

Exercise Induced Collapse

The syndrome of exercise intolerance and collapse (EIC) is being observed with increasing frequency in young adult **Labrador Retrievers**. Most, but not all, affected dogs have been from field-trial breedings. Black, yellow and chocolate Labradors of both sexes are affected, with the distribution of colors and sexes closely reflecting the typical distribution in field trials (black males most common). Signs first become apparent in young dogs - usually between 5 months and 3 years of age (average 14 months). In dogs used for field trials, this usually coincides with the age at which they enter heavy training. Littermates and other related dogs are commonly affected but depending on their temperament and lifestyle they may or may not manifest symptoms. Affected dogs exhibiting symptoms of collapse are usually described as being extremely fit, muscular, prime athletic specimens of their breed with an excitable temperament and lots of drive.

DESCRIPTION OF COLLAPSE

Affected dogs can tolerate mild to moderate exercise, but 5 to 20 minutes of strenuous exercise with extreme excitement induces weakness and then collapse. Severely affected dogs may collapse whenever they are exercised to this extent - other dogs only exhibit collapse sporadically. All of the factors important in inducing an episode have not yet been well established.

The first thing noted is usually a rocking or forced gait. The rear limbs then become weak and unable to support weight. Many affected dogs will continue to run while dragging their back legs. Some of the dogs appear to be incoordinated, especially in the rear limbs, with a wide-based, long, loose stride rather than the short, stiff strides typically associated with muscle weakness. In some dogs the rear limb collapse progresses to forelimb weakness and occasionally to a total inability to move. Some dogs appear to have a loss of balance and may fall over, particularly as they recover from complete collapse. Most collapsed dogs are totally conscious and alert, still trying to run and retrieve but as many as 25% of affected dogs will appear stunned or disoriented during the episode.

It is common for the symptoms to worsen for 3 to 5 minutes even after exercise has been terminated.

NOTE: A few affected dogs have died during exercise or while resting immediately after an episode of exercise-induced collapse so an affected dog's exercise should ALWAYS be stopped at the first hint of incoordination or wobbliness.

Most dogs recover quickly and are normal within 5 to 25 minutes with no residual weakness or stiffness. Dogs are not painful during the collapse or after recovery. Massage of the muscles or palpation of the joints or spine does not cause discomfort. Affected dogs are not stiff or sore or limping upon recovery.

FACTORS CONTRIBUTING TO COLLAPSE IN DOGS WITH EIC

Ambient Temperature. Actual ambient temperature does not seem to be a critical factor contributing to collapse, but if the temperature is much warmer or the humidity is much higher than what the dog is accustomed to, collapse may be more likely. Affected dogs are less likely to collapse while swimming than when being exercised on land. There are severely affected dogs, however, who have exhibited collapse while breaking ice retrieving waterfowl in frigid temperatures and some dogs have drowned when experiencing EIC -related collapse in the water.

Excitement. Dogs that exhibit the symptoms of EIC are most likely to have intense, excitable personalities, and it is very apparent that their level of excitement plays a role in inducing the collapse. There are some severely affected dogs who, if they are extremely excited, do not even require much exercise to induce the collapse. Dogs with EIC are most likely to collapse when engaging in activities that they find very exciting or stressful. This can include retrieving of live birds, participation in field trials, training drills with electric collar pressure and quartering for upland game.

Type of Exercise. Routine exercise like jogging, hiking, swimming, most waterfowl hunting, and even agility or flyball training are not very likely to induce an episode in dogs with EIC. Activities with continuous intense exercise, particularly if accompanied by a high level of excitement or anxiety most commonly cause collapse. Activities commonly implicated include grouse or pheasant hunting, repetitive "happy retrieves", retrieving drills or repetition of difficult marks or blinds where the dog is being repeatedly corrected or is anticipating electric collar correction, and running alongside an ATV.

