loss (alopecia)
- Hot spots (acute moist dermatitis)
- Immune-mediated dermatoses
- Metabolic skin disease (calcinosis cutis, hepatocutaneous syndrome)
- Neoplastic (cancer-associated) and paraneoplastic skin disease
- Nail and/or footpad disorders
- Parasitic skin disease (demodicosis, scabies, cheyletiellosis)
- Yeast infections

Services offered include:

- Allergy testing
- Cytological evaluation
- Skin biopsy and dermohistopathology evaluation
- Bacterial cultures and sensitivity testing
- Skin scrapings, cytological evaluations, skin biopsies

Appointments Available 4 Days a Week

A NOTE FROM THE EDITOR



Last winter delivered little snow; spring has passed and finally the summer is here.

Graduation ceremonies have begun this month and with “mask free” outdoor celebrations on grills, our pets will be doing their usual begging for bits of BBQ’d foods, most of which can disrupt canine metabolic processes. Additionally, summer seems to bring on more accidents, rashes, ingestions, gastrointestinal disruptions and injuries of many kinds. LIVS continues to be open for any emergencies that may arise. The usual COVID protocols are still being observed and care is still available all hours of every day. Although lessened in the US, COVID-19 is still a worldwide phenomenon.

“How do these pandemics end? The viruses don’t go away. Instead, the viruses undergo a transition. Or more to the point, we do. Our immune systems learn enough about them to fend off the deadliest manifestations of infection, at least most of the time. Humans and viruses reach an immunological détente. Instead of causing an avalanche of devastating illnesses, over time the viruses trigger small surges of milder illnesses. Pandemic flu becomes seasonal flu and the viruses become endemic.

If the pattern holds, and it is expected to, COVID-19 will at some point join a handful of human coronaviruses that cause colds, mainly in the winter, when conditions favor their transmission.

Now something “new” is rewving up. Fungus infections!... and we are likely to think of them, if we think of them at all, as minor nuisances like mold on cheese, mildew on shoes, or mushrooms springing up in the garden. Fungi constitute their own biological kingdom of about six million diverse species, ranging from baking yeast to wild exotics. Unlike animals, they have cell walls, not membranes; unlike plants, they cannot make their own food; unlike bacteria, they hold their DNA within a nucleus and pack cells with organelles—features that make them, at the cellular level, weirdly similar to us and there are possibly 300 million people infected with fungal diseases worldwide and 1.6 million deaths every year—more than malaria, as many as tuberculosis!

Now states across India have begun declaring a “black fungus” epidemic as cases of the fatal rare infection shoot up in patients recovering from COVID-19.

The fungal disease, called mucormycosis, has a 50% mortality rate. It affects patients initially in the nose but the fungus can then spread into the brain, and can often only be treated by major surgery removing the eye or part of skull and jaw. Mucormycosis in dogs usually affects the sinus, nasal passages, skin and at times, the stomach and liver.

It is usually a rare disease, but in patients who had severe cases of Covid-19, it has been linked to an overuse of steroids, which can acutely compromise the immune system if taken over a prolonged period of time no matter the illness.

Some news on “ivermectin’.....Why aren't we following the science- - -? They make this stuff in India and it would be of help there right now!.....The corporate media has ignored the findings of a peer-reviewed study just published in the American Journal of Therapeutics that concludes that the readily available, inexpensive

(off-patent) drug ivermectin is effective in treating existing cases of COVID-19 and in preventing the illness. It has been around for many years and is safe for all but a few people. Veterinarians use it to prevent heartworm in pooches---there are other uses too.

Numerous studies report low rates of adverse events, with the majority mild, transient, and largely attributed to the body's inflammatory response to the death of the parasites and include itching, rash, swollen lymph nodes, joint pains, fever, and headache. In a study that combined results from trials including more than 50,000 patients, serious events occurred in less than 1% and largely associated with administration. The inventors of ivermectin received the Nobel Prize in Medicine and Physiology.

