



PURINA Pro Club

Labrador Retriever Update

Vol. 8, No. 1 ■ September 2009

Selective Breeding Can Prevent Producing EIC-Affected Dogs

The intensity of a Labrador Retriever as he makes multiple retrieves, following whistles and hand signals, cannot be disputed. It is that intensity, coupled with strenuous exercise and extreme excitement, that causes exercise-induced collapse, an inherited condition, in otherwise healthy, young Labradors.

Primarily a disorder that is recognized in hunting and field trial Labrador Retrievers, EIC causes dogs to become weak and collapse after five to 20 minutes of strenuous exercise. For nearly two decades EIC was misidentified and confused with other disorders. After all, Labradors can collapse for a number of reasons, including heat stroke, low blood sugar and diseases of the muscular, nervous, cardiovascular and respiratory systems.

With the discovery of the EIC gene mutation by scientists at the University of Minnesota collaborating with those at the Western College of Veterinary Medicine at the University of Saskatchewan and the Comparative Neuromuscular Unit at the University of California-San Diego, and the subsequent development of a direct DNA test for the condition, breeders may now selectively breed Labradors to prevent producing EIC-affected dogs. Additionally, the Orthopedic Foundation for Animals maintains a registry of EIC test results that enables breeders to plan selective breedings and scientists to track disease prevalence.

Importantly, the EIC test also allows owners whose dogs test positive to reduce the risk of collapse, even possibly death, by limiting their participation in exciting, strenuous trigger activities. Dogs diagnosed with EIC rarely are able to participate in field trials, although they make wonderful companions and live fairly normal lives with limited intense exercise and excitement.

An Autosomal Recessive Condition

Nearly half of Labradors are affected by or are carriers of EIC. The gene mutation was discovered in the canine dynamin 1 (DNM1) gene, in which the dynamin 1 protein maintains neural and neuromuscular transmission during

high-intensity stimulation, such as a dog may experience during a field trial.

The dynamin 1 gene mutation discovery resulted from a full genome scan to identify the genetic marker for EIC and then to find the mutation. The dynamin 1 protein is expressed primarily in the brain and spinal cord, but also in most other nerves. DNM1 is not required during low-level neurological stimulation such as jogging, hiking or swimming, but during intense exercise when a dog becomes highly excited and body temperature increases, it is essential for normal brain and spinal cord function.

EIC has an autosomal recessive pattern of inheritance, meaning affected dogs inherit a copy of the gene mutation from both their sire and dam. Affected dogs have an 85 percent chance of experiencing collapse under the right conditions before they reach

3 years of age. Carriers are not affected by EIC but have one copy of the gene mutation and one normal gene. Healthy dogs have normal forms of the dynamin 1 gene.

Labradors affected by EIC generally exhibit signs of the disease between 6 months and 3 years of age, when they are old enough to participate in intensely exciting strenuous exercise and training. Dogs with calmer temperaments may never collapse, even if they are genetically susceptible. Researchers believe that heat, exercise and excitability are triggers for collapse in susceptible dogs because the mutation in the dynamin protein hinders their functioning at higher temperatures.

"Labradors with EIC and Labradors without EIC both have elevated body temperature with intense exercise and

Continued on page 2

<p>Breeding two clear dogs</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td colspan="2"></td><th colspan="2">Sire's Genotype</th></tr> <tr><td colspan="2"></td><th>N</th><th>N</th></tr> <tr><th rowspan="2">Dam's Genotype</th><th>N</th><td>N/N</td><td>N/N</td></tr> <tr><th>N</th><td>N/N</td><td>N/N</td></tr> </table>			Sire's Genotype				N	N	Dam's Genotype	N	N/N	N/N	N	N/N	N/N	<p>Breeding a clear dog to an affected dog</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td colspan="2"></td><th colspan="2">Sire's Genotype</th></tr> <tr><td colspan="2"></td><th>N</th><th>N</th></tr> <tr><th rowspan="2">Dam's Genotype</th><th>E</th><td>N/E</td><td>N/E</td></tr> <tr><th>E</th><td>N/E</td><td>N/E</td></tr> </table>			Sire's Genotype				N	N	Dam's Genotype	E	N/E	N/E	E	N/E	N/E
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Implications of the EIC Mutation for Breeding

Each sire and dam contributes either the E (affected) or N (clear) form of the EIC (exercise-induced collapse) gene to a puppy. This results in an individual puppy's genotype of N/N (clear), N/E (carrier) or E/E (affected). Researchers do not recommend selecting dogs for breeding based solely on their being N/N (clear) for the DNM1 gene as this could result in losing outstanding exercise and performance traits of many lines of Labradors. A better approach, they say, is to use many of the excellent N/E and E/E dogs by mating them to N/N dogs in order to produce litters without EIC. This also provides a choice of dogs to progressively decrease the frequency of the DNM1 gene in future matings to N/N dogs.

