A NOTE FROM THE GHI TEAM

Spring is waning and summer is upon us with a vengeance. With the promise of sweltering summer heat, weather hazards and an increase in summertime parasites, it's time to plan ahead for these possibilities for your family and your pets. Because of hot weather, more Greyhound play dates and summer can bring their own concerns, we will touch on some of them in this issue as a gentle reminder with an emphasis on heat.

We would like to thank all of you who participated in our recent “Celebrate the Donors” Auction benefitting the Greyhound Health Initiative Blood Bank. We raised over $2500.00 and it was your support as donors, bidders, visitors, and those who shared their donor dog’s stories to the auction, that made it a wonderful success! We felt it was important not only to celebrate all of the canine blood donor heroes around the country, but to encourage more people to have their canine companions screened and to volunteer them to be donors as well. We hope that all our followers will continue to celebrate their blood donor heroes all year by sharing their stories and accomplishments. In this issue we share one family’s story of their many “hero hounds”

An article on “Bloat” was requested and we have provided one we feel is appropriate. Discussions on the use of raised feeding bowls continue to be controversial and the pros and cons of one large meal per day vs feeding small meals twice or more per day, remain topics for discussion. We hope that you find the article informative. We have added a journal article on Bloat to our “resources” page from the Journal Small Animal Practice/BSAVA

We have also included in this issue, two abstracts of current journal articles about hookworms and high potassium levels during anesthesia in Greyhounds. Both of these problems have been front and center within the Sighthound community for some time now. Because not all of our readers have medical backgrounds, we have given you the abstract for each with a link to each full article. You may download, print, copy or share these articles with your veterinarian.

Another risk that is always in the back of our minds is the 4th of July and the ever present dangers of fireworks. “Dwight’s Story” brings a frightening tale to light and reminds us to consider safety planning for our pups, not only on the 4th but the days leading up to and the days following the celebrations.

The Greyhound Health Initiative Team thanks you for your unwavering support of our mission to improve the health of Sighthounds worldwide. Have a happy and safe summer!

Articles and product information within the Healthy Hound Quarterly are not intended as a substitute for medical advice and, while the information contained herein is provided as a reference, it should not under any circumstance replace proper veterinary care and diagnostics. Any questions regarding the content of reproduced articles should be addressed with the original author.
Warm Weather Pet Safety

You might know that cold weather poses health risks to your pets, but so does warm weather — even on days that don’t seem that hot to you. Knowing the risks and being prepared can help keep your pet safe.

Be Prepared

- Talk to your veterinarian about warm weather risks for pets (and travel safety if you plan to travel with a pet).
- Make sure your pets have unlimited access to fresh water, and access to shade when outside.
- Keep your pet free of parasites that are more common during warm weather, such as fleas, ticks and heartworm.
- Ask your veterinarian how to recognize signs of heat stress.

Keep Pets at Home

- Leave your pets at home if possible when you need to go out and about.
- Provide different temperature zones within your house for your pet’s comfort.
- Never leave a pet in the car, even in the shade or with windows cracked. Cars can overheat quickly to deadly temperatures, even when the weather isn’t severe.

Keep Them Comfortable

- If it’s hot outside for you, it’s even hotter for your pet.
- Take walks, hikes or runs during the cooler hours of the day.
- Avoid hot surfaces, such as asphalt, that can burn your pet’s paws.
- Ask your veterinarian if your pet would benefit from a warm-weather haircut or sunscreen.

Exercising with Your Pet

- Consult your veterinarian prior to starting an exercise program for your pet. Overweight pets and short-nosed dog breeds have higher risk of problems with warm-weather exercise.
- Don’t walk, run or hike with a dog during the hottest parts of the day or on particularly warm days.
- Take frequent breaks.
- Bring enough water for both you and your pet.

Garden and Yard Safety

- Make sure the plants in your garden and yard are safe for pets.
- Store lawn fertilizer and insecticides out of reach of your pets.
- Always follow safety instructions on lawn and garden products, particularly the instructions on how long you should keep pets out of the treated areas.
- If you use a lawn service, make sure they are aware that you have pets.
- Avoid using cocoa bean mulch, which contains the same pet toxin found in chocolate.
THANK YOU!!!!

To all our supporters, donors, bidders and visitors who joined us for the “CELEBRATE THE DONORS AUCTION” benefitting The Greyhound Health Initiative’s Blood Bank

You helped make this auction a success!!

We now ask that you continue to celebrate your “Hero Blood Donor” canines by posting their donor achievements throughout the year. Encourage others to have their canine companions screened as possible donors. And always consider inviting a canine friend and its owner to come along when your pup donates.

Through every post and share, we can build up a mighty army of “Super Hero Blood Donors”

Find a canine blood donation center near you and help your canine companions help save the lives of other dogs

Our thanks again for your support,

~Janet Shaffer and Leslie Glynn~
My Greyhounds, 
My Blood Donor Heroes 
By Tara Campbell

My love affair with Greyhounds started March 27, 2010 when I brought home our first Greyhound, Will CoCo (AKA CoCo Chanel). During that first year, I learned a lot about Greyhounds and attended many Greyhound events such as Greyhounds in Gettysburg and Greyhounds Reach the Beach. It was during our first beach trip that year that I learned all about Greyhounds as blood donors and Blue Ridge Veterinary Blood Bank in Purceville, Va. I talked at length to the vet tech and got a lot of information. I took the brochures home and decided to give it a try.

It was amazing watching the process as CoCo was checked in. They were very attentive on our first trip, loving on CoCo, giving her treats and simply getting to know her. During that visit they picked her up and put her on the table. The vet assistant got up behind her, spooned her and loved on her while the vet tech stood beside her and talked to her. They wanted to evaluate how she would respond and react to being on the table, and of course just like all greyhounds she soaked up every second of love they provided her. CoCo became a regular blood donor over the next two years. Some of the benefits we received as donors included vaccinations, bath and day care, annual blood work, discounted emergency fees, donor appointment exams and much more.

Two years later we brought home another greyhound, Kiowa Neon Night. He would be our first “Neon”. Because donating blood is more fun with a friend along, Neon started going with CoCo to keep her company and he eventually started donating right along with her. It was amazing watching my hounds donate together as we continued our journey of making a difference donating to save other fur babies in need.

My heart was crushed in May 2013 when Neon was diagnosed with Osteosarcoma. We decided to take a break from donating while we dealt with this devastating illness. It saddened me that we would need to take this break, but I needed to focus on making sure Neon got the vet care and attention he needed during his battle with osteo. Six months later on 11/12/13, Neon lost his battle with osteo. It took us a that loss.
In 2014 we were ready to adopt yet another Greyhound, Uhaul Woody. He was a big beautiful boy with the most wonderful brindle markings. With our family now complete again, we were able to get back into the “donation” swing of things. I called to schedule them both to start donating again. I took both CoCo and Woody in together so that CoCo could resume her donating and Woody could start his career as a hound hero. It’s always more fun donating with a friend! The staff, as always at BRVBB, was amazing in the love they showed and how happy it made them to be a part of the process of saving lives.

Later that year we were offered a greyhound puppy and of course I was all over it, and in October 2014, we brought home this tiny little greyhound puppy that we named Nova. While he was too little to donate, he was able to tag along with us so that he could get familiar with the staff. There is nothing better than a puppy, especially a Greyhound “land shark”.

As a crazy, silly puppy, he got lots and lots of attention, all of which he just knew he deserved. It didn’t take Nova long to reach the age and weight required to become a blood donor like the rest of his pack. He seemed to grow from a 10 pound puppy to a 98.6 pound man hound overnight. Once they were able to do his “practice run” which was to get him on the table safely and comfortably, draw blood and to do his physical exam and have everything checked. All went well and he would be able to begin as an official blood donor on his next visit. We now had three hounds who were all blood donor heroes.

Again, life and the health of one of my hounds got in the way. We had to take another break when Woody became ill. Again, I needed to focus on Woody’s health, even as I still tried to take Nova and CoCo when I could. It was during this break that CoCo would retire as a blood donor. She had reached the age of 8 which is the age cut off for most animal blood banks. She was given her retirement papers and is now not only retired from racing but she is a retired from her second career as a blood donor. Sadly, our pack also changed once again during that time as we lost Woody. In a short time, we had gone from three donor hounds to just one with Nova continuing to donate regularly.
In October of 2018, we brought home another retired racer, Neon’s Night. He would be the second “Neon” to come into our lives. He and Nova are now donating together. They love seeing Dr. Val and Chris. At his next donation, Nova will have reached the wonderful accomplishment of donating 1 Gallon of blood. His plasma has been used to save a litter of puppies that had parvo. When BRVBB posts or sends a text that his blood was used, it warms my heart. I did get a message after one of their donations that both Neon and Nova’s blood was being sent out to another animal hospital that needed blood, I don’t always know where and when their blood is being used but I do know that every time they donated that it will be put to good use. I know that if it was not for these donations, many families would lose their beloved family pet. I would not want any family to go thru that. I would not want to find myself in a position with any of my hounds were in need of a blood transfusion and that I might possibly lose them if there was no blood readily available.

