



Great Dane

Update

Vol. 9, No. 1 ■ November 2010

Hypertrophic Osteodystrophy in Great Danes May Have Genetic Link

When pain and lameness in the rear legs struck her 12-week-old mantle Great Dane puppy, "Erik," Mari Lindland was heartbroken. She knew about hypertrophic osteodystrophy (HOD), a skeletal disorder affecting rapidly growing large- and giant-breed puppies, but she had never experienced it firsthand.

"The veterinarian examined Erik and took X-rays, which confirmed the diagnosis of hypertrophic osteodystrophy," says Lindland, who breeds Twin Bay Danes in Traverse City, Mich. "Fortunately, the condition was caught early, and we were able to begin treatment with a good prognosis."

A painful disease, hypertrophic osteodystrophy can cause disabilities and deformities. Neither the cause of the condition nor a cure is known.

"The disease can cause so much pain that an animal is debilitated and will not or cannot eat. A dog's health deteriorates unless adequately supported," says Paul Manley D.V.M., DACVS, emeritus professor of orthopedic surgery at the University of Wisconsin-Madison School of Veterinary Medicine.

Signs of the disease include lameness, lethargy, reluctance to stand or walk, fever and loss of appetite. Painful swelling occurs at the ends of long bones, most often in the legs at the carpus (wrist), elbow and hock (ankle). The disorder can appear in puppies as young as 2 months old but generally develops between 5 and 7 months of age.

Normal long bone growth continues until dogs are 8 to 12 months old, so when HOD occurs, the growth of the bones is often affected. Great Danes do not reach their adult height until they are 12 to 15 months of age. Adult

**A PAINFUL DISEASE,
HYPERTROPHIC OSTEODYSTROPHY
CAN CAUSE DISABILITIES AND
DEFORMITIES. NEITHER
THE CAUSE OF THE
CONDITION NOR
A CURE IS KNOWN.**

males average 34 inches tall, whereas females average 32 inches tall.

"Compared to other developmental orthopedic diseases, HOD has the earliest onset of clinical signs," says Alison N. Starr, Ph.D., research assistant professor of genetics and biochemistry at Clemson University in South Carolina. "The rapid growth experienced by puppies of large and giant breeds makes them more susceptible to skeletal disorders."

"When Great Danes are affected, they often have more severe clinical signs. For them, HOD can be extremely debilitating," Manley says.

The condition usually can be treated with medication and by avoiding

overnutrition and preventing dietary imbalances. Surgery can correct extreme deformities, although some dogs will have a resulting limp, and others will completely recover. In a small number of cases, death occurs due to prolonged fever as high as 104 degrees Fahrenheit, loss of appetite or bacteria in the blood. With early diagnosis and proper treatment, many dogs affected by HOD live full, normal lives.

A 2004 survey by the Great Dane Club of America found that around 2 percent of Great Danes suffer from HOD. Other breeds at increased risk include Boxers, Chesapeake Bay Retrievers, Doberman Pinschers, German Shepherd Dogs, Irish Setters, Labrador Retrievers and Weimaraners. The prevalence in certain breeds indicates HOD may have a genetic predisposition.

Searching for a Linked Marker

Promising research at Clemson University supports the theory that HOD may have a possible genetic link. Using a single nucleotide polymorphism (SNP) chip to study DNA extracted from blood samples of affected and healthy Irish Setters, the scientists are seeking genetic similarities and differences. The AKC Canine Health Foundation is funding the two-year study.

Rather than searching for specific genes, the SNP chip will help the scientists pinpoint a genetic region linked

Continued on page 2



Radiographs show the effect of hypertrophic osteodystrophy (HOD) on a young male Great Dane treated by Dr. Paul Manley of the University of Wisconsin-Madison School of Veterinary Medicine. A disease that occurs in large and giant breeds, HOD causes painful swelling at the ends of long bones. This Great Dane puppy was severely affected in his skull and legs, but has responded well to treatment.

Hypertrophic Osteodystrophy

continued from page 1

to HOD. If a region can be identified, Starr hopes to narrow the study's focus to find a genetic mutation that causes HOD. The discovery might lead to development of a genetic test.

Starr expects to know preliminary results soon, but the research is far from over. "If we map the region for HOD to a highly gene-rich area, it may take a long time to correctly identify the mutation(s) before we can develop a test, if we can do it at all," she says.