Used with permission from the University of Minnesota.

EIC-Affected Dogs

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excitement, and we know that the faulty protein associated with EIC works pretty normally at a normal body temperature and less well at a high temperature," says Edward "Ned" Patterson, D.V.M., Ph.D., DACVIM, assistant professor of veterinary clinical sciences at the University of Minnesota. "Fruit flies have a similar mutation in which affected flies have trouble flying or walking at higher temperatures."

Heat isn't always a factor in collapse, says Susan Taylor, D.V.M., DACVIM, professor of small animal clinical sciences at the Western College of Veterinary Medicine at the University of Saskatchewan in Saskatoon, Canada. "Labradors have collapsed while breaking ice on retrievers in frigid temperatures. A few have even drowned when they experience a collapse in the water."

Dogs at Greatest Risk

High-intensity field trial and hunting dogs with drive seem to be particularly susceptible to collapse not because they are more prone to the genetic mutation causing EIC, but because they are more likely to participate in strenuous activities, says Taylor. Some people believe that black male Labrador Retrievers are more susceptible, but Taylor attributes that belief to the fact that black male Labradors are most commonly used for field competition, and thus are more likely to be involved in intense activities and would show more frequent collapse. "EIC is common in all colors, black, yellow and chocolate Labradors, and both sexes," she says.

Owners first notice a rocking or forced gait, and then the rear limbs become weak and unable to support their weight. Many dogs continue to run while dragging their back legs. Some dogs are unable to move at all and may fall over. Most collapsed dogs remain conscious and are in such an excited state, they continue to try to run. Weakness progresses in some dogs to the forelimbs, and they may experience temporary paralysis. In rare cases dogs have died during collapse.

Signs of EIC generally increase in severity for about five minutes after the dog stops working. Clinically, EIC-affected dogs do not have heart rhythm abnormalities, electrolyte disturbance or unusual respiratory problems. Even their thyroid gland function and adrenal gland cortisol production are normal. Fortunately, EIC is not painful, and most dogs recover quickly to normalcy within five to 30 minutes with no residual signs of weakness.

Labrador breeders and owners should be aware if their dogs suffer from EIC so they will know whether to restrict unsupervised exercise and look for signs of wobbliness. "A number of pet Labradors and competitive field trial dogs have died suddenly during an episode of EIC collapse when the owner or handler did not recognize

Registering EIC Test Results with OFA

Testing Labrador Retrievers for exercise-induced collapse (EIC) is the first step in responsible breeding. Registering those results in the EIC database at the Orthopedic Foundation for Animals (OFA) is the next step. Importantly, this gives breeders everywhere easily accessible, credible information.

"More than 7,000 Labradors have been tested for the EIC mutation, yet those results are often not available to breeders who are trying to decide which dogs or bitches to breed to," says Susan Taylor, D.V.M., DACVIM, professor of small animal clinical sciences at the Western College of Veterinary Medicine at the University of Saskatchewan in Saskatoon, Canada.

"For a nominal fee, OFA posts EIC test results on its Web site," Taylor says. "This database allows breeders to search to learn the EIC status of a dog and to find their certification status for other heritable disorders as well."

For information, visit the OFA Web site at www.offa.org. Please note that EIC test results are posted on the open registry only with owner permission.

the early signs and stop their activity," cautions Taylor.

While no cure exists for EIC, backing off from vigorous exercise and activities that can cause intense excitement can help to prevent future collapse. "Most EIC-affected Labradors can do moderate exercise but not high-performance field trials," Patterson says. "If they cease strenuous exercise, they usually can live normal life spans."

A few dogs can continue to hunt or compete with veterinary-supervised treatment; typically Phenobarbital is prescribed. "We don't think the drug directly addresses the condition, but it has an indirect effect by taking the edge off and keeping the dog calmer," says Patterson.

The Veterinary Diagnostic Laboratory at the University of Minnesota is the only laboratory in North America authorized by the team that discovered the EIC mutation to perform the genetic test. Veterinarians may submit DNA from blood samples, semen, cheek swabs or dew claws from newly whelped puppies. The direct DNA test for the mutation is 100 percent reliable.

"It is so important for breeders to take advantage of this test and check their dogs for EIC," says Fran Smith, D.V.M., Ph.D., DACT, director and health chairwoman of the Labrador Retriever Club. "It is equally important that they are willing to disclose the results. Given the certainty of this test, no dog needs to be totally excluded from a breeding program, and that includes affected dogs."