CoCo, the Queen of Donors and Hearts, turned eight years old, the age for retirement from the blood donor program. With the loss of Woody, Nova was now the only hound donating. That wouldn’t last long!

Neon2, a very handsome boy, joined the family ranks as a blood donor and donates regularly with his “brother” Nova.

It wasn’t long ago I also fostered Italian greyhounds. One of my former fosters, Abu that lived within 15 minutes of us, fell ill. They at first thought he might need a blood transfusions; his mom was devastated that she may lose him. I advised her that since I had Nova, if Abu needed any blood that I would bring him to the vet office she was at and they could draw his blood and use for Abu. Thankfully, they did not need the blood, but we were willing and ready to help him if we could. I would and do offer my services for anyone who uses our vet, that if an animal comes in and needs blood (and it has been long enough in between donations) that my hounds are always here for them if needed. If a family is in need of blood and could not afford the cost of the transfusion, we would donate our time and blood to them without charge for getting it from my hound.
The best thing about greyhounds is the universal blood type they have; they can help save other Greyhounds as well as so many other canine breeds. And that is the best part! Most people don’t ever think about what blood type their canine pet has until it’s needed. As blood donors, we are given this information upon the first blood draw. My hounds get a full blood work up by BRVBB every year that saves me around $800.00 a year per hound that is a donor. Put yourself in the position of having to take your dog to the vet and finding out they need blood transfusions to save them and there is no blood to save your dog! We all need one another to step up at times to help others. Allowing your canine to be a blood donor is a generous and valuable gift to other canines and their families.

**UPDATE:** Sadly, Tara lost her Heart Hound and Blood Donor, CoCo on May 3, 2019 as we celebrated all of the canine blood donors in our lives. The Greyhound Health Initiative gives thanks for all the love she gave her family and pack and we wish to thank her for her service in helping other canines live through her gift of blood.

**Being a blood donor is important. Please consider making your hound a hero. You never know when you may need a hero in your life to save your best friend. Please look for a canine donation center in your area!**

Love from my hero’s, both present and past.
CoCo, Neon1, Woody Nova, and Neon 2

Tara Campbell lives in Martinsburg West Virginia with her son Lane. She worked for many years within the health care field of patient and hospice care. She now works as a Customer Service Escalations Specialist. Her hounds have been adopted from Greyhound Inc. now known as Paws on the Mountain and Wheeling Island Adoption Kennel and Sarah and James Blanchard, Blanchard Kennels LLC.
Combination Anthelmintic Treatment for Persistent Ancylostoma caninum Ova Shedding in Greyhounds

Lindie B. Hess, BS, Laurie M. Millward, DVM, Adam Rudinsky DVM, Emily Vincent, BS, Antoinette Marsh, PhD

Ancylostoma caninum is a nematode of the canine gastrointestinal tract commonly referred to as hookworm. This study involved eight privately owned adult greyhounds presenting with persistent A. caninum ova shedding despite previous deworming treatments. The dogs received a combination treatment protocol comprising topical moxidectin, followed by pyrantel/febantel/praziquantel within 24 hr. At 7–10 days posttreatment, a fecal examination monitored for parasite ova. Dogs remained on the monthly combination treatment protocol until they ceased shedding detectable ova. The dogs then received only the monthly topical moxidectin maintenance treatment. The dogs remained in the study for 5–14 mo with periodical fecal examinations performed. During the study, three dogs reverted to positive fecal ova status, with two being associated with client noncompliance. Reinstatement of the combination treatment protocol resulted in no detectable ova. Use of monthly doses of combination pyrantel, febantel and moxidectin appears to be an effective treatment for nonresponsive or persistent A. caninum ova shedding. Follow-up fecal examinations were important for verifying the presence or absence of ova shedding despite the use of anthelmintic treatment. Limitations of the current study include small sample size, inclusion of only privately owned greyhounds, and client compliance with fecal collection and animal care. (J Am Anim Hosp Assoc 2019; 55:--------. DOI 10.5326/ JAAHA-MS-6904)

To read, download or print the entire journal article for yourself or to share with your vet, a downloadable copy is HERE
Hyperkalemia during general anesthesia in two Greyhounds

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CASE DESCRIPTION
A 36-kg (79-lb) castrated male Greyhound (dog 1) and a 25-kg (55 lb) spayed female Greyhound (dog 2) underwent general anesthesia for dental care with similar perianesthetic protocols on multiple occasions from 2013 to 2016. Both dogs had periodontal disease but were otherwise deemed healthy. Both dogs developed clinically relevant hyperkalemia, with signs including loss of P waves on ECG tracings, during multiple anesthetic events.

CLINICAL FINDINGS
Dog 1 developed hyperkalemia during 2 of 2 anesthetic events, with ECG changes noted during the first event. Dog 2 developed hyperkalemia during 3 of 4 anesthetic events, with ECG changes identified during the second and third events. Serum potassium concentration for both dogs was within the reference range prior to and between anesthetic events. No underlying etiopathogenesis for hyperkalemia was identified for either dog.

TREATMENT AND OUTCOME
In each hyperkalemic event, the clinician stopped the dental procedure and continued to provide supportive care and monitoring while the dog recovered from anesthesia. The ECG changes resolved, and serum potassium concentration returned to the reference range rapidly after inhalant anesthetic administration was discontinued. The dogs were discharged from the hospital without further complications.

CLINICAL RELEVANCE
Hyperkalemia in anesthetized Greyhounds resulted in serious cardiac conduction abnormalities, which could be potentially fatal if not recognized and promptly treated. Further investigation into the etiopathogenesis, prevention and treatment strategies, and genetic or familial components of this condition is indicated. (J Am Vet Med Assoc 2019;254:1329–1334)

ECG performed prior to anesthetic induction revealed

To read, download or print the entire journal article for yourself or to share with your veterinarian, a downloadable copy is HERE
Fear Can Be Fatal

Dwight’s Story

By Lenka Perron

Greyhounds are not new to me. In 1994, I had founded and managed a Greyhound adoption group in Michigan, and had personally fostered hundreds of new retirees. I handed over the reins of my organization when my third child came along, and after losing our last two adopted greyhounds, we decided not to “replace them” until our kids were older.

My children always knew about the background of the racing greyhound, but it wasn’t until my oldest daughter, who was 16 at the time, asked if we could consider fostering greyhounds. Her request to do so had a backstory. My daughter had significantly struggled with depression and anxiety, and I knew her request came from a place of wanting to help something else in need. I also knew there was a very good chance that by her rescuing an animal in need, that animal would rescue her in return.

We fostered our first “greyhound” after reaching out to a very good friend who ran her own veterinary clinic and who I worked closely with back in my greyhound adoption days. Knowing she still provided care to retired greyhounds, I asked her if she had a dog that needed to be fostered. We ended up with a Galgo from Spain. Galgos are used for hunting in rural areas of Spain, and they are inhumanely killed in large numbers. We opened our home to Chrissy, who was part Galgo, part Labrador. She was rambunctious and quite different from the relaxed racing greyhounds we were used to. It didn’t take long to flunk Fostering 101, and Chrissy became a permanent family member, much to my daughter’s pleasure.

It didn’t take long (and of course, it was no surprise to me), that Chrissy needed a playmate. Another group of Galgos had just arrived from Spain and included three puppies that needed fostering. We took Chrissy to meet the pups, and watched as one skinny, goofy and energetic boy stayed glued to Chrissy’s side. We named him Dwight from “The Office”. I think everyone can guess how the story ends. We were now proud owners of two Galgos, and they put more smiles on my daughter’s face than I had ever seen before during all her personal struggles.

Life went on joyfully, until the evening of June 30th, 2018. It was dark, and for some reason, I chose to go out into the fenced yard with Chrissy and Dwight. Thank God I did so. It happened immediately. There were a series of loud explosions way beyond any fireworks I had ever
heard. These explosions were in rapid succession, reminding me of the canons being shot at the historic Fort Mackinac battlefield re-creation. As this was occurring, our entire backyard lit up so brightly that I could have read a book from the illumination. What was happening was that commercial grade fireworks were being detonated so close to us, that we must have experienced what it felt to be like in a war zone.

It only took seconds. Literally, just seconds – for Dwight to severely panic. We have a safe yard and safe gate. We’ve fostered hundreds of greyhounds and never had one escape or leap a fence. But fear – serious, life threatening fear can make any living creature do whatever it takes to save themselves. As the explosions were going off rapidly, and as the yard was being lit up under bright skies, Dwight lunged for the gate, and squeezed his wide chest in between the 4” slats of our gate. I turned to look at the commotion I sensed at the gate and only saw as his back leg disappear.

