

Tricuspid Valve Dysplasia in the Labrador Retriever

By Frances O. Smith DVM PhD

ABC's of Tricuspid Valve Disease in Labrador Retrievers

By Frances O. Smith DVM PhD DACT
Vice President and Health Chair the Labrador Retriever Club, Inc.

A — Always have every puppy ausculted by a veterinarian prior to placement in a new home. If any murmur is heard, it needs to be investigated for the significance and impact on the puppy's life.

B — Be honest and be forthcoming. Be sure to do all of the required tests for CHIC for your breed and to be a top tier elite breeder do all of the recommended tests as well. Be sure to post the results both normal and abnormal on the OFA website. The purpose of this information is to allow owners and breeders to make informed decisions.

C — Choose to make a difference in your breed's health. While a bitch contributes both good and bad traits to her puppies, a stud dog if popular can both improve and devastate a breed if he sires many litters. This is particularly important for our big winning FC's, AFC's because they sire lots of puppies.

CHIC – the canine health information center is about transparency and selection for health. For the Labrador Retriever the required tests to obtain a CHIC number are OFA hips, OFA elbows, OFA eyes, EIC testing, the D locus (dilute test). Optional but **OPTIMAL TESTS**: CNM, congenital cardiac disease, advanced cardiac disease, and the genetic test for prcd-PRA which causes hereditary blindness in the Labrador. A CHIC number is **NOT ABOUT BEING CLEAR** – it is about doing appropriate testing and publishing the results. Once we have a genetic test for tricuspid valve dysplasia it will be added to the required test list.

As owners and breeders of the most popular and versatile breed in the country, it is our responsibility to do all that is possible to ensure the health of the Labrador Retriever.

TRICUSPID VALVE DYSPLASIA is a congenital (present at birth) heart disease in dogs involving defects in the tricuspid valve which results in leakage of blood between the chambers of the right side of the heart (leakage between the atrium- the top side of the heart and the ventricle – the bottom side of heart). If a Labrador is born with a heart defect, the odds are very high that it will be caused by tricuspid valve dysplasia rather than by other causes of heart problems.

A dog with severe abnormalities of the tricuspid valve typically develops right sided congestive heart failure within the first few years of life. Conversely many dogs with mild abnormalities of this valve may have only a very soft or sometimes even no heart murmur and appear clinically normal for many years. These dogs may exercise, hunt, work, train and be competitive performance dogs. In some of these dogs the diagnosis of tricuspid valve dysplasia may only be suspected after they produce seriously affected offspring.

The conformation community has been well aware of tricuspid valve dysplasia for many years because of an important and imported Labrador Stud dog that produced a number of affected puppies. An affected stud dog that is widely used can rapidly disseminate the genes that cause this disease. While a bitch can also be the source of this problem, the bitch cannot do as much damage to a gene pool as a stud dog can because she has a limited number of offspring. It is known that this disease is **INHERITED**. Early research on tricuspid valve dysplasia funded by committed Labrador owners seemed to indicate that the mode of inheritance was a dominant trait. Genetic analysis of these dogs mapped a susceptibility gene to canine chromosome 9 but further research on a large number of dogs did not reveal a simple mode of inheritance.

What this means is we know that tricuspid valve dysplasia is inherited but we do not know the definitive mode of inheritance. There is consensus opinion that dogs with tricuspid valve dysplasia **SHOULD NOT BE BRED**. Given the impact that a popular Labrador stud dog has on our overall population it is very important that a stud dog be

cleared with all existing technology before populating a breed with a serious health issue.