A large majority of randomized and observational controlled trials of ivermectin are reporting repeated, large magnitude improvements in clinical outcomes. Numerous prophylaxis trials demonstrate that regular ivermectin use leads to large reductions in transmission. Based on the totality of the trials and epidemiologic evidence presented along with the preliminary findings of the Unitaid/WHO meta-analysis of treatment, perhaps ivermectin should be globally and systematically considered in the prevention and treatment of COVID-19.

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A NOTE FROM THE EDITOR

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Lastly, a bill has been introduced in Albany to curb sale of dogs, rabbits and cats at pet stores. New York has more pet stores than any other state. The ASPCA and the Humane Society of the United States support the bill however the Associated Dog Clubs of New York and the American Kennel Club oppose it stating passage will increase the price of pets for consumers, cost jobs at retailers and decrease the choice of breeds available. Legislators Rosenthal and Gianaris countered that “puppy mills” can force females to reproduce constantly, often with too little water, food, space and medical attention. A call/text to your legislators is the way to express your opinion.

The renovation process at LIVS is progressing daily and all our departments remain fully staffed to serve our patients all hours of every day and night.

Consultations and appointments can be made by calling (516) 501-1700. As before we welcome all comments, please submit them to Imarino@livs.org

Leonard J. Marino, MD, FAAP, LVT



Greyhound Corns

Continued from Front Cover

The function of the stratum basale is to anchor (via hemidesmosomes), repair and re-populate the epidermis (via keratinocytes), to provide skin tone (via melanin from the melanocytes), provide mechanoreceptors, and to influence cutaneous blood flow, keratinocyte proliferation, the hair cycle and sweat production (the latter is via Merkel's cells).

The normal stratum spinosum in the footpads is 20 cells thick (1 to 2 cells thick in other areas of skin). The function of the stratum spinosum is to further anchor the epidermis via hemidesmosomes, desmosomes, adherens junctions and focal adhesions. In addition, the keratinocytes of this layer produce lamellar granules (keratinosomes, membrane-coating granules, and Odland bodies) to aid in the barrier function of the epidermis. The keratinocytes are also phagocytic. Langerhans' cells are part of the skin-associated lymphoid tissue, providing stimulation of helper T-lymphocytes and cytotoxic T-lymphocytes.

The function of the stratum granulosum is to provide keratinization, a barrier, and hydration to the stratum corneum. The stratum lucidum is a layer of dead cells that is rich in protein-bound lipids and is most prominent in the footpads. The stratum corneum is constantly shedding terminally differentiated keratinocytes to provide a constant epidermal thickness. It also provides a natural sunscreen. Normal dogs have measured a 5 to 1500 µm thickness. A large amount of lipids and antigenic material (protected from T lymphocytes) are also present.

The balance between growth and differentiation of keratinocytes is termed epidermopoiesis or keratogenesis, and is characterized by proliferation, differentiation and keratinization stages. This system is delicately controlled by various intracellular messengers, cytokines, enzymes and hormones. Keratin is the primary protein product of the epidermis and is the primary constituent of the skin barrier to the environment.

The end result is cornification. Among the most important and well-known epidermal lipids produced in this process is arachidonic acid, bound to the cell membrane phospholipid layer. It is the precursor to eicosanoids (vitaly involved with epidermal homeostasis). These lipids are important for the barrier function of the skin, stratum corneum water-holding, cohesion, desquamation of corneocytes, and epidermal proliferation and differentiation.

Human Medicine

In human medicine, hyperkeratotic lesions are described as calluses, corns or porokeratosis plantaris discreta. A callus is defined as a thick and hard area of skin formed as a response to repeated contact or pressure trauma. Corns are more discrete calluses with a central conical core of keratin found on the dorsal, lateral or interdigital aspect of the toes. They result from chronic pressure or friction where there is insufficient soft tissue between the skin and underlying bone. In humans, these lesions resolve when the cause for the abnormal stress is removed or corrected.

Porokeratosis plantaris discreta in humans is a painful hyperkeratotic lesion found on the weight-bearing plantar surface of the foot. This is thought to be due to hypertrophy of the eccrine sweat glands. Corns in greyhounds may resemble this condition, although no histopathological similarity has been found.