He was out.

To describe the rest of this experience triggers so many horrible emotions. Mind you – as I describe all we did to find and capture Dwight, the explosions were still going off over our heads, lighting up our entire subdivision. And mind you – Dwight was trying to escape all of this but there was nowhere to go. Like city-sponsored fireworks, you could see and hear this display for miles in every direction.

I immediately ran into our home and screamed for everyone to run out. Only my oldest daughter and brother were home. Both ran barefoot outside without losing a moment. There was nowhere to run but towards a busy street. Dwight would not run the other way because it leads to our lake front where the fireworks were being blown off. I grabbed the car keys and made my way to the car, driving the side streets screaming for Dwight.

I want to add that in my panic, I wanted to drive to the lake and scream for whoever was responsible to STOP THE FIREWORKS!

As the streets were lighting up with explosive “booms”, we could see bloody paw prints up and down our street. During Dwight’s frantic escape, he managed to run back to our yard and turned around again. His bloody prints could be seen under the brightly lit skies, and we screamed to each other to follow his paw prints.
I think the hardest part was the part I witnessed. I was in my van, headlights shining ahead of me, and I could see Dwight running towards me. He was running so fast under the barrage of explosions...so hard and so fast that his legs couldn't keep up with his will. My daughter was in the middle of the street, and I wish no one could ever hear their child cry out the way she did. She screamed for Dwight, and he ran to her, virtually collapsing in her arms. She screamed and cried, because she knew he was hurt and scared. She was covered with feces, urine and blood. I was witnessing two lives that I cared about being scarred by this event.

She found the strength to carry him the short distance back to my van. He was breathing rapidly. It was an extremely hot evening, so we assumed that he was suffering from heat exhaustion. My brother is a registered nurse, so he began the process of bringing down Dwight's internal temperature. As I watched my brother cooling Dwight down in our bathtub, the shocking scene of blood throughout our home and around the bathtub from each of his pads being ripped off, angered me. I wanted to run down to the lake and scream at whoever was doing this. Even as we were trying to cool him down, the explosions were still going off. I quickly called our regular vet, Dr. Karen Michalski at Serenity Animal Hospital for advice.

That is also when I decided, in my moment of rage, to take pictures and post it on my personal Facebook page, with a quick message to STOP LIGHTING OFF FIREWORKS ILLEGALLY. We then left for what felt like the longest drive to Advanced Animal Emergency Center, an overnight emergency clinic 15 miles way. Dwight was still breathing heavily, and we thought it was because he was still in a state of panic. X-rays showed otherwise. In that brief (but what felt like forever) amount of time that he was running for his life, he had been hit by a car. It was chest impact, and he was bleeding internally in his lungs. We would need to transfer him to another "ICU" type clinic for animals another 30 miles away.

While he remained in the emergency clinic overnight to be stabilized, we were able to return home briefly to make additional arrangements. My daughter was with me (early morning), and it was then we could see bloody prints up and down our street as we made our way to our driveway. It was horrifying, painful and sad to see the severity of all Dwight had been...
through. We followed the prints to the main road, and saw that he had headed south past our local convenience store, and then ran out into the street. We could see the sight of impact on the main road. We then followed more prints back to our subdivision as Dwight tried to return home.

I took a moment to email the President of our residential association, asking if she knew who was lighting the commercial grade fireworks at the lake last night. She lives on the lake, and certainly she would know as permission to use our lakefront is required. She did not return my email, which was highly unusual of her.

I then visited my Facebook page and was utterly shocked. My post had been shared over 7000 times, and I had messages from local media wanting to cover the sad events surrounding Dwight. I knew instinctively that this was the positive that would come out of all this. Changing people from being ignorant of the risks of fireworks, to making them INFORMED. Dwight was going to be an agent for change, but first we had to carefully transport him to Oakland Veterinary Referral Services, the specialty clinic. We were overwhelmed with the description of his injuries and the level of care he would require. He would be attached to a machine that continually drained the blood and fluid from his lungs. He’d be on oxygen. He’d be medicated to keep calm. He’d have one technician assigned to stay by him 24/7, and we would pray that his body could heal himself without needing major surgery, or worse.

Dwight required intensive care around the clock. Being hit by a car caused injuries to his ribs and his lungs as well as his feet. He was kept sedated for 5 days in the ICU and required placement of a chest tube to help re-inflate his lungs and help them heal. His paw pads required monitoring and dressing changes. Because keeping Dwight calm and quiet were of paramount importance to his healing, his family was not allowed to visit but were updated regularly.
That afternoon, we came home to a barrage of requests from both local and national media. We tried to accommodate them all. We focused our media quotes on the anxiety fireworks cause to animals and to veterans and people suffering from PTSD. We urged people to learn about their local fireworks ordinances and adhere to them for the safety of all, or better yet, do not light them off at all. Within 24 hours of Dwight’s injury, my post had been shared over 300,000 times, and my inbox had over 10,000 private messages from around the world. Heartbreaking, poignant messages detailing personal stories of what had happened to their pets due to fireworks. Messages from veterans wishing citizens would understand that people may be hiding in a quiet, dark house, suffering from panic attacks while people light off their fireworks. Messages of support from Africa, Australia, Poland, you name it….....they were coming fast and furious. People were sharing Dwight’s story, and it’s the one time I was happy with what social media could accomplish.

As Dwight remained in critical condition, I began investigating further the details around the fireworks on June 30th. The reason the president of our association did not return my email was because it was her and her husband who purchased the illegal fireworks and hosted the event. Because Dwight’s care was going to exceed $10,000, I did contact an attorney (the homeowner’s insurance company will usually cover the costs as it was clear negligence), and I filed a police report. Unfortunately, despite having many animal-loving witnesses who attended the fireworks willing to give a statement, the president lied to the police. Sadly, both the police and the attorney indicated that without actual proof (videos, etc.), this would drag out for years and cost me in the long run. As much as I feel that financial penalties make for a good deterrent, I was going to have to let drop my desire to hold the homeowner responsible for Dwight’s medical costs.

After all the media focus on Dwight, we got the call that Dwight was healing very well, and that he could come home. We brought our entire family with us to pick him up, and he cradled with us in the back seat, so happy to be with us again. He came home to hand made blankets and ointments and toys sent by beautiful, well-wishing strangers. A Go Fund Me was set up, and we had Dwight’s $13,000 bill covered by the generosity of complete strangers within days. What I do not think these generous people realize is that in the midst of seeing her beloved dog suffer, and in the midst of witnessing how poorly the responsible party handled it, it was the genuine love and concerns by thousands of strangers that helped my daughter heal from this event.

As they say, love conquers all. Always.

I would like to now give personal advice around this very serious issue. And when I say serious, I mean serious – serious to both humans and animals.

We must educate. We must talk, talk, and talk to everyone. Cities have firework ordinances for a reason, and I can tell you that most people do not know what they are, and furthermore, police
cannot enforce these ordinances for a number of reasons, including the fact that by the time fireworks are lit off in someone's driveway, they are finished by the time the police arrive.

A few things you may not know.

Fireworks continue to be designed “bigger and badder”. And, believe it or not, the fireworks industry has lobbyists who contribute to local politicians. If you want to know how or why average citizens are able to buy more and more dangerous fireworks, look no further than the fireworks industry making political contributions, and in return, getting more and more communities to relax their fireworks ordinances. So it is very important to grab all your animal loving friends, fellow veterans and those suffering from PTSD to speak in front of your city council meetings and demand more restrictions and better enforcements, as well as better education around fireworks safety. And be armed with statistics. Pay attention to your local community FB pages, etc., following big fireworks events. You would be shocked at how many dogs escape their yards in fear during fireworks season. Find opportunities to reach out to kids and parents, since kids very commonly light off fireworks at unpredictable times. Try to appeal to their compassionate, animal loving side, or to their support of our veterans.

Talk to fellow residents about your local ordinances and make sure they are aware. In our case, the lakefront homeowner violated 3 ordinances. She lit them off outside the dates allowed (June 30th), she detonated illegal fireworks (commercial grade), and she detonated within 200 feet of a residential home. These ordinances are there for safety reasons.

And finally, take advantage of social media. Comment, share links, and do whatever you can throughout the sphere of social media to get these conversations going and inform the public. You would be surprised at how many citizens oppose the use of fireworks outside the careful control of city-sponsored shows. The more our local politicians are aware of the growing sentiment against public use of fireworks, the more likely they will pass tougher ordinances. But as long as the fireworks industry remains powerful and profitable, this is going to be a tough fight – but one well worth it.

As for caring for your own pets, simply be prepared. Get a prescription ahead of time for anti-anxiety medication. It helps a lot. Create a safe place for your pet to retreat, and keep on some background noise to deaden the sound of fireworks.

In closing, our experience with Dwight while horrific, also allowed Dwight to become an incredible “spokes-dog” for a very important issue. No one would ever volunteer for a position like this, but Dwight had a bigger calling I guess.