Basic cardiac health clearance begins with an initial examination of all puppies at 7-8 weeks of age. This examination should detect any heart murmur. If a heart murmur is present, additional diagnostic procedures will need to be performed to identify the cause of the murmur. The American College of Cardiology offers two levels of cardiac clearance. The first level is the Congenital Cardiac Clearance which is for dogs at least 12 months of age. This examination is based on auscultation (listening to the heart) and submission of an application for registration of the results with the OFA. This examination may be performed by a general practitioner, a specialist or a Board Certified Cardiologist. The second level is the Advanced Cardiac Form which requires that all examinations be performed by a Board Certified Veterinary Cardiologist and will include an echocardiogram of the heart. The echocardiogram will examine all of the heart chambers, will assess heart valve function, blood flow and assess cardiac arrhythmias. This is a comprehensive cardiac exam and can detect both congenital and developmental heart disease in dogs. These results can and should be submitted to the OFA so that a breeder can make an informed decision prior to selecting a breeding partner for their dog.

A stud dog that will sire multiple litters should have all of the following health clearances and the results need to be published in an established health data base. For the Labrador Retriever those clearances are OFA hips, OFA elbows, OFA eyes, EIC, CNM, prcd form of PRA, congenital cardiac and advanced cardiac. The eye certification can only be performed by a Board Certified ophthalmologist. The advanced cardiology examination can only be performed by a Board Certified Cardiologist. EIC, CNM and the prcd form of PRA require cheek swabs and can be ordered or performed by many veterinarians. Results of any test that are not published should be suspect as the purpose of this testing is to produce healthy Labrador Retrievers.

The Labrador Retriever Club, Inc. recently donated a total of \$50,000 to the AKC's Canine Health Foundation for the purpose of identifying the genetic cause of tricuspid valve dysplasia. This research will help us to make appropriate breeding decisions that minimize the risk of producing affected dogs. ■

Frances O. Smith DVM PhD is a Diplomate in the American College of Theriogenology – Smith Veterinary Hospital, Inc., the President of the Orthopedic Foundation for Animals (OFA) and the Vice-President of The Labrador Retriever Club, Inc.

Editor's Note:

You Need to Know ... Some in "the gallery" erroneously believe this issue has been created due to financial motive. They couldn't be more

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Application for Congenital Cardiac Database

Office Use Only: APPL, RAD, CK

Registered name: _____ Breed: _____ Sex: _____ Date of Birth (month-day-year): _____
 Registration number: AKC CKC Other registry name: _____
 Other registry #: _____
 # Number (if any): Tattoo Microchip Registration number of sire: _____ Registration number of dam: _____
 Owner name: _____ Co-Owner name: _____ Examining veterinarian's name or veterinary hospital: _____ Date of Evaluation (mm-dd-yy): _____
 Mailing address: _____ Mailing Address: _____
 City: _____ State: _____ Zip/postal code: _____ City: _____ State: _____ Zip/postal code: _____
 Phone: _____ E-mail: _____ Phone: _____ E-mail: _____

I hereby certify that the animal examined is the animal described on this application. I understand that all normal results will be released to the public.
 Signature of owner or authorized representative: _____

Authorization to Release Abnormal Results INITIAL **Authorization to Collect Statistical Data** INITIAL

Veterinary Instructions
 Clinical findings based on cardiac auscultation is required. (see page 2)
 Auscultation is within normal limits. Additional diagnostic studies not indicated.
 Auscultation reveals a soft (grade 1 or grade 2) murmur at rest.
 Auscultation reveals a moderate to loud heart murmur.
 Auscultation was performed after exercise and revealed:
 Normal heart sounds without a cardiac murmur.
 A soft (grade 1 or grade 2) murmur.
 Describe any cardiac murmurs:
 Timing: systolic diastolic continuous
 Point of maximal intensity: Mitral valve area Aortic or subaortic area
 Pulmonary valve area Tricuspid valve area
 Other location: _____
 Radiation or other characteristics: _____

Echocardiography if indicated (see page 2):
 Echocardiography with Doppler was performed and the results were within limits of normal.
 Echocardiography with Doppler was performed and the results were equivocal/mild congenital heart disease cannot be conclusively diagnosed nor excluded based on this study.
 Echocardiography with Doppler was performed and the results were indicative of congenital heart disease.
 Describe any abnormal echocardiographic or Doppler findings, including transvalvular or other perturbed velocities in m/sec.
 pulse/continuous wave left atrial/subaortic
 Summary evaluation and opinion of the examiner:
 Equivocal cardiovascular examination—congenital heart disease is not evident diagnosed nor excluded; status uncertain for breeding.
 Abnormal cardiovascular examination—congenital heart disease cannot be diagnosed nor excluded; status uncertain for breeding.
 Abnormal cardiovascular examination indicative of congenital heart disease indicate diagnosis below: _____