"You don't want to reproduce a genotypically and clinically affected dog, but a dog with two copies of the abnormal gene can be bred for other genetic characteristics, as long as you breed to a clear dog, producing carrier offspring but no affected offspring. Breeders really need to understand this. You don't want to risk losing other important characteristics."

Having experienced this firsthand, Smith explains. "I just recently bred a bitch of mine that is affected but at 7 years old has never experienced a collapse. I bred her to a clear dog knowing that 100 percent of the puppies would be carriers but none would be affected. I can now go on to another generation, maintaining this bitch's outstanding characteristics while

eliminating one of her bad qualities."

The bitch's positive qualities — excellent hips and elbows, normal eyes and clear echocardiogram test — justified breeding her. "She isn't an excitable dog, which may be why she never collapsed," Smith says. "She does fieldwork and hunting in a very efficient, methodical manner. She's a great example of the breed."

Taylor agrees that a positive EIC test result doesn't spell the end of a breeding program or even of a promising dog that is a carrier or affected. "It would be an enormous mistake and overreaction to only breed dogs clear of the EIC mutation," she says. "Doing so would effectively reduce genetic diversity within the breed and eliminate some great dogs and lines of dogs with outstanding heritable traits."

While some breeders may be surprised and disappointed to learn that a promising dog is genetically predisposed to EIC — especially if the dog has never had an episode of collapse — the test is 100 percent reliable.

"Most susceptible dogs only collapse when the circumstances are right," Taylor says. "Excitement, stress, exercise and heat are all contributing factors. Dogs need dynamin 1 protein to repackage their neurotransmitters under those conditions."

Since a positive test result doesn't exclude a dog from a breeding program, Smith stresses that breeders shouldn't feel uncomfortable with the results and should be willing to disclose them with others. "You just have to know the status of a dog you are considering breeding to, and this test gives you that information," she says.

Patterson agrees. "If breeders follow the breeding strategy of not producing affected dogs, we will be able to decrease the number of affected dogs. Over generations, we will eventually decrease the prevalence of the EIC mutation in the population." ■

Purina appreciates the support of the Labrador Retriever Club Inc. and particularly Fran Smith, D.V.M., Ph.D., DACT, the LRC health chairwoman, in helping to identify topics for the *Purina Pro Club Labrador Retriever Update* newsletter.

Pro Plan Puppy Formulas Add OptiStart®

During the first year, puppies require optimal nutrition for growth and development. To help give puppies an excellent start, *Purina Pro Plan* has specially formulated its dry puppy line with OptiStart®, which contains easy-to-digest natural milk proteins to help nourish a puppy's developing immune system.

Breeders, who order *Pro Plan* Puppy Starter Kits, will notice a new flier included about OptiStart. Importantly, *Pro Plan* nutrition, including the milk proteins contained in OptiStart, has been documented to promote healthy immune and digestive systems, while fueling growth in puppies.

When a puppy finishes weaning, around 7 weeks of age, his immune system may not be fully developed. *Pro Plan* puppy formulas with OptiStart contain the special nutrition needed to help puppies stay healthy. The natural milk proteins in OptiStart help puppies absorb nutrients, gain weight and thrive.

In addition, *Pro Plan* Puppy Formulas:

- Provide complete and balanced nutrition;
- Contain as the No. 1 ingredient real poultry or lamb, which provides high-protein sources that help support muscle mass for strength and provide energy;



- Are highly digestible for maximum nutrient delivery;
- Contain DHA (docosahexaenoic acid), a nutrient found in mother's milk for brain and vision development; and
- Are formulated with high levels of antioxidants to help nourish a developing immune system.

Purina Pro Plan is sold at PetSmart, PETCO, pet specialty and farm supply stores, and some veterinary clinics.

For information, visit www.proplan.com or to talk to a pet nutrition consultant, call (800) PRO-PLAN or (800) 776-7526 from 9 a.m. to 4 p.m. CST Monday through Friday. ■



Purina-Sponsored Dog Shows* September to November 2009

Event	Date	Location
Gateway Fall Cluster	Sept. 18 to 20	Purina Farms Gray Summit, MO
Chihuahua National Specialty	Oct. 1 to 3	Chicago, IL
Labrador Retriever National Specialty	Oct. 6 to 11	Bloomington, IL
Doberman Pinscher Regional Specialty	Oct. 10 to 11	Fort Mitchell, KY
German Shepherd Dog Club of America National Specialty	Oct. 12 to 17	Springfield, OH
Doberman Pinscher National Specialty	Oct. 13 to 18	Fort Mitchell, KY
Dachshund National Specialty	Oct. 20 to 24	Frederick, MD
Great Dane National Specialty	Oct. 20 to 25	Lancaster, PA
Golden Retriever National Specialty	Oct. 25 to 28	Enid, OK
Old Fort Cluster	Oct. 28 to Nov. 1	Fort Wayne, IN
Kennel Club of Philadelphia	Nov. 12 to 15	Ft. Washington, PA

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

Getting the Most of Your Pro Club Membership

Here are tips to help *Pro Club* members when submitting weight circles or redeeming Purina Points.