I wonder if my daughter knew what she was getting into when she asked the one innocent question in 2016, “Can we foster a greyhound mom?”

Lenka Perron lives in Michigan with her husband, 3 children and 2 Galgos and works as a Risk Management Consultant. Lenka was the co-founder of Michigan Retired Greyhounds as Pets and served as the Michigan liaison for the Greyhound Protection League from 1994-2007.
Fear of Thunderstorms and Fireworks

Why are dogs afraid of thunderstorms and fireworks?

- Many dogs are afraid of loud, sudden, unpredictable noises, not just thunderstorms and fireworks. If a dog is noise-sensitive, it’s very likely that these noises will be frightening to him.
- Wild animals react to thunderstorms fearfully. This is appropriate, because storms can be dangerous. If you can’t take cover from a storm, you risk being struck by lightning, drowning in a flash flood, or being injured by falling trees or flying debris. Seen from this perspective, fearful behavior during thunderstorms is not really abnormal at all. The problem is that modern pet dogs are, for the most part, shielded from the real dangers of storms, but they may create danger for themselves by their reactions to storms.
- Occasionally, storms cause real damage to the dog’s environment: trees fall on houses, lightning strikes, power goes out, flooding occurs. These real experiences usually worsen fears, or cause fears in dogs who weren’t afraid of storms before.
- Fireworks have many of the features of thunderstorms, including various explosions and other strange noises, and flashes of light. It’s not surprising that many dogs are just as afraid of fireworks as they are of thunderstorms. Smaller firecrackers set off by neighbors are just as problematic, since they are close and completely unpredictable.
- Whether because of years of frightening experience or decreased tolerance, storm fear often appears in adult dogs, and may even appear for the first time in senior dogs.

What are the signs of thunderstorm fear?

The behavioral signs of thunderstorm fear often begin before a storm arrives. Dogs who are fearful of storms look for signs like increasing wind, low barometric pressure (muggy, humid days), and darkening skies.

- Panting; pacing; whining; salivating; trembling; urination and defecation (including diarrhea) in the house; digging and clawing at floors and walls; chewing household objects, woodwork or walls; attempts to hide or escape (which may include digging and chewing); running away if escape occurs; attempts to stay near a family member, are all signs of thunderstorm fear.
- Some dogs exhibit redirected aggression to other household dogs as a result of their fear. This can result in dog fights with injury, as the fearful dog attacks another dog in the household. The dog who is the target of the aggression may be one with whom the fearful dog has conflict even without the stress of a storm. Vigilance is required to prevent injury, and the fearful dog will need to be separated from the target dog.
- There is a danger in multi-dog households that another dog will attack the dog behaving fearfully. This is not an attempt to “correct” the behavior; it is an emotional response to the behaviorally agitated state of the fearful dog. This same situation occurs when other household
dogs attack an epileptic dog during a seizure. Again, vigilance is required to prevent injury, and the fearful dog will need to be separated from the other dogs in the household.

○ Aggression that occurs during storms can worsen conflict that occurs during normal daily life.

• Unfortunately, some dogs who are afraid of storms will eventually generalize their fear of thunderstorms to any and all rain or wind events. Clear, windy days, and gentle rain will then cause the same fear and panic as thunderstorms do.
• These dogs may require, at least for a time, management with appropriate antianxiety medication daily even in the absence of storms (see below).

What options are there for behavioral management of thunderstorm fear?

First, it’s important to remember that fear responses are not voluntary; that is, a dog doesn’t decide to feel and exhibit fear of storms. The amygdala, a part of the brain which processes both negative and positive emotions, is a part of the central nervous system that is not under voluntary control.

Remembering the difference between operant conditioning and classical conditioning is important here. Operant conditioning is the training type of conditioning, and involves “if:then”. If I say sit, and you put your rear end on the ground, then I will give you a treat. Classical conditioning is the “Pavlov’s dog” type of conditioning. Bell rings, indicating that people are entering the lab to feed, dogs begin to salivate at the sound of the bell, which had no association with feeding and therefore salivating until the dogs learned that connection over many repetitions. Fear or eagerness in certain situations is learned by classical conditioning, not operant conditioning. They do not involve voluntary responses, but involuntary emotional responses the dog can’t control.

Because fear is not an operantly conditioned behavior, it can neither be effectively punished or rewarded. The goal of managing storm fear behaviorally is to change the dog’s emotional state from frightened and distressed to neutral or even content. Though limited, there are a few options for addressing fear of thunderstorms behaviorally.

• First, do not ignore your dog during storms. This advice used to be given because it was believed that attention during storms would reward the fearful behavior. As above, this is simply false. Ignoring a fearful, panicky dog deprives him of whatever comfort and psychological support you can give him. It also leaves him without any information about what he should be doing instead.
  ○ NEVER PUNISH A DOG BEHAVING FEARFULLY! Punishing a dog by yelling, holding him down, squirting him with water, jerking his collar or anything else aversive, may temporarily stop some behaviors like pacing, digging and whining. However, punishment only inhibits behavior; it does not calm. Never use a shock collar or even a citronella collar to stop fearful behavior during storms.
  • Inhibition and calm may look somewhat similar (absence of agitated behavior), but calm is an absence of stress and inhibition is a very stressful state.
• Punishment’s undesirable effects include: adding to the stress of an already badly stressed dog; adding to his fear of storms as he anticipates the punishment he now associates with the storms; decreasing his trust in you, and therefore the possibility that you will be able to calm him during storms.

• It may be helpful with puppies and young dogs to try to do pleasant things with them during storms in an effort to prevent fear from developing. This includes having a supply of things they really love to chew, and providing these special things during storms. These can include food toys stuffed with really delicious food or marrow bones in the freezer, and special chewies like bully sticks or pigs’ ears. These things are not reserved for storms, which could make them become associated only with storms and therefore undesirable. But they are provided when a storm starts.
  ◦ If possible, get your dog started on one of these items as quickly as possible before the storm is really raging, in hope that he will be less attentive to and sensitive to the noise and lightning.

• Some dogs are able to direct their anxiety to destroying “sacrifice items”, such as cardboard boxes or paper items like old phone books. This destructive behavior can function as a way to displace the dog’s anxiety onto a pleasurable activity. This is not an option for dogs who would ingest the items, however.

• If there is an activity your dog can’t get enough of, that is something to do during storms. This can include playing fetch, chase games, even cuddling and petting, or holding the dog firmly next to you if that comforts him.

• There is some evidence that some dogs will respond to pheromone devices, such as a DAP, Adaptil or NurtureCalm collar, though some dogs do not respond at all. Some of these products are also available in a plug-in diffuser, which could be tried in the safe haven.
  ◦ Aromatherapy is sometimes recommended for storm fear, though there is no good evidence that it is effective. Most essential oils are toxic to cats, so caution is necessary in households with cats.
  ◦ There is no good evidence that Bach flower essences and homeopathic calming preparations are helpful for true storm fear.

• When storms occur at night, some dogs can be comforted by being allowed in bed with you. Again, this is not going to reward or encourage his fear, but it may be comforting enough that you can both get some sleep.

• If you are afraid of storms, or if the storm is a particularly bad one and you are frightened yourself, try not to act obviously afraid. Dogs are very good at reading our behavior, and if our emotional state is distressed, this will add to their distress.

• If the fearful dog is an aggressor or target of aggression with other dogs in the household, he will need to be separated from them during storms.
  ◦ This may mean that he must be elsewhere (day care, with you, in someone else’s home) on days when storms are likely.
  ◦ It’s unlikely that you will be able to separate the dogs by crating the fearful dog, because of the chance that he will panic in the crate and injure himself trying to escape.
What options are there for environmental management of thunderstorm fear?

Some dogs respond well to having a “safe haven” to go to where they can hide and be reasonably secure and comfortable. This can be a room, a large closet, or a basement. Some dogs prefer a bathroom, especially the bathtub or shower. It’s important to teach the dog to go to the safe haven on cue. The safe haven should always be available to the dog, in case a storm occurs when he’s alone at home.

- It may be helpful to have blackout shades in this room to minimize the effect of lightning.
- Having a light on in the room may also help to minimize the visual impact of the lightning flashes.
- Competing sounds, like a radio or a white noise machine, may be helpful, but loud thunder can’t be masked by any ordinary sound.
- Some dogs may do best if they can hide under a bed during a storm.
- Some dogs do well in covered crates. In this case, though, it’s important to make sure they don’t overheat in a crate without ventilation in warm weather.
- Dogs are probably attracted to bathtubs and showers by the fact that bathrooms are often somewhat sound insulated, and bathtubs and showers even more so.
  - There is no truth to the idea that dogs seek out bathtubs and showers because the plumbing grounds them, offering protection from static electricity. During humid weather and rain, water-saturated air becomes a conductor of electricity, preventing static electricity from building up. This conductivity is the reason why a car with an electrical system problem won’t start on wet and humid days. The opposite is true in dry environments, which is why we often get static shocks in the winter when the heat is on and the atmosphere in our homes is very dry.