Until more is known about the genetic basis of HOD, Starr cautions breeders. "We generally do not recommend that affected dogs be bred," she says. "If owners decide to breed a dog that had HOD as a puppy, extra care should be taken to breed to a dog with no history of the disorder."

Even though dogs can be successfully treated for HOD, the pain and potential long-term effects from the disease should deter breeders from breeding affected dogs. HOD affects a dog's growth plates, which are made of cartilage and located between the tubular part and the ends of long bones.

"Typically the cartilage in growth plates expands, then it eventually mineralizes to become bone," Manley says. "With HOD, there is a delay in mineralization of the cartilage, so the growth plate lengthens but does not differentiate into bone."

That delay in growth plate mineralization may change joint anatomy and cause angular limb deformities. "Sometimes microscopic fractures occur at the cartilage-bone junction, and there is secondary inflammation in response to these fractures, causing swelling and pain," says Manley.

A cycle of deterioration undermines the bone structures and exacerbates the disorder. "When studied microscopically, a series of events can be seen taking place within the affected bones," says Daniel A. Degner, D.V.M., DACVS, of Michigan Veterinary Specialists.

"First, the blood vessels near the growth plate become distended and bleed into the bone. Next, the bone in this region dies, is resorbed and develops microfracturing due to weakening of the bone structure. In response to this, new bone is laid on the surface of the bone."

"The areas of the long leg bones

— the radius, ulna and tibia — are especially vulnerable in dogs with HOD," Starr says.

The radius and ulna comprise the foreleg between the elbow and carpus, and the tibia extends between the knee and the hock of the hind leg.

"Severe cases may result in deformities of the front and/or rear legs, and some of these may require surgical intervention," says Starr. "Left untreated, dogs may have difficulty walking and could develop early secondary osteoarthritis."

"WE GENERALLY DO NOT RECOMMEND THAT AFFECTED DOGS BE BRED. IF OWNERS DECIDE TO BREED A DOG THAT HAD HOD AS A PUPPY, EXTRA CARE SHOULD BE TAKEN TO BREED TO A DOG WITH NO HISTORY OF THE DISORDER."

*ALISON N. STARR, PH.D., RESEARCH ASSISTANT
PROFESSOR OF GENETICS AND BIOCHEMISTRY,
CLEMSON UNIVERSITY*

In some cases, HOD also affects the ribs, pelvis and jaw. Manley is treating a 9-month-old Great Dane that is severely affected in his skull. "In this dog, HOD made it difficult for the dog to open his mouth, but he is responding well to treatment," Manley says. "The owners have been diligent about care, and the dog has been able to regain some function as he has matured."

A Treatable Condition

Several theories attempt to explain the cause of HOD. They include excessive levels of dietary calcium or phosphorus, bacterial or viral infections, a vitamin C deficiency, and an immune reaction to vaccination for distemper or other diseases.

"One study sought to link bacteria to HOD by examining blood cultures," Starr says. "The researchers were unable to identify a cause. Dietary deficiencies of vitamin C have been researched due to the similar effects of HOD and scurvy but have not been substantiated."

"A link between vaccinations and the development of HOD has been suggested since signs of HOD often

show up within a few weeks of a puppy's vaccinations. This suggests that HOD may be a result of an overstimulated immune response."

A veterinarian typically prescribes anti-inflammatory medications for a dog suffering from HOD. Antibiotics also might be prescribed if bacterial infection is present. A diet change may be advised if a dog is fed a high-calcium dog food. Acute cases may require hydration via intravenous fluids, and a feeding tube might be inserted if the dog does not eat for up to five days. Monthly evaluations and radiographs are conducted to monitor progress.

"Some dogs do really well with treatment, especially the milder cases, once they reach skeletal maturity," Manley says. "Others have growth defects requiring corrective surgery to straighten bones or realign joints."

The path HOD follows is unpredictable, as is its resolution. "Hypertrophic osteodystrophy may resolve spontaneously, as quickly as within a week," Degner says. "But, it also can be a recurrent, cyclic disease that goes on for a long time. Between 20 and 25 percent of dogs that experience HOD have a relapse."

Lindland feels fortunate that her Great Dane puppy's HOD was caught early and is being successfully managed. Erik has gone on to complete Canine Good Citizen training and is registered with Therapy Dogs International.