I certify that the standards for cardiac examination as set forth by the OFA were carefully followed in performing this examination.
 I DID verify tattoo/microchip on this dog I DID NOT verify tattoo/microchip on this dog

Veterinarian Signature: _____ Specialty: Practitioner, Specialist, Cardiologist Date: _____

Fees
 Animals Over 12 Months: \$15.00 **kennel Rate**—Individuals submitted as a group, owned/co-owned by same person.
 Litter of 3 or more submitted together: \$30.00 **Minimum of 5 individuals \$7.50 per study**
 Exams on animals under 12 months of age are considered preliminary evaluations and are not eligible for OFA numbers.
 Payments can be made by check, money order, (U.S. funds drawn on a U.S. bank) cash, Visa, or Mastercard, payable to the Orthopedic Foundation for Animals.

Visa/Master Card Number: _____ Name on Card: _____ Exp Date: _____ CVV (security code): _____

47372 Affected Animals, Statistical Data Submission and Resubmissions at No Charge

Application for Congenital Cardiac Database
<https://www.ofa.org/diseases/other-diseases/cardiac-disease>

misinformed. We thank Dr. Smith for her volunteer position as President of OFA. Further, we need to be aware her role is not only a non-paid position but it is an elected position. Furthermore, the financial difference this testing and recording revenue will make to the OFA is unlikely to reach a few thousand dollars. The testing is based on fee of \$15.00 per dog – and many dogs would be eligible for the discounted fee of \$7.50. Also be aware the OFA is not-for-profit.

There is no financial motive in doing the right thing for our Labrador Breed – please donate to CHF and utilize the OFA to its fullest to protect our field Labrador gene pool.

Cardiology Research Program Area

02531: Identification of Genetic Risk Allele(s) Associated with the Development of Tricuspid Valve Dysplasia in the Labrador Retriever

Principal Investigator: Kathryn Meurs, DVM, PhD; North Carolina State University

Total Grant Amount: \$57,158.00; Grant Period: 6/1/2018 - 5/31/2020


Tricuspid valve dysplasia is an inherited heart defect that is characterized by an abnormally formed tricuspid valve on the right side of the heart. It is reported to be most commonly observed in the Labrador Retriever although it has been observed in a few other breeds as well including the Boxer and Golden Retriever, among others. Although some affected dogs only have a very mild

valve malformation and can live quite comfortably with the defect, others are born with a very abnormal valve that results in heart valve leakage and the eventual development of congestive heart failure. Tricuspid valve dysplasia has been shown to be an inheritable trait in the Labrador Retriever. The investigators will study and compare the genome sequences for affected and unaffected dogs. If successful, this study will identify a genetic marker for tricuspid valve dysplasia in the Labrador Retriever and which can be used to develop a strategy to gradually reduce the prevalence of the genetic variant and tricuspid valve dysplasia in the Labrador Retriever.

This research is generously supported by the Labrador Retriever Club of the Potomac Top Twenty Gala Foundation and the Labrador Retriever Club, Inc.