Greyhound Dogs (see Figure 2)

Signalment

Affected dogs are usually middle-aged to older racing or retired greyhounds. Age of affected Greyhounds ranges from 2 to 15 years. Breeds affected within this genre include racing and pet greyhounds, racing and pet Whippets, and greyhound crosses (called Lurchers). The incidence is unknown. The male to female ratio is 5:1. All affected females are spayed while 36% of males are neutered.

Gross Appearance

In dogs, corns are described as a circumscribed hyperkeratosis of the paw pad that is sensitive to pressure. Grossly, corns appear as thick, white circular firm areas of hyperkeratosis over the central, weight bearing portion of the digital pad with some protrusion above the pad surface. They may have a softer center in them, representing a conical core of keratin. This soft center may be the inciting cause of pain, inflammation and lameness.

Physical Examination

Dorsopalmar digital pressure by the veterinarian across the affected pad will elicit discomfort. Lameness of the patient may range from not present to non-weight bearing. Lameness may have a gradual, progressive onset, although an acute onset of severe lameness may be seen. Hard surfaces exacerbate the lameness. The nails of affected digits may appear less worn due to a tendency to bear weight on the metacarpal or metatarsal pads.

Location

The most common location is the center of the digital pads (the primary weight-bearing region), but the metacarpal and metatarsal pads have also been reported. Ninety percent of corns are located



Fig. 2 - Typical appearance of a corn on a Greyhound.
www.vetlearn.com

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Greyhound Corns

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on the digital pads of thoracic limbs with the remaining 10% are located on the digital pads of pelvic limbs. Ninety percent of lesions are found on the weight-bearing digital pads (digits 3 or 4). The second digit has also been reported to be affected. Multiple corns are found in 23% of cases.

Concurrent Conditions

Forty percent of cases may present with concurrent pathologies. These include carpal hyperextension, deep digital flexor tendon rupture (either incomplete or complete), superficial flexor tendon rupture, phalanx 2/3 ankylosis, phalanx 2/3 subluxation, and phalanx 3 amputation. Whether these conditions occur independently, are a result of corns or the cause of corn formation, is unknown.

Causes

It is suspected that, similar to humans, corns in dogs may be the result of chronic low-grade pressure. This may be due to their activity levels and tendency to be experience pressure stress from racing. This appears to be the most prevalent theory at this time.

Anatomical differences may also play a role. Compared with Labrador retrievers, Greyhounds have long, narrow feet with little distance separating the digital pads from each other. In addition, Greyhounds have less adipose tissue and therefore less subdermal connective tissue resulting in decreased cushioning of the pads against the flexor process of phalanx 3, however, biopsies of normal Greyhounds compared to normal German shepherd dogs, reveals no differences.

Perhaps adding to the two above theories, the striking gender difference is interesting.

This predilection of males may represent their tendency to weigh more than females, their proportionally increased paw pad areas, and their use being more common in racing.

Another reported cause is foreign body penetrations, although they are rarely found.

Chronic wounds, causing small particles of epithelium to be introduced into the subcutis (either by foreign body penetration or by the exploration of cuts, punctures, or lacerations resulting in scar tissue formation), has been suggested as a possible cause.

Papilloma viral infection is another potential cause. Unfortunately, a viral etiology to warts on the paw pads of greyhounds has not been found. Histopathological evaluation, immunohistochemical staining, polymerase chain reaction, and electron microscopy have all failed to reveal papillomatosis.

Diagnosis

Clinical suspicion is highly suggestive of the disease and histopathological evaluation confirms the diagnosis.

Radiographs of the affected paw may reveal a foreign body (glass, plant material or grit). Other associated abnormalities include soft tissue swelling of the affected digit(s) and degenerative joint disease of the metatarsophalangeal, metacarpophalangeal, or interphalangeal joints.

Histopathological evaluation of corn lesions may reveal (1) acanthosis with orthokeratotic and parakeratotic compact hyperkeratosis resulting in a cylindrical or conical mound of keratin raised above the skin surface, (2) fissuring and thickening of the stratum corneum, (3) loss of the normal rete ridges forming plaque-like areas of pad epidermis, and (4) variable amounts of dermal and subcutaneous necrosis, granulation tissue formation and fibrosis.