Dogs who are aggressive or targets of aggression with other household dogs will need to be separated from them during storms. This can make it more complicated to find an appropriate safe haven for the fearful dog.

Some dogs seem comforted by wearing a Thundershirt (which has a money back guarantee) or an Anxiety Wrap. Others find these kinds of apparel distressing, and they shouldn’t be made to wear them.

- Any dog wearing any sort of clothing needs to be carefully monitored so that his temperature does not rise, especially in his agitated state during a storm. Although dogs do regulate their body temperature mainly through panting, as stated on the Thundershirt web site, anything that insulates their body makes that job harder. In other words, the simple fact that clothing doesn’t interfere with the dog’s ability to pant, doesn’t mean it is perfectly safe. Particularly if there is no air conditioning, it’s critical to make sure the dog isn’t overheating, which can happen quickly with an agitated, frightened animal.
Behavior Medicine

- It may be necessary to insure that your dog is not alone during a storm. This may mean day care or having someone stay home with the dog on days when there is at least 50% chance of storms.
- Forcing a dog to stay behind a closed door or gate, or in a kennel or crate, can be very dangerous. Attempts to escape can cause injury and sometimes death, not to mention property damage.

What about medication?

- For most dogs with moderate or severe storm phobia, antianxiety medication is essential to manage the dog safely. Panicky dogs can damage homes, injuring themselves in the process. Some dogs will jump through screens or even windows in their fright. They may be injured doing this, and, if they run away, they may be hit by vehicles.
  - Because of the very fact that storm fear is not abnormal, it is usually very difficult to manage these dogs without antianxiety medication.
- The only person legally permitted to prescribe medication is a veterinarian.
- It may be necessary for someone to come in and give the dog his medication if you are unable to do so because of work or other absence. Each of the drugs has its own timing requirements, based on the time required for it to take effect, and how long the effect lasts.
- Dogs taking doses of medications likely to cause ataxia (balance problems) must be protected from falling down steps or other accidents.
- Finding the right doses of the right medications for individual dogs can be difficult and frustrating. Having the help of a veterinary behaviorist who has a lot of experience in this field may be crucial. Most veterinary behaviorists would be willing to consult with your veterinarian about this.

What about desensitization to storms?

Unfortunately, there is no good evidence to support the idea that dogs can be desensitized to storms. This is probably because it is simply impossible to replicate all the sensory stimuli of a real storm with a CD of storm sounds. The low barometric pressure, the rain, the humidity, the lightning, and the smell of ozone from lightning strikes cannot be imitated.
  - Playing a CD of storm sounds while treating or otherwise supporting and encouraging the dog is very time-consuming, with little hope of helpful results.
  - This effort may instead further sensitize the dog to storm sounds, worsening the situation.
  - If this occurs, the dog may associate even more things with storms—getting out a CD; working with his owner using treats; being in the room you use for practice.
  - The risks of attempting desensitization this way, combined with the time and effort involved, make it a poor strategy for working with dogs with thunderstorm fear.
• It makes more sense to work with the dog during a real storm, as above, and keep reminders of storms out of his daily life.

Alison Seward
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Behavior Clinic
Ryan Veterinary Hospital of the University of Pennsylvania
Why are dogs afraid of fireworks?

July 2, 2018 | News

Carlo Siracusa, director of Animal Behavior Service at Ryan Hospital, part of the University of Pennsylvania's School of Veterinary Medicine, offers some tips on how to make your pets feel safe during thunderstorms and fireworks. Click here for additional suggestions and some more in-depth information.

**Why are dogs afraid of thunderstorms and fireworks?**

**What are some environmental management options?**

Some dogs respond well to having a “safe haven” where they can hide and be reasonably secure and comfortable. This can be a room, a large closet, even a basement. Some dogs prefer a bathroom, especially the bathtub or shower. During storms and fireworks, keep dogs who are aggressive or targets of aggression separate from other household dogs. This can make it more complicated to find an appropriate safe haven for the fearful dog. Some dogs cannot overcome their fear with just environmental changes and therefore, it might be appropriate to discuss medication options with a veterinarian.
What are the signs of this kind of fear?

For a thunderstorm, the behavioral signs often begin before a storm arrives. Generally speaking, such signs include panting; pacing; whining; salivating; trembling; urination and defecation (including diarrhea) in the house; digging and clawing at floors and walls; chewing household objects, woodwork or walls; attempts to hide or escape (which may include digging and chewing); running away if escape occurs; and attempts to stay near a family member.

Some dogs exhibit redirected aggression to other household dogs because of their fear. This can result in dog fights with injury, as the fearful dog attacks another dog in the home. There is also a danger in multi-dog households that another dog will attack the dog behaving fearfully. This is not an attempt to “correct” the behavior; it is an emotional response to the behaviorally agitated state of the fearful dog.

What are some behavioral management options?

Because fear is not an operantly conditioned behavior, it can neither be effectively punished or rewarded. The goal of managing this fear behaviorally is to change the dog’s emotional state from frightened and distressed to neutral or even content. Though limited, there are a few options. First, do not ignore your dog during storms or fireworks. Ignoring a fearful, panicky dog deprives him of whatever comfort and psychological support you can provide. It also leaves him without any information about what he should be doing instead. Also, never punish a dog acting fearfully. Punishment only inhibits behavior; it does not calm. For puppies and young dogs, it may be helpful to try to do pleasant things with them during storms or fireworks, in an effort to prevent fear from developing.

What are some environmental management options?

Some dogs respond well to having a “safe haven” where they can hide and be reasonably secure and comfortable. This can be a room, a large closet, even a basement. Some dogs prefer a bathroom, especially the bathtub or shower. During storms and fireworks, keep dogs who are aggressive or targets of aggression separate from other household dogs. This can make it more complicated to find an appropriate safe haven for the fearful dog. Some dogs cannot overcome their fear with just environmental changes and therefore, it might be appropriate to discuss medication options with a veterinarian.

Carlo Siracusa is a clinical assistant professor of behavior medicine at the University Of Pennsylvania School Of Veterinary Medicine.
Bloat in Greyhounds
By Dr. Janette O’Keefe BscBVMS

What is “Bloat” – this is a term commonly used to describe gastric dilation and volvulus (GDV).

Bloat is a very serious health risk for many dogs, yet many dog owners know very little about it. It is frequently seen in deep-chested dogs and has been reported in greyhounds. The incidence of GDV or Bloat in greyhounds is such that it is important to be aware of the symptoms and the factors that can predispose the condition in order to manage your greyhound and minimize the risk.

The first and most important fact is that Bloat can kill in less than an hour; therefore any concern with your greyhound with regards to the presenting clinical signs seeking veterinary care is critical as time is of the essence.

The technical name for bloat is “Gastric Dilatation-Volvulus” (“GDV”) and has two parts to the condition:

1. **Gastric Dilation** - dilation of the stomach is often related to swallowed air (although food and fluid can also be present). It usually happens when there’s an abnormal accumulation of air, fluid, and/or foam in the stomach. Dilation can occur with or without “volvulus” (twisting).

2. **Volvulus or Torsion** - As the stomach swells, it may rotate 90° to 360°, twisting between its fixed attachments at the esophagus and at the duodenum (the first section of the small intestine). The twisting stomach traps air, food, and water in the stomach, resulting in obstruction of veins in the abdomen, leading to low blood pressure, shock, and damage to internal organs. The combined effect can quickly kill a dog.

### Symptoms

Typical symptoms often include some or all of the following:

**Primary or Cardinal Symptoms**

- a. Attempts to vomit, usually unsuccessful, and is often referred to as the “Hallmark Symptom”. Can be reported as sounding like a repetitive cough;
- b. Your greyhound is not acting like him/her usual self. This is usually the earliest sign and can sometimes be the only sign;
- c. Significant anxiety and restlessness. May refuse to lie down or even sit down;
- d. “Hunched up” or appear arched in the back;
- e. Lack of normal gurgling and digestive sounds in the abdomen;
- f. Bloated abdomen that may feel tight (like a drum).

**Secondary symptoms** *(These become apparent as the condition progresses)*

- a. Pale or off-color gums commonly cold to touch – dark red in early stages while in the later stages very pale to white;
- b. Coughing and unproductive gagging;
- c. Heavy salivating or drooling;
- d. Foamy mucous around the lips, or vomiting foamy mucous;
- e. Unproductive attempts to defecate;
- f. Looking at their side or other evidence of abdominal pain or discomfort;
- g. Drinking excessively;
- h. Heavy or rapid panting with shallow breathing;
- i. Apparent weakness; unable to stand or has a spread-legged stance, especially in the advance stages;
- j. Shallow breathing, accelerated heartbeat, weak pulse leading through to collapse.
Treatment

Stabilization and surgery are best when performed early in the course of the disease and mortality rates increase with the severity of disease. If your greyhound has exhibited any of the above clinical signs, they should be evaluated by a veterinarian immediately – do not waste time waiting to see if the symptoms stop or attempt home remedies (as some sites suggest online); the best and only real option is to seek veterinary advice early to increase the chances of survival.

