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VOLUME FOUR

the Boxer Bark

HEALTH NEWSLETTER of the Pacific Northwest Boxer Club

UPCOMING HEALTH CLINICS

NOTE: Upcoming health clinics at area dog shows can now be found on our website:
pacificnorthwestboxerclub.com

We're happy to be back!

We missed producing a 2022/23 Fall/Winter BoxerBark because there was just too much going on with our BoxerBark volunteers. Personal and professional schedules simply collided! But we thank you for your patience and we hope you enjoy our Spring issue!

INSIDE this issue...

All issues of
the Boxer Bark
are available on PNBC's website
pacificnorthwestboxerclub.com

ARVC

Arrhythmogenic Right Ventricular Cardiomyopathy *aka* Boxer Cardiomyopathy

What is ARVC?

Arrhythmogenic right ventricular cardiomyopathy (ARVC) is an inherited disease that appears in adult Boxer dogs. Also referred to as Boxer Cardiomyopathy, this disease rarely affects other breeds. ARVC disease is very common in Boxers. In one study, 50% of Boxers were positive for the ARVC1 gene mutation that causes.

With ARVC, the normal heart muscle is replaced with fibrous, fatty tissue. This leads to electrical instability in the heart muscle and heart arrhythmias (irregular heart rhythm), which can seriously affect the heart and cause a dog to faint, collapse, or even die suddenly.

The specific arrhythmia related to this disease is called ventricular premature complices (VPCs). These early abnormal heartbeats originate from the heart muscle instead of the specialized conduction tissue in the heart, where normal heartbeats originate. If VPCs occur sequentially, an arrhythmia called ventricular tachycardia occurs and can cause symptoms.

The condition generally develops in middle-aged (5 to 7 years old) dogs, and in rare cases in younger dogs. Arrhythmias can often (but not always) be detected during a physical examination in dogs that are affected.

What causes ARVC?

Up to 50% of Boxers have the gene deletion mutation **ARVC1** (discovered in 2008) in an important heart gene (striatin) with a characteristic called "incomplete penetrance." A gene deletion is a type of mutation that involves the absence of a segment of DNA. Penetrance refers to the likelihood that a clinical condition will occur when a particular genotype is present; therefore, incomplete penetrance means that some Boxers will develop the signs of ARVC while others won't.

Most recently, in 2021, a second gene variant (**ARVC2**) was discovered and believed to be an autosomal dominant mutation in a regulatory gene involved in important cardiac proteins. An autosomal dominant mutation is a way a genetic trait or condition can be passed down from parent to offspring. Once again, however, the ARVC2 variant is also characterized by incomplete penetrance; i.e., not all Boxers testing positive for ARVC2 will develop the disease.

Separate tests can now identify if a Boxer is positive for ARVC1 and ARVC2. Since both variants exhibit incomplete penetrance, the conclusion at this point is that multiple genetic AND nongenetic factors may contribute to whether a dog develops this disease. Translation: Even if your dog is negative for both ARVC1 and ARVC2, it does not mean that heart disease or an arrhythmia will never develop; just as there are many genetic and nongenetic causes for the cardiac disease in people, this could also be true in Boxers.

Can ARVC be prevented by genetic testing before breeding?

In a word, no, mainly due to the incomplete penetrance characteristic of both ARVC1 and ARVC2 variants. Testing for these mutations is a helpful tool; however, there are likely other unknown multiple genetic and nongenetic factors likely responsible for ARVC, so a negative genetic test result does not guarantee that a dog will not be affected. Additionally, while dogs that test positive are at a substantially higher risk for developing ARVC, they may not necessarily experience symptoms.

It is important to also realize that the field of canine genetics is still very new and the field of cardiac genetics is VERY complex. Ongoing research will continue to provide new information on causes, testing, and treatment of ARVC.

That being said, breeders may still benefit from the factors below when making **breeding decisions**:

- Boxers that are positive for either ARVC1 or ARVC2 will not necessarily develop significant heart disease and die from ARVC. Some dogs will develop a very mild form of the disease and will live quite comfortably; others may need treatment.
- Removal of a significant number of dogs from the breeding population could be very bad for the Boxer breed. Remember that dogs