Other Dog Breeds

Non-greyhound breeds tend to have lesions located on the fifth digital pad, the metacarpophalangeal pad or the metatarsophalangeal pad. These breeds are more likely to be positive for papillomavirus (60% of those patients). The virus requires a 6-week incubation period before a wart is evident and if present on a Greyhound, up to 8 or 10 can be present during a period of 7 days. It appears as though papillomatosis should be considered a separate clinical condition, even if found on a Greyhound dog. Histopathological examination of the lesion may reveal the absence of inflammation in the Greyhound but the presence of it in other affected breeds (40% of those patients). Finally, recurrence after treatment appears to be less likely with non-greyhound breeds affected by wart-like lesions of the paw pads.

Treatment Options

The treatment of choice is full-thickness excision (using a laser, scalpel blade or punch biopsy). When performing surgical excision care must be taken to fully resect any sinus tract or foreign material present. In many instances elliptical incision around the corn is made to the level of the phalangeal bone. When closing the defect care must again be taken to achieve excellent apposition and keeping sutures away from incision line. Protective bandaging should be placed to minimize tension across incision line when weight bearing. Healing of the pad takes longer than other incisions and sutures are recommended to remain at least three weeks with regular bandage changes to monitor healing. Alternatively, distal digit ostectomy with pad repositioning has also been recommended; the distal condyles of the second phalanx and the bone and nail of the third phalanx are excised. Finally, digit amputation has been recommended but only as a salvage procedure.

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Greyhound Corns

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Alternate Therapies

Because of their common recurrence post-operatively, other modes of therapy have been tried. These include laser surgery, physical extrusion, hulling out the hard center (curettage), padding the foot with specialized boots (www.therapaws.net), subdermal silicone block gel particle implantation/injection lesion debridement, tea tree ointment application, duct tape application, soaking the corn followed by manual pressure to express the corn, corn flattening (with a rotary tool), keratolytic agent application, removal via a sharp flat-tipped dental root elevator and simply avoiding pavement floors. Silicone injection beneath the distal interphalangeal joint to increase cushioning, did seem to result in a decrease in pressure of the foot within three months. Regardless, all of these options lack considerable research and seem to carry unsatisfactory results thus far.

Post-operative Care

Post-operative care usually requires strict rest or limited walking exercises for 2 weeks followed by bandage and suture removal at that time. If incomplete healing is evident, cyanoacrylate skin glue can be applied. With racing greyhound, hand slips and trials can commence 7 days after suture removal.

Outcome

A high percentage of corns recur in patients even with surgical management. Most recur within two to three months post-operatively. The average period of time between successive surgeries was 20 months. Recurrence may be less likely with distal digit osteotomy and pad repositioning, although large studies are lacking.

Success rates for surgical excision alone (with up to one year follow-up) are 74%, however, recurrence within 5 years post-operatively is 52%. Concurrent foot abnormalities may have a higher rate of corn recurrence (78% versus 39%).

Re-excision is the current recommendation for recurrent corn lesions. Recurrence of either the primary lesion or development of a new lesion may occur in almost 100% of greyhounds post-operatively at some point in time.



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Radioiodine Therapy

Radioiodine therapy at Long Island Veterinary Specialists is the preferred choice! Radioiodine therapy (I-131) is the safest treatment for hyperthyroidism in cats and has been proven to be 96-98% effective, employing a single treatment. At LIVS, our specially designed radioiodine facility allows us to accommodate many patients and permits quick access to this life-saving therapy.

- Full-time, on-site medical staff provides care 24-hours a day
- On-site board-certified radiologists, internists, and oncologists
- Premier facilities feature cat condos, movies, and Animal Planet®
- LIVS' 3-day program allows the patient to go home sooner

**Call to refer your patients today!
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Using Food as Medicine, Part 2

Michel Selmer, DVM, MS, CTCVMP (Integrative Medicine)

Integrative Medicine



Essentially, kibble is fast food for our pets. It is not smart to make it your dog's lifetime, day in, day out meal. We live in a fast-food nation of overfed and undernourished people; commercial kibble only guarantees the minimum daily requirements of protein, fat, carbohydrates, vitamins and minerals, just like the fast-food industry for us. Will kibble -- fed occasionally -- do harm to your dog? No. Just like running through the drive thru occasionally will not do irreparable harm to your child. The key word here is occasionally.