Submitting Weight Circles

- Be sure to use a Weight Circle Claim Form, which can be downloaded at www.purinaproclub.com. You also may call *Pro Club* customer service toll free at (877) PRO-CLUB or (877) 776-2582 to receive a form.
- Fill out the Weight Circle Claim Form completely to help expedite processing.
- Always put your return address on the weight circle submission envelope.
- Submit a minimum of 250 pounds' worth of weight circles.
- 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.
- Mail weight circles by certified first class mail or some other traceable delivery method to ensure proof of delivery verification.

Redeeming Purina Points

- Purina Points expire three years from the date of last activity. Note that you are responsible for any taxes that may be owed as a result of points earned and/or redeemed.
- Your *Pro Club* account address should be current. *Pro Club* is not responsible for items sent to the wrong address.
- Purina rebate 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 dog food check can be used with the purchase of one bag of a *Purina* product.

- 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.
- *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 for merchandise, gift cards and gift certificates.
- Visit www.purinaproclub.com to see the complete Terms and Conditions or to view your Purina Point balance. ■



Pro Club Web Site Is Redesigned

Easy navigation tools that take *Pro Club* members directly to their Purina Point balance — and then, if they choose, to point redemptions and placing orders — are among the highlights of the newly designed *Purina Pro Club* Web site. The new Web site, which launched in mid-September, has the same address — www.purinaproclub.com.

Maureen Salamone, Purina Brand Director for Breeder-Enthusiast Marketing, says, "The *Pro Club* Web site is a member-driven community in which visitors have a reason for being there. Transactions drive most members to the site, thus our goal in the redesign was to make it easy to gather

information and place orders."

Among the site's transactional features is the ability to:

- Download Weight Circle Claim Forms;
- Check Purina Point balances;



Pro Club members will be able to easily conduct transactions on the newly redesigned *Pro Club* Web site.

Visit *Pro Club* on the Web

Starting mid-September, *Pro Club* members should visit the newly designed *Purina Pro Club* Web site at www.purinaproclub.com.

- Order Puppy Starter Kits;
 - Order from the Rewards Brochure, including *Purina* dog food checks, veterinary checks, gift certificates and gift cards, and *Purina* logo clothing and merchandise;
 - Update personal address or e-mail information; and
 - Search for articles previously published in *Today's Breeder* or the *Purina Pro Club Update* newsletters.
- Visitors to the Web site continue to increase each year. With an emphasis on purebred dogs and breeders and enthusiasts, the Web site showcases both show and sporting segments. ■

Purina-Sponsored Sporting Events September to November 2009*		
Event	Date	Location
NAVHDA (North American Versatile Hunting Dog Association) Invitational	Sept. 17 to 20	Bloomington, OH
All-Age Chicken Championship	Sept. 17 to 21	Solon Springs, WI
Tilden Valley English Springer Spaniel Field Trial	Sept. 19 to 20	Florence, WI
NGSPA (National German Shorthaired Pointer Association) Region 8 Championship	Sept. 21 to 26	Cheyenne, WY
UKC (United Kennel Club) World	Sept. 25 to 26	Rogersville, TN
AKC (American Kennel Club) Gundog Brace Nationals	Oct. 2 to 3	Magnolia, OH
National Pheasant Shooting Dog Championship	Sept. 29 to Oct. 7	Baldwinsville, NY
Northeastern Grouse and Woodcock Championship	Oct. 3 to 6	Calais, ME
GSPCA (German Shorthaired Pointer Club of America) National Championships	Oct. 12 to 24	Eureka, CA
PKC (Professional Kennel Club) World	Oct. 19 to 28	Salem, IL
Master National	Oct. 24 to 31	Manheim, TX
Foxhound Nationals	Oct. 25 to 31	Grenada, MS
GWPCA (German Wirehaired Pointer Club of America) Nationals	Oct. 27 to Nov. 1	Pickneyville, IL
Grouse and Woodcock Grand National	Nov. 2 to 5	Marienville, PA
UBGF (United Beagle Gundog Federation) Nationals	Nov. 6 to 7	Morgantown, KY

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

PURINA Pro Club Labrador Retriever Update

Point balance may not reflect current account activity

Your Quarterly
Purina Points Summary
Account Activity through August 31, 2009



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