<table>
<thead>
<tr>
<th>Causes</th>
<th>Preventative measures</th>
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<tbody>
<tr>
<td>Stress - Mating, whelping, boarding, change in routine, new dog/s or people in household, etc.</td>
<td>Avoid highly stressful situations. If you can't avoid them, try to minimize the stress as much as possible.</td>
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<tr>
<td>Eating habits - especially rapid eating, drinking water to quickly which can cause gulping of air, eating gas-producing foods (especially soybean products, legumes &amp; brewer's yeast), high fat meals and elevated food bowls.</td>
<td>• Do not use an elevated food bowl; • Do not permit rapid eating; • Feed 2 or 3 meals daily, instead of just one; • When switching dog food, do so gradually (allow several weeks); • Allow access to fresh water at all times but manage the amount of water-intake one hour before or after a meal.</td>
</tr>
<tr>
<td>Exercise - before and especially after eating.</td>
<td>• Do not exercise for at least an hour (longer, if possible) before and especially after eating; • Particularly avoid vigorous exercise.</td>
</tr>
<tr>
<td>Build &amp; Physical Characteristics - usually larger breeds with deep-chests with a higher incidence if they are underweight.</td>
<td>• Ensuring the diet is balanced and high quality with a protein content of &gt;30% (particularly raw meat) that is low in fat; • Avoid feeding dry foods exclusively.</td>
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<tr>
<td>Disposition - Fearful or anxious temperament, prone to stress or history of aggression towards other dogs or people.</td>
<td>• Being aware of their character traits and managing the environment to minimize risk factors.</td>
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<tr>
<td>Heredity - Especially having a first-degree relative who has bloated or underlying conditions affecting digestion (i.e. Exocrine Pancreatic Insufficiency – EPI) as gas is associated with incomplete digestion.</td>
<td>• If there are any concerns with regard to the condition or weight of your greyhound and if all other factors are normal but their weight or body condition remains poor; assessment by a vet to establish or rule out any underlying conditions such as EPI. Therefore if there is an underlying cause working with your vet is the best way forward for minimizing risk.</td>
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While reviewing articles and information on the internet related to this condition I noted that there were numerous sites offering reasonable information. Unfortunately also a number of sites presented information that was confusing and contradicting but worse of all they offered home-based treatment options. In no circumstances should you ever attempt home remedies with regard to bloat or GDV – it wastes time and can cause complications or the death of your greyhound. Bloat is an “emergency” and should be treated as such and not left to wait and see or attempt first aid at home.

To summarize, Bloat or Gastric Dilatation-Volvulus" ("GDV") has a rapid onset with a short window of time to seek veterinary advice and treatment. Once one or more of the above symptoms are present or if you have any concerns with your greyhound it is important that you seek veterinary advice ASAP as Bloat can kill within an hour.
# QUICK REFERENCE BLOAT CHART

**BLOAT** — Gastric Dilatation Volvulus (GDV) is a medical condition in which the stomach becomes overstratched and can sometimes twist (Gastric Torsion) by excessive gas content. It often occurs suddenly and can be fatal. Survival depends on recognizing the symptoms and getting prompt medical attention.

**SYMPTOMS MAY INCLUDE:**
- Extreme Restlessness
- Excessive Salivation
- Non-Productive Vomiting
- Enlarged & Painful Abdomen

**BLOAT MAY BE CAUSED BY:**
- Stress
- Excitement
- Swallowed Air
- Long Drink
- Familial Tendency
- Vigorous Exercise Before/After Meals
- Large Meals/Feeding Once A Day
- Diet of Dry Food

**THE CHART BELOW MAY HELP IN CASES OF BLOAT**

<table>
<thead>
<tr>
<th>PHASE I</th>
<th>WHAT IS HAPPENING</th>
<th>WHAT THE DOG DOES</th>
<th>WHAT YOU SHOULD DO</th>
<th>VET TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Air, fluid, and/or foam accumulates in the stomach and the stomach does not empty completely</td>
<td>Seems slightly uncomfortable; Loss of appetite but may eat grass; May try to vomit</td>
<td>Do not leave the dog alone; Keep the dog quiet; Give antacid (Gas X or Pepcid AC) if vet agrees</td>
<td>During this period the dog may recover without going into bloat; If there is doubt, call your vet</td>
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<table>
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<tr>
<th>PHASE II</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stomach starts to fill with gas (Gastric Dilation)</td>
<td>Anxious; Restless; Pacing; Salivating; Will not eat anything; Tries to vomit and may bring up white foam; Abdomen may be swollen</td>
<td>Call your vet, tell him what you suspect and why</td>
<td>During this period the dog may recover when your vet releases the pressure with a stomach tube</td>
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<tr>
<th>PHASE III</th>
<th>WHAT IS HAPPENING</th>
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<th>VET TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stomach twists (Gastric Torsion)</td>
<td>Very restless; Whining &amp; panting; Excessive salivation; Tries to vomit every 2-3 minutes; Stands with legs apart &amp; head down; Abdomen swollen &amp; sounds hollow if tapped; Gums dark red; Heart rate 80-100 beats/min; Temp as high as 104</td>
<td>Get someone to tell your vet that you are on your way and why</td>
<td>During this period the vet will need to relieve the stomach pressure; Starts intravenous fluids and drugs to combat shock; Performs immediate surgery to untwist the stomach</td>
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<tr>
<th>PHASE IV</th>
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<th>VET TREATMENT</th>
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<tbody>
<tr>
<td></td>
<td>Spleen &amp; stomach tissue become necrotic; Shock becomes very severe which could result in Heart Failure and Death</td>
<td>Unable to stand or stands shakily with legs apart; Abdomen very swollen; Breathing shallow; Gums white or blue; Heart rate over 100 beats/min; Pulse very weak; Temp drops to 98</td>
<td>Death is imminent; Get someone to tell your vet that you are on your way and why</td>
<td>As well as the treatment above, the vet will remove part of the stomach and spleen and continue to give drugs to counteract shock; It may not be possible to save the dog's life</td>
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May 2013
Heat stroke: diagnosis and treatment

Quick response, proper cool-down techniques essential to favorable outcome

By Melissa Marshall, DVM, Dipl. ACVECC

Heat stroke is a life-threatening condition characterized by an elevated core body temperature and central nervous system dysfunction. Despite aggressive lowering of core body temperature and treatment, the pathophysiologic changes associated with heat stroke can lead to multi-organ dysfunction, which can be fatal.

Recent research has shown that heat stroke results from thermoregulatory failure coupled with an exaggerated acute-phase response and altered expression of heat-shock proteins. This article will summarize the incidence, thermoregulation, predispositions, pathophysiology, treatment and outcome of heat stroke.

Definition and incidence

Hyperthermia in dogs can be pyrogenic or nonpyrogenic. Nonpyrogenic hyperthermia can result from exposure to high environmental temperature (non-exertional heat stroke) or from strenuous exercise (exertional heat stroke).

The classic definition of heat stroke is an elevated core body temperature > 41 C in dogs, accompanied by central nervous system dysfunction. An alternative definition that might be more appropriate in veterinary patients is: a form of nonpyrogenic hyperthermia associated with a systemic inflammatory response, leading to a syndrome of multi-organ dysfunction.

Data on incidence of heat stroke in veterinary patients are lacking, but it is a commonly recognized condition in dogs, especially in hot, humid environments.

Thermoregulation

Heat is generated by basal metabolism, muscular activity and oxidative metabolism.

The thermoregulatory center of the body is located in the hypothalamus and receives input from hypothalamic sensor cells that detect the temperature of the circulating blood and cutaneous sensor cells. A physiologic response is triggered when afferent sensors throughout the body converge in the hypothalamus and warm blood supplying the hypothalamus stimulates compensatory cooling mechanisms.

There are four modes of heat dissipation: evaporation, conduction, convection and radiation (see Figure 1).

Evaporative cooling involves the loss of water to the environment and cools the tissue/skin surface. Radiative cooling is the transfer of heat between the animal and the atmosphere. Convective cooling involves the movement of air across a surface carrying the heat away. Conductive cooling is the exchange of heat between two objects in direct contact with one another.
At ambient temperatures <32 C, convection, conduction and radiation maintain normothermia. Cutaneous vasodilation and increased cardiac output lead to increased cutaneous circulation, which promotes heat loss through radiation, conduction and convection.

Approximately 70 percent of the total body heat loss in dogs and cats is due to radiation and convection from the body surface. As environmental temperature increases, evaporative cooling is more important.