I know the ideal way to feed a pet is to use wholesome, whole foods prepared to meet the dog's specific nutritional needs. In my work, I see the damage done from our dogs being undernourished and I see the healing take place when a dog is finally fed with a nutritionally specific and lovingly prepared menu of whole foods. Still, there are times when I feed dry kibble, times when life gets in the way. I am busier than normal and I have just not taken the time to prepare their menu properly. So, as you read this, give yourself permission to be imperfect. All pet owners are. Use this as a guide to properly feed pets, and aim for progress not perfection, and -- if just starting out -- start small.

In other words, if you have only fed your dog kibble his entire life, do not commit today to feeding nothing but a variety of ideally prepared, whole

foods forever, without fail. Instead, see if you can commit to supplementing your dog's current diet with one properly prepared meal per day or one amazing meal per week. This is better than nothing. It is a great start and excellent beginning. (Plus, your dog will love it!!) And if you have fallen "off the wholesome bandwagon" yourself --as I have many times -- do not give up. Just start again. This blog will show you how.

I just cannot tell you how many dogs have been "cured," how many issues and illnesses and conditions have resolved simply by addressing nutritional changes, including -- but not limited to-- simply getting them off kibble. Take Buddy, for instance, a dog who was regurgitating his kibble regularly due to a genetic anatomical defect that resulted in an esophagus that had lost its tone.

Now, with western medicine alone, Buddy's parents would be told to raise the height of his food dish, liquify his diet, and they would be told that this regurgitating would likely be part of Buddy's life forever. However, with an integrated approach we were able to take these suggestions

and also add a whole food diet. To be fair, I wanted to put Buddy on some herbal therapies, but in the beginning, he could not tolerate them so a diet change is what we were left with as a solid option.

Ask Buddy's mom what made the biggest difference in Buddy's life and she'll tell you switching to a whole food diet made all the difference. The same could be said by many of my clients. Here is an incomplete list of conditions that have been completely resolved, not with blood testing, surgery, medications or herbal remedies, but simply with a generic switch from kibble to whole food:

- allergies
- itching
- vomiting
- diarrhea
- skin problems
- and more!

"It matters not whether medicine is old or new, so long as it brings about a cure. It matters not whether theories are Eastern or Western, so long as they prove to be true."



**Please stay tuned for the next blog!
Using Food as Medicine Part 3: Ideal Food for Fido**

Canine Immune-Mediated Hemolytic Anemia

Kimberly Golden, DVM, Internal Medicine Clinician

Internal Medicine



Immune-mediated hemolytic anemia (IMHA) is the most common cause of hemolytic anemia in dogs. It arises when the immune system targets and destroys red blood cells. The disease is seen mostly in young adult to middle-aged dogs. Females are overrepresented. Approximately 1/3 of all cases of IMHA are seen in Cocker Spaniels. Other common breeds include Miniature Schnauzers, Bearded and Rough-coated Collies, English Springer Spaniels, Poodles, Bichon Frise, Miniature Pinschers, Flat-coated Retrievers and Old English Sheepdogs.

Most dogs (60-75%) with IMHA have primary/idiopathic disease. Secondary causes include:

- Infectious diseases (Ehrlichia, Anaplasma, Babesia, Bartonella, Mycoplasma, Leishmania, Blastomycosis, Leptospirosis, Heartworm, bacterial infections including diskospondylitis, chronic abscesses, pyometra, pyelonephritis)
- Neoplasias (lymphoma, hemangiosarcoma, leukemia, soft tissue sarcoma, bronchoalveolar carcinoma, mast cell tumor)
- Drugs (cephalosporins, sulfonamides, penicillin, Rimadyl, Methimazole, Phenobarbital)
- Vaccines – studies lack

Rule outs for IMHA that are considered non-immune-mediated hemolytic anemias include zinc

toxicity, acetaminophen toxicity, envenomation, and pyruvate kinase deficiency.