Tricuspid Valve Dysplasia Methods of Examination – Clinical Examination

- 1. The clinical cardiac examination** should be conducted in a systematic manner. The arterial and venous pulses, mucous membranes, and precordium should be evaluated. Heart rate should be obtained. The clinical examination should be performed by an individual with advanced training in cardiac diagnosis. Board certification by the American College of Veterinary Internal Medicine, Specialty of Cardiology is considered by the American Veterinary Medical Association as the benchmark of clinical proficiency for veterinarians in clinical cardiology, and examination by a Diplomate of this specialty board is recommended. However, any licensed veterinarian may be able to perform this examination by auscultation.
- 2. Cardiac auscultation** should be performed in a quiet, distraction-free environment. The animal should be standing and restrained, but sedative drugs should be avoided. Panting must be controlled, and if necessary, the dog should be given time to rest and acclimate to the environment. The clinician should be able to identify the cardiac valve areas for auscultation. The examiner should gradually move the stethoscope across all valve areas and also should auscultate over the subaortic area, ascending aorta, pulmonary artery, and the left craniodorsal cardiac base. Following examination of the left precordium, the right precordium should be examined.
 - The mitral valve area is located over and immediately dorsal to the palpable left apical impulse and is identified by palpation with the tips of the fingers. The stethoscope is then placed over the mitral area and the heart sounds identified.
 - The aortic valve area is dorsal and 1 or 2 intercostal spaces cranial to the left apical impulse. The second heart sound will become most intense when the stethoscope is centered over the aortic valve area. Murmurs originating from or radiating to the subaortic area of auscultation are evident immediately caudoventral to the aortic valve area. Murmurs originating from or radiating into the ascending aorta will be evident craniodorsal to the aortic valve and may also project to the right cranial thorax and to the carotid arteries in the neck.
 - The pulmonic valve area is ventral and the one intercostal space cranial to the aortic valve area. Murmurs originating from or radiating into the main pulmonary artery will be evident dorsal to the pulmonic valve over the left hemithorax.
 - The tricuspid valve area is a relatively large area located on the right hemithorax, opposite and slightly cranial to the mitral valve area.
 - The clinician should also auscultate along the ventral right precordium (right sternal border) and over the right craniodorsal cardiac border.
 - Any cardiac murmurs or abnormal sounds should be noted. Murmurs should be described as indicated below.
- 3. Description of cardiac murmurs** – A full description of the cardiac murmur should be made and recorded in the medical record.
 - Murmurs should be designated as systolic, diastolic, or continuous.
 - The point of maximal murmur intensity should be indicated as described above. When a precordial thrill is palpable, the murmur will generally be most intense over this vibration.
 - Murmurs that are only detected intermittently or are variable should be so indicated.
 - The radiation of the murmur should be indicated.
 - Grading of heart murmurs is as follows:
 - Grade 1** – a very soft murmur only detected after very careful auscultation
 - Grade 2** – a soft murmur that is readily evident
 - Grade 3** – a moderately intense murmur not associated with a palpable precordial thrill (vibration)
 - Grade 4** – a loud murmur; a palpable precordial thrill is not present or is intermittent
 - Grade 5** – a loud cardiac murmur associated with a palpable precordial thrill and not audible when the stethoscope is lifted from the thoracic wall
 - Grade 6** – a loud cardiac murmur associated with a palpable precordial thrill and audible even when the stethoscope is lifted from the thoracic wall
 - Other descriptive terms may be indicated at the discretion of the examiner; these include such timing descriptors as: proto(early)-systolic, ejection or crescendo-decrescendo, holo-systolic or pan-systolic, decrescendo, and tele(late)-systolic and descriptions of subjective characteristics such as: musical, vibratory, harsh, and machinery.
- 4. Effects of heart rate, heart rhythm, and exercise.**
 - Some heart murmurs become evident or louder with changes in autonomic activity, heart rate, or cardiac cycle length. Such changes may be induced by exercise or other stresses. The importance of evaluating heart murmurs after exercise is currently unresolved. It appears that some dogs with congenital subaortic stenosis or with dynamic outflow tract obstruction may have murmurs that only become evident with increased sympathetic activity or after prolonged cardiac filling periods during marked sinus arrhythmia. It also should be noted that some normal, innocent heart murmurs may increase in intensity after exercise. Furthermore, panting artifact may be a problem after exercise.
 - It is most likely that examining dogs after exercise will result in increased sensitivity to diagnosis of soft murmurs but probably decreased specificity as well. Auscultation of the heart following exercise is at the discretion of the examining veterinarian.
 - At this time the OFA does not require a post exercise examination in the assessment of heart murmurs in dogs; however, this practice may be modified should definitive information become available.



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