"Though there is a hitch in his gait, there have been no other lasting effects," Lindland says. "We were quite lucky. Erik is doing well. He is active and happy." ■

Purina appreciates the support of the Great Dane Club of America and particularly J.P. Yousha, chairwoman of the GDCA Health and Research Committee, in helping to identify topics for the *Purina Pro Club Great Dane Update* newsletter.

Want to Reach the Editor?

Have comments about *Purina Pro Club Update*? Send them to us at: *Purina Pro Club Update*, c/o Editor, Nestlé Purina PetCare, 2T Checkerboard Square, St. Louis, MO 63164 or via e-mail at today'sbreeder@purina.com.

Send Us Your Questions

Have questions about your Purina Points or how to redeem weight circles for rewards and rebate checks? Contact *Purina Pro Club* at (877) PRO-CLUB, or (877) 776-2582, between 7 a.m. and 5 p.m. CST Monday through Friday. You also may visit www.purina.proclub.com to review and redeem Purina Points.

Owners of Great Danes Can Participate in HOD Study

Researchers at Clemson University in South Carolina have received funding from the AKC Canine Health Foundation for a two-year study to investigate a possible genetic link to hypertrophic osteodystrophy (HOD). The scientists are seeking DNA samples from healthy and affected Great Danes.

To participate in the study, owners should submit:

- A small sample of blood collected by a veterinarian;
- The medical history and pedigree of the dog; and
- Copies of radiographs or other verification of diagnosis of HOD in affected dogs.

For more information, contact Alison N. Starr, Ph.D., research assistant professor at Clemson University, at astarr@clemson.edu.

Purina Pro Club Members Reap Many Benefits from Program

Purina Pro Club offers many perks for members. Here are tips to help you tap into valuable member services and get the most of your membership.

Submitting Weight Circles

Weight circles are the colored circles on packages of Purina brand dog food that can be redeemed for Purina Points and used to order items from the Pro Club Rewards Brochure and dog food checks. When submitting weight circles, you should:

- Use a Weight Circle Claim Form. You may download a form at www.purinaproclub.com by signing into your account and clicking on "Pro Club Tools" on the red bar at the top of the screen. Then under Pro Club Forms, click on "Download Weight Circle Claim Form." You also may call Pro Club member services toll free at 877-PRO-CLUB or 877-776-2582.
- Fill out the Weight Circle Claim Form completely. A completed form expedites the processing.

Certify Weight Circles

Pro Club recommends that you mail your weight circles by certified first class mail or other traceable delivery method. This helps to ensure proof of delivery in the event Pro Club does not receive your weight circles. Pro Club is not responsible for weight circles not in its possession.

- Always put your return address on the weight circle submission envelope.
- Submit a minimum of 200 pounds' worth of weight circles.
- Submit only weight circles, not UPC codes. Only weight circles are valid for credit to your account.
- Effective Dec. 31, 2009, Purina Hi-Pro weight circles were no longer accepted.
- Weight circles and points from redeemed weight circles cannot be purchased or otherwise transferred.
- Do not submit torn and worn

weight circles, and avoid taping multiple weight circles together.

Ordering Puppy Starter Kits

Pro Club members may order Puppy Starter Kits for new owners that contain important information on caring for new puppies. You should only order Puppy Starter Kits for the puppies you currently have on the ground. Starter Kit information and coupon expiration dates are continually updated, so make sure you have only the most current Starter Kit information.

Redeeming Purina Points

Weight circles turn into Purina Points that can be redeemed for items from the Pro Club Rewards Brochure or dog food checks. When redeeming points keep in mind:

- Purina Points expire three years from the date of last activity. You are responsible for any taxes that may be owed as a result of points earned and/or redeemed.
- Your Pro Club account address

Continued on page 4



Flying Fast

A dog clears a jump at the United Flyball League (U-FLI) International Tournament of Champions Nov. 13 at the Purina Event Center in Gray Summit, Mo. About 1,000 people and 70 flyball teams attended the tournament.

The event was the eighth held at the new dog facility since it opened in August. Nearly 3,000 people and 6,000 dogs have participated in National Specialties, all-breed dog shows, and obedience, agility and flyball competitions.

More than 100 events are scheduled at the Purina Event Center through 2013. Among the National Specialties that will take place over the next couple of years are the Golden Retriever, Australian Shepherd and Border Collie.