Clinical signs are mostly associated with anemia including lethargy, weakness, anorexia, collapse, and respiratory distress. If Evan's syndrome (combination of immune-mediated hemolytic anemia and immune-mediated thrombocytopenia with platelet count < 50,000) is present, clinical signs can include epistaxis, petechial hemorrhage and ecchymosis. Other clinical signs include hemoglobinuria, vomiting, diarrhea, and pica.

Physical examination findings are commonly associated with anemia (pale gums, tachycardia, tachypnea, heart murmur), icterus, splenomegaly, hepatomegaly, lymphadenopathy, and abdominal distension.

Initial diagnostics should include CBC, blood smear to evaluate for spherocytosis, saline agglutination testing, chemistry, and urinalysis. To perform a saline agglutination test, a drop of blood should be mixed with 4 drops of saline (100% specificity) and the slide should be evaluated for autoagglutination. It is important to differentiate agglutination from rouleaux formation. Spherocytosis in dogs and autoagglutination are the hallmark of IMHA.

Spherocytes are red blood cells that are partially phagocytized by cells of the spleen. What remains in an RBC that is slightly paler and more spherical in shape that is smaller than a neutrophil. Direct Coombs antibody test can be helpful to try to obtain a diagnosis for dogs that do not exhibit autoagglutination or spherocytosis. This test will help to identify antibodies coating the surface of RBCs. Most cases of IMHA have a regenerative anemia (2/3 of cases). An inflammatory leukogram (neutrophilia +/- degenerative left shift) is common. Neutropenia and thrombocytopenia can occur. Hyperbilirubinemia is quite common secondary to destruction of red blood cells. Other chemistry abnormalities demonstrate azotemia and hepatopathy. Hemoglobinuria and bilirubinuria are

common findings during evaluation of urinalysis. Other recommended diagnostics include a pathology review, abdominal radiographs (evaluate for metallic structures as zinc toxicity which can cause hemolytic anemia), thoracic radiographs, abdominal ultrasound, tick borne disease testing (PCR, serology, 4DX), Leptospirosis PCR and MAT.

Treatment is tailored for each pet as it is important to determine if an underlying disease is present. Components of treatment include treating the anemia, suppressing the immune system to reduce red blood cell disruption, and antithrombotic treatment.

- Packed red blood cell transfusion
 - 10-15mL/kg IV x 4 hours
 - Recommended for patients that are clinical for anemia and/or severe anemia
 - 1mL/kg will raise PCV 1%
 - Blood typing
 - Most canine blood is universal donor
 - Crossmatch
 - First blood transfusion does not require crossmatch
 - After initial blood transfusion, crossmatching is required
- Glucocorticoids – mainstay of treatment to suppress the immune system:
 - Prednisone PO 2mg/kg/day

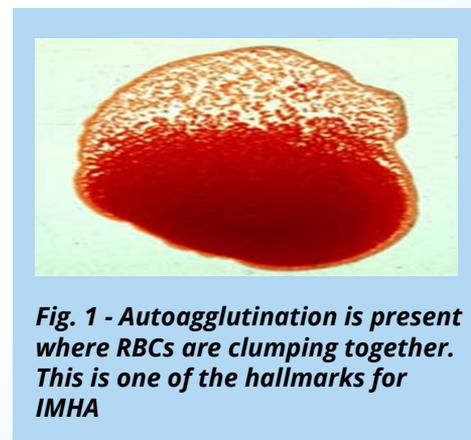


Fig. 1 - Autoagglutination is present where RBCs are clumping together. This is one of the hallmarks for IMHA

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Canine Immune-Mediated Hemolytic Anemia