The initial compensatory mechanism is activation of the panting center in the brain as the nasal turbinates provide a large surface area for loss of water from the moist mucous membranes. Some heat loss occurs through sweating (foot pads) and excretion of feces and urine.

Nonpyrogenic hyperthermia occurs when heat production cannot be adequately dissipated by normal thermoregulatory mechanisms.

Predisposing factors

Predisposing factors for the development of heat stroke can be categorized into conditions decreasing heat dissipation and those increasing heat production.

Environmental conditions decreasing heat dissipation include increased ambient temperature, humidity, poor ventilation and water deprivation.

Patient factors include any condition or medication that impairs the ability of the normal homeostatic response mechanism, such as laryngeal disease, brachycephalic anatomy, cardiovascular disease, central or peripheral nervous system disease, obesity, hair coat, age and medications (diuretics, B blockers, phenothiazine derivatives). Excessive heat production can occur through extreme exercise, seizures, hormonal hyperthermia and drugs/toxicities.

Pathophysiology

Heat stroke causes an altered heat-shock response and an exaggerated acute-phase response that leads to the production of reactive oxygen species, increased vascular and intestinal permeability, culminating in direct cellular injury and enzyme destruction.

The central nervous system changes are characterized by cerebral edema, hemorrhage, infarction and cerebellar dysfunction. Experimental studies suggest that temperatures as low as 41 C may cause permanent brain damage, which may predispose patients to subsequent hyperthermic episodes.

The cardiovascular and pulmonary systems are compromised due to the peripheral vasodilation and decreased peripheral vascular resistance leading to hypovolemia. Excessive panting leads to hemoconcentration, sludging of blood flow and respiratory muscle fatigue.

Direct cardiac injury may cause myocardial hemorrhage and necrosis. Pulmonary edema may result from cardiac failure, damage to the vascular endothelium or hypoproteinemia. Damage to the gastrointestinal system is characterized by gut ischemia, which predisposes to bacterial translocation. Hepatic damage also has been seen and is described as hepatocellular vascular degeneration with centrilobular necrosis and cholestasis.

Acute renal failure due to tubular necrosis is a result of direct thermal injury, hypoxia and microthrombi. Hyperthermia induces the platelet activation and coagulation factors; combined with endothelial and platelet damage, this can lead to disseminated intravascular coagulation. Rhabdomyolysis occurs as a direct result of high temperature and may be increased in patients experiencing an exertional heat stroke.

Clinical presentation and laboratory findings

A complete physical examination and thorough history should be performed on all cases, because certain changes have been associated with a poor prognosis. The exam will help determine if the
hyperthermia is nonpyrogenic in origin. These patients should not be excluded from the suspicion of heat stroke if the history and clinical signs fit.

The temperature is typically greater than 41 C (106 F), although some patients may have normal temperatures at the time of presentation if the owner has already begun external cooling. The heart rate and pulse quality are variable, depending on state of shock ranging from bounding to absent pulses and tachycardia to bradycardia. Arrhythmias may be auscultated.

Tachypnea is common, and the patient may or not be dyspneic with stertorous breathing. With extreme neurologic dysfunction, apnea may occur. The mucous membrane color and capillary refill time are variable.

Initially these patients are hyperemic or have darkened mucous membranes due to systemic vasodilation and increased cardiac output, but can progress to pale or cyanotic mucous membranes with an absent CRT. Icterus may be noticed due to hemolysis or hepatic dysfunction. Patients may have altered mentation, seizures, be blind or comatose. Integument exam may reveal petechial hemorrhages or ecchymosis.

Initial assessment of patients with clinical signs related to hyperthermia should include: PCV/ts, blood glucose, electrolytes and blood urea nitrogen and/or creatinine.

Thorough laboratory work should occur early during resuscitation and include complete blood count, coagulation testing, chemistry and urinalysis. Complete blood-count changes seen can include thrombocytopenia and hemoconcentration.

Chemistry: hypoproteinemia/hypoalbuminemia, hypoglycemia, elevated alanine aminotransferase, alkaline phosphatase and total bilirubin, increases in creatinine phosphokinase, which may peak 24 to 48 hours after the insult, elevations in blood urea nitrogen and creatinine.

Various electrolyte changes are seen, such as hypernatremia, hyperkalemia and respiratory alkalosis and/or metabolic acidosis. Urinalysis may reveal casts indicating tubular damage, proteinuria and myoglobinuria. Coagulation testing may show prolongation in clotting times and elevations in fibrinogen degradation products.

Treatment

The goal of emergency treatment is to safely lower core body temperature as soon as heat stroke is suspected. This includes instructing owners to begin the cooling process before the patient arrives at the hospital. This can be accomplished by tepid water baths/hosing and fans. The use of ice baths is discouraged because it can cause peripheral vasoconstriction, which will impair heat dissipation. Additionally, leaving a cool towel on a patient will impair radiative, conductive and convective cooling once the initial conductive cooling has occurred.

Additional cooling mechanisms in hospital include cool water enemas and intravenous fluids. Cooling should be stopped once the temperature reaches 39.5 C (103 F) to avoid hypothermia and shivering, because temperature will continue to fall once cooling measures have stopped.

If dyspnea or cyanosis are observed on exam, upper airway disease should be suspected and appropriate treatment instituted (e.g., tracheostomy, sedation and intubation and supplemental oxygen).

Once cooling measures have been instituted and the airway is secure, therapeutic goals include volume resuscitation with isotonic crystalloids at a shock dose of 60ml/kg for cats and 90ml/kg for dogs.

Colloid resuscitation is indicated in patients with hypoproteinemia. If colloid resuscitation is used, the dose of crystalloid should be reduced by approximately 40 percent. Crystalloid and colloid fluid therapy should be continued based on the patient's cardiovascular and hemodynamic status.
Other factors taken into account should include the patient's need for oncotic support, glucose supplementation, electrolyte and acid-base abnormalities. Additional therapy should be directed at the affected body systems. Seizures should be treated appropriately with anti-convulsants (diazepam, phenobarbital, propofol). Cerebral edema may be treated with mannitol or corticosteroids. Corticosteroids also would benefit a patient with upper airway edema.

The gastrointestinal tract should be protected and antibiotic therapy instituted if bacterial translocation is suspected. The patient should be closely watched for the development of pulmonary edema, and treatment should be based on underlying cause (cardiogenic vs. noncardiogenic).

Nonsteroidal anti-inflammatory agents should be avoided due to increased risk of gastrointestinal bleeding, decreased platelet function and impaired renal function. Cardiac output and perfusion should be maximized by treating any underlying cardiac condition with appropriate medications (anti-arythmics, positive inotropes) and with vasopressors once adequate intravascular volume is obtained.

Serial examinations and lab work are of utmost importance to quickly identify any complications such as DIC and renal failure.

Outcome/prognosis

There are limited studies evaluating the prognosis and outcome for patients with heat stroke. The largest study identified an overall mortality rate of 50 percent. Risk factors for death in this study included hypoglycemia and prolonged PT and PTT at admission, elevated creatinine at 24 hours, delayed admission to the hospital of >90 minutes, seizures and obesity.

Heat stroke can result in multi-organ dysfunction that can be life-threatening.

The key to successful treatment includes rapid recognition and protocols aimed at rapid cooling and support of the affected body systems.

Collection of laboratory values helps determine the prognosis. Prevention of heat stroke relies on educating clients about the disease, especially for those patients deemed at risk.

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Disease Risks for Dogs in Social Settings

The following is a list of the most common diseases to which your dog(s) may be exposed at a dog gathering. There may be specific risks in your area that are not listed. For more information about specific diseases in your area, consult your veterinarian.

People can also spread some diseases (such as mange, ringworm, kennel cough and canine influenza) from dog to dog through shared brushes, collars, bedding, etc. or by petting or handling an infected dog before petting or handling another dog.

Canine distemper
Canine distemper is caused by a very contagious virus. Puppies and dogs usually become infected through virus particles in the air or in the respiratory secretions of infected dogs. Infected dogs typically develop runny eyes, fever, snotty nose, coughing, vomiting, diarrhea, seizures, and paralysis. It is often fatal.

Fortunately, there is an effective vaccine to protect your dog from this deadly disease. The canine distemper vaccine is considered a "core" vaccine and is recommended for every dog.

Canine influenza ("canine flu" or "dog flu")
Canine influenza is caused by the canine influenza virus. It is a relatively new disease in dogs. Because most dogs have not been exposed to the virus, their immune systems are not able to fully respond to the virus and many of them will become infected when they are exposed. Canine influenza is spread through respiratory secretions, contaminated objects (including surfaces, bowls, collars and leashes). The virus can survive for up to 48 hours on surfaces, up to 24 hours on clothing, and up to 12 hours on people's hands.