For information about reservations for dog shows and events, contact Purina Event Center Director Brock Fitzgerald at 888-688-PETS (888-688-7387) or by e-mail at brock.fitzgerald@purina.nestle.com. Visit www.purinaproclub.com/eventcenter for more information about the Purina Event Center.

Purina-Sponsored Sporting Events December 2010 to February 2011*

Event	Date	Location
Weimaraner National Field Championships	Dec. 4 to Conclusion	Ardmore, OK
English Springer Spaniel National Amateur Championship	Dec. 6-10	Cambridge, MD
UKC (United Kennel Club) Battle of the Breeds	Dec. 10-11	Ada, OK
UKC Grand American	Jan. 7-8	Orangeburg, SC
Continental Championship	Jan. 17 to Conclusion	Dixie Plantation, Greenville, FL
UKC Winter Classic	Jan. 28-29	Albany, GA
National Open Shooting Dog Championship	Feb. 7 to Conclusion	Sedgefield Plantation, Union Springs, AL
National Championship	Feb. 14 to Conclusion	Ames Plantation, Grand Junction, TN

*This table lists some, but not all, upcoming sporting events sponsored by Purina.

Pro Plan Introduces Two New Dog Products



Purina Pro Plan is introducing two new dog products in early February: an all life-stages dry dog food, featuring a small kibble and made with real lamb as the No. 1 ingredient, and a dog snack formerly marketed as *Purina Carvers*.

Pro Plan Lamb & Rice Small Bite Formula contains 26 percent protein and 16

percent fat. This nutrient-dense food offers complete and balanced nutrition appropriate for puppies, pregnant or nursing dams, adults and senior dogs. *Pro Plan Lamb & Rice Small Bite Formula* comes in three package sizes: 6 pounds, 18 pounds and 37.5 pounds.

Pro Plan Roasted Slices is made with over 80 percent real chicken. Already a dog fancy favorite used ringside and for training, this dog snack is high in protein and highly palatable. Roasted Slices can be fed

whole or torn into bite-sized portions. Lightly seasoned and oven-cooked, this dog snack is made without corn, wheat, artificial colors or flavors.

Pro Plan is sold at pet specialty and farm supply stores. For information, visit www.proplan.com or to talk with a pet nutrition consultant, call 800-PRO-PLAN (800-776-7526) from 9 a.m. to 4 p.m. Central time Monday through Friday. ■



Pro Club Member Benefits

continued from page 3

- should be current. *Pro Club* is not responsible for items sent to wrong addresses.
- *Purina* dog food checks have a one-year expiration and cannot be reissued if you allow them to expire.
- As stated on the dog food check, only one \$7 check can be used

with the purchase of one bag of a *Purina* product. The terms on the check state "limit one check per bag."

- Rewards — dog food checks, veterinary checks, gift certificates and gift cards — are like cash and should be protected. *Purina* is not responsible for replacement in the event of loss, theft or destruction.
- *Pro Club* Terms and Conditions state that three to five weeks should be

allowed for processing and delivery of checks, and six to eight weeks should be allowed for processing and delivery of merchandise, gift cards and gift certificates.

- Visit www.purinaproclub.com to see the complete Terms and Conditions or to view your *Purina* Point balance. ■

Purina-Sponsored Dog Shows* December 2010 to February 2011

Event	Date	Location
Lone Star Winter Classic	Dec. 9-12	Dallas, TX
Holiday Cluster	Dec. 10-13	Long Beach, CA
Cleveland Crown Classic	Dec. 16-19	Cleveland, OH
Kennel Club of Palm Springs Dog Show	Jan. 6-9	Indio, CA
Land O'Lakes Cluster	Jan. 7-9	St. Paul, MN
Florida Classic Cluster I & II	Jan. 13-23	Brooksville, FL
Foothills Dog Show Cluster	Feb. 17-20	Spartanburg, SC
Rocky Mountain Cluster	Feb. 18-21	Denver, CO
International Kennel Club (IKC) Dog Shows	Feb. 24-27	Chicago, IL

* This table lists some, but not all, upcoming Purina-sponsored dog shows.

Purina Pro Club Great Dane Update



**Your Quarterly
Purina Points Summary**
Account Activity through October 31, 2010

Point balance may not reflect
current account activity

PRSR1 STD
U.S. POSTAGE
PAID
St. Louis, MO
Permit No. 475

1400 South Highway Dr.
Fenton, MO 63026