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- Do not exceed 60mg/day regardless weight of patient due to intolerable adverse effects
- Adverse effects: Polydipsia, polyuria, polyphagia, excessive panting, muscle weakness, lethargy, urinary incontinence, temperament change, diabetes mellitus, secondary infections, calcinosis cutis
- Dexamethasone sodium phosphate IV 0.3mg/kg/d
- Second line immunosuppressive drugs:
 - Atopica
 - 5-10mg/kg PO q12h
 - Freeze capsules (not entire box) to reduce GI effects
 - Improved bioavailability if given on an empty stomach. If GI signs, give with food.
 - Adverse effects: GI (vomiting, nausea, diarrhea, anorexia), gingival hyperplasia, uncommon idiosyncratic hepatopathy, secondary infections
 - Azathioprine
 - 2mg/kg PO q24h, reduce to every other day after 2-3 weeks
 - Adverse effects: GI signs (nausea, anorexia, vomiting, diarrhea) are usually self-limiting, severe hepatotoxicity, marked myelosuppression
 - Hepatotoxicity
 - > 2-fold increase in ALT
 - ALT > ALP
 - German Shepard Dogs are significantly over-represented
 - Median onset 2 weeks
 - Monitor liver values every 2 weeks during the first 2 months of treatment and then every 1-2 months until treatment is discontinued
- Monitor CBC during treatment
- Mycophenolate
 - 8-12mg/kg PO q12h
 - Adverse effects: Diarrhea (most common, higher doses and usually responds to dose reduction)
- Human Intravenous immunoglobulins (IVIg)
 - Salvage measure for refractory patients
 - 0.5-1.5g/kg single dose infusion over 6-12 hours
 - Adverse effects - uncommon: Anaphylaxis, increased risk of thrombosis, renal failure, hypotension
 - Very expensive
- Antithrombotic treatment
 - Not recommended for patients with severe thrombocytopenia (platelet count < 30,000)
 - Continue until prednisone is discontinued
 - Clopidogrel
 - Preferred drug due to unpredictable platelet inhibition with low dose aspirin and GI adverse effects
 - Loading dose 10mg/kg PO once and then 1-4mg/kg PO q24h
 - Adverse effects: Hemorrhage - uncommon
 - Aspirin
 - 0.5mg/kg PO q24h
 - Adverse effects: Vomiting, anorexia, abdominal pain, dermatologic, hemorrhage, nephrotoxicity - rare
- Doxycycline
 - Treatment of choice for most tick-borne disease
 - 5-10mg/kg PO q12-24h with food x 30 days
 - Adverse effects: Vomiting, diarrhea, anorexia/hyporexia, hepatopathy

- Gastroprotectants (Pantoprazole or omeprazole > famotidine; sucralfate)
 - Consider if ongoing evidence of GI ulceration (melena) or potential risk factors for developing GI ulcers

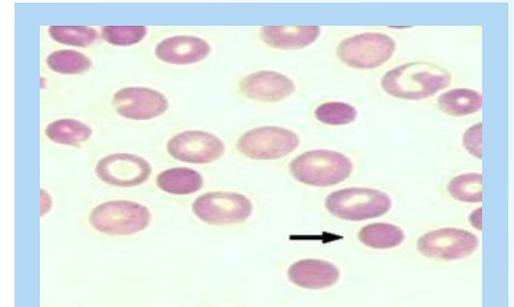


Fig. 2 - Spherocytes are seen and described as small RBCs with lack of central pallor. These cells are smaller than a neutrophil. This is one of the hallmarks for IMHA

Immunosuppressants should be gradually weaned over several months. Reduction of an immunosuppressant is recommended every 3-4 weeks if the hematocrit/packed cell volume is normal with absent or minimal spherocytosis. Complications of immune-mediated hemolytic anemia include thromboembolism, refractory anemia, hemorrhage, acute kidney injury, and disseminated intravascular coagulation. Numerous studies have been performed evaluating poor prognostic indicators include hyperbilirubinemia (>4g/dL), hemoglobinuria, degenerative left shift, thrombocytopenia, and hypoalbuminemia. Death is usually associated with thromboembolic disease. Approximately 30-80% of dogs with IMHA die from thromboembolic disease. The prognosis for IMHA is considered guarded with relapse rates of 6-13%.

Patients should only receive rabies for legal purposes. Other vaccines should be considered on case-by-case basis (i.e., unvaccinated puppies). Avoid contact with other dogs when receiving immunosuppressants – dog park, pet stores, etc. In the future, dogs with IMHA should not receive drugs that can cause IMHA – see above. Patients can have a good quality of life, but treatment can be very expensive as patients often require multiple pRBC transfusions.



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