Dogs can be shedding the virus before they even show signs of illness, which means an apparently healthy dog can still infect other dogs. Dogs with canine influenza develop coughing, a fever and a snotty nose, which are the same signs observed when a dog has kennel cough.

There is a vaccine for canine influenza, but at this time it is not recommended for every dog. Consult your veterinarian to determine if the canine influenza vaccine is recommended for your dog.
Canine parvovirus ("parvo")

*Parvo* is caused by the canine parvovirus type 2. The virus is very contagious and attacks the gastrointestinal system, causing fever, vomiting and severe, often bloody, diarrhea. It is spread by direct contact between dogs as well as by contaminated stool, surfaces, bowls, collars, leashes, equipment, and the hands and clothing of people. It can also survive in the soil for years, making the virus hard to kill. Treating parvo can be very expensive and many dogs die from parvo despite intensive treatment.

Fortunately, there is a vaccine for parvo. It is considered a "core" vaccine and is recommended for every dog.

External parasites (ticks, fleas and mange)

*External parasites*, such as ticks, fleas and mange, are fairly common dog problems. Ticks from the environment, fleas from other dogs and the environment, and mange from other dogs pose risks at dog gatherings. Ticks can transmit diseases (see tick-borne diseases below). Fleas can transmit some types of tapeworms as well as some diseases, and they may end up infesting your home and yard if they hitchhike home on your dog(s).

There are many approved products available to **effectively prevent and treat external parasites** on dogs. Consult your veterinarian about the best product for your dog.

*Cheyletiella* mites cause "walking dandruff" on dogs (itching and flaky skin on the dog's trunk). They are spread from dog to dog by direct contact, and may require more aggressive treatment than fleas.

Fertilizers and pesticides

Some fertilizers and pesticides can be **toxic** to dogs. Avoid letting your pet walk, run, play or roam in areas that have recently been treated with fertilizers or pesticides.

Fungal infections (blastomycosis, histoplasmosis, cryptococciosis, coccidioidomycosis, etc.)

Fungal organisms in the soil can infect dogs when they eat or sniff contaminated soil. Dogs can also be infected through the skin, especially through a skin wound. The types of fungus seen vary throughout the U.S.: **histoplasmosis** is more common in the Eastern and Central U.S.; **blastomycosis** is more common in the Southeast, Southcentral and Midwest regions; **cryptococciosis** is more common in the Pacific Northwest region; and **coccidioidomycosis** is more common in the Southwest U.S. Histoplasmosis can be spread by bird or bat droppings.

In general, the fungus infects the body through the respiratory tract and causes fever, coughing, lethargy and flu-like or pneumonia-like signs. If eaten, digestive problems (e.g., pain, diarrhea) can occur. Immunosuppressed dogs (dogs whose immune systems are weakened because of disease or certain medications) are much more likely to become infected with these fungi and develop disease.
Heartworms

Heartworms are spread by mosquitoes and can cause coughing, lethargy, difficulty breathing, heart disease and death. Fortunately, there are many approved products to prevent heartworm infection. Consult your veterinarian about the best product for your dog.

Heatstroke

Heatstroke is a big risk during warm and hot weather. Remember that your dog is always wearing a fur coat and they are usually warmer than you are. A temperature that seems only a little warm to a person can be too hot for a dog. Add to that the fact that dogs at dog gatherings are often active and playing, and the heat could become deadly for your dog. Never leave your pet in the car on warm days. Even a 70°F day can be too hot in a car. Short-nosed breeds, such as pugs, Boston Terriers, boxers, bulldogs, etc. are more prone to heatstroke and breathing problems because they don’t pant as effectively as breeds with normal-length noses.

Signs of heatstroke include excessive panting and drooling, anxiousness, weakness, abnormal gum color (darker red or even purple), collapse and death.

Any dog showing signs of heatstroke should be immediately taken to a shaded area and cooled with cold, wet towels that are wrung out and rewetted every few minutes. Running cool water over the dog’s body and quickly wiping it away (so the water absorbs the skin’s heat and is immediately wiped away) can also help. Transport the dog to a veterinarian immediately, because heatstroke can rapidly become deadly.

Injuries

Any time unfamiliar dogs and/or dogs with different temperaments are mixed, there is a risk of conflict and injury. Bite wounds should be immediately evaluated by a veterinarian and efforts should be made to determine the rabies vaccination status of the biting dog. Overweight dogs and dogs accustomed to more sedentary lifestyles should be encouraged to become more active, but excessive activity can put them at risk of injury to joints, bones or muscles. If your dog is overweight and/or you plan to increase its activity level, consult with your veterinarian about the best plan to get your dog active with the least risk of injury.

Intestinal parasites

Intestinal parasites such as roundworms, hookworms, whipworms and tapeworms lay eggs that are passed in the dog’s stool and infect other dogs when they eat contaminated soil, lick contaminated fur or paws, or drink water contaminated with the stool from infected dogs. Tapeworms are spread when dogs eat fleas, lice, or rodents infected with tapeworms.

These worms can cause malnutrition (because they steal nutrients as food is being digested) and diarrhea, and hookworms can cause blood loss. There are many products available to treat worms, and you should consult their veterinarian for the appropriate products for your pets.
Coccidia and Giardia are single-celled parasites that damage the lining of the intestine. Dogs can become infected with coccidia by eating infected soil or licking contaminated paws or fur. Puppies are at the highest risk of infection and illness.

Kennel cough
Kennel cough can be caused by a combination of viruses and bacteria. It is very contagious and your dog can become infected if it comes into contact with an infected dog. Dogs with kennel cough may not seem ill in the early stages of the disease but they can still infect other dogs. Most commonly, dogs with kennel cough will have a snotty nose and a dry, hacking cough.

There are vaccines for kennel cough, but not all dogs need to receive the vaccine. Consult your veterinarian about whether or not the kennel cough (Bordetella) vaccine is right for your dog.

Leptospirosis
Leptospirosis is caused by species of the Leptospira bacteria. The bacteria are shed in the urine of infected animals, and animals and people usually become infected by drinking contaminated water or coming into contact with contaminated soil or food. Dogs infected with Leptospira may develop fever, muscle weakness, vomiting, lethargy, abdominal pain, and kidney or liver failure. There is a vaccine for leptospirosis; consult your veterinarian about whether or not the vaccine is appropriate for your dog. Some canine distemper combination vaccines include a Leptospira vaccine.

Rabies
Any mammal is capable of being infected with the virus that causes rabies. Most dog parks and organized dog gatherings require proof of rabies vaccination, but some do not. Rabies is caused by the rabies virus and is 100% fatal in animals once they start to show signs of disease. The virus is spread by saliva, either by a bite from an infected animal or by saliva contaminating a skin wound. In addition, any contact with wildlife (including bats) can introduce the risk of rabies infection. Raccoons, skunks and other wild animals can carry the rabies virus and may be present in areas where dogs gather.

Fortunately, rabies infection is preventable with vaccination. Many local and state governments require regular rabies vaccination for dogs.

Regional wildlife risks and feral animals
Wildlife mixing with dogs can increase the risk of diseases, such as rabies and plague, as well as the risk of injury. In some areas of the U.S., prairie dogs often invade dog parks. Prairie dogs carry fleas that can carry the bacteria that causes plague. Skunks, raccoons, foxes, feral cats and pigs, and other wildlife can also carry rabies and other diseases that can infect dogs. Feral dogs present disease and injury risks.

Ringworm
Although its name suggests it's a worm, ringworm is actually due to fungal infection of the skin. It can be spread by contact with an infected dog, its bedding or something that has come in contact with the infected dog. The fungus can also survive in the soil. Although its name suggests it's a worm, ringworm is actually due to fungal infection of the
skin. It can be spread by contact with an infected dog, its bedding or something that has come in contact with the infected dog. The fungus can also survive in the soil. Ringworm gets its name because it often causes circular patches of hair loss. Some dogs will excessively scratch the areas, while others may not be itchy. Many dogs will recover without treatment, but they are often treated to prevent them from spreading the infection to other dogs or to people.

**Tick-borne diseases (hemobartonellosis, babesiosis, ehrlichiosis, rickettsial diseases such as Lyme disease, and others)**

A variety of diseases that can infect dogs are spread by ticks, including Lyme disease and many others. Some diseases are more common in specific areas of the U.S. These diseases can cause anemia (blood loss), lameness, weakness, lethargy, organ failure, and even death. The best way to prevent these diseases is to prevent tick bites. There are many products available that reduce tick bites and kill ticks on dogs; consult your veterinarian about the best product for your dog. Check your dog for ticks after any outside dog gatherings and remove the tick(s) as soon as possible.

For more information on Tick–borne diseases from the National Center for Veterinary Parasitology

For more information from Merck Veterinary Manual on plants that are toxic to pets

See Also:

- Dogs' Social Lives and Disease Risks
- Protect Your Dog, Yourself and Others
- Disease Risks for People

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