HEREDITY

Littermates and other related dogs are commonly affected, as expected with a hereditary condition. Clinically unaffected dams and sires commonly produce litters with more than one affected dog and pedigree analysis strongly supports an autosomal recessive mode of inheritance.

Since the discovery of the mutation in Labrador Retrievers, we have also observed the mutation in clinically affected Chesapeake Bay Retrievers and Curly-Coated Retrievers. Because of the close relatedness of these breeds to Flat-Coated Retrievers, we are very interested in surveying the breed to determine if the mutation is present, and to give breeders an indication of how prevalent it is throughout the breed.

UNDERSTANDING TEST RESULTS: THE INHERITANCE OF EIC

In exchange for allowing us to sample your dog to advance the research into how common the mutation is in the **Flat-Coated Retriever** population, we will provide you with test results, letting you know whether your dog is:

Affected by EIC (*has 2 copies of the probable causative mutation*)

A carrier of EIC (*has 1 copy of the probable causative mutation*)

Clear of EIC (*no copies of the probable causative mutation*)

Participation and results are strictly confidential. Only the owner of the dog will have access to test results.

EXPLANATION:

Every dog gets 2 copies of every gene - one from its mother and one from its father.

The mutation in the gene that causes EIC is inherited as an autosomal recessive trait, which means that all **affected dogs** (*those showing signs of collapse*) have 2 copies of the mutated gene - one that they got from their mother, and one that they got from their father.

Carriers, by definition, are dogs that have one copy of the mutated gene that they got from either their mother or their father and they have one normal copy of the gene that they got from the other parent. These dogs do not have EIC and will not show signs of collapse. They will pass their copy of the mutated gene on to approximately half of their puppies.

- if a carrier is bred to a non-carrier, none of their pups will be affected by EIC, but about half of their pups will be carriers.
- if a carrier is bred to another carrier, about 1/2 of their pups will be carriers, 1/4 of their pups will be non-carriers (clear) and 1/4 of their pups will be affected by EIC.
- if a carrier is bred to an affected dog, about 1/2 of their pups will be carriers and 1/2 of their pups will be affected by EIC.

So you can see, if you have a carrier dog or bitch, it is very important to know the EIC status of any dog you are breeding to.

Clear dogs are dogs that do not have any copies of the mutation.

- these dogs do not have EIC and will not show signs of collapse
- if a clear dog is bred to a non-carrier (clear) dog, none of their pups will be carriers and none will have EIC
- if a clear dog is bred to a carrier, about 1/2 of their pups will be carriers but none will have EIC
- if a clear dog is bred to an affected dog, all of their pups will be carriers, but none will actually have EIC.

Affected dogs have 2 copies of the mutation

- both of their parents are either carriers or affected by EIC
- affected dogs have EIC and most will show signs of exercise intolerance or collapse when participating in trigger activities with a high level of excitement/stress
- a few genetically affected dogs (*having 2 copies of the mutation*) never exhibit any signs of EIC
- breeding one affected dog to another affected dog will result in all puppies having EIC.
- if an affected dog is bred to a carrier, about 1/2 of their pups will be carriers and 1/2 of their pups will be affected by EIC.
- if an affected dog is bred to a clear dog, all of their pups will be carriers, but none will actually have EIC

A comprehensive study of this condition is underway involving collaborators from the Western College of Veterinary Medicine (WCVN) of the University of Saskatchewan (Taylor, Shmon), the College of Veterinary Medicine at the University of Minnesota (Mickelson, Patterson, Minor), and the Comparative Neuromuscular Unit at the University of California (Shelton). The objectives of this study are to (1) describe the syndrome so that it can be recognized by dog owners, veterinarians and trainers, (2) to thoroughly evaluate affected dogs to try to establish an efficient means of diagnosis and to gain some insight into the cause of the collapse and (3) to determine the genetic basis for the collapse syndrome. This research has been supported by generous grants from the Morris Animal Foundation and the WCVN's Companion Animal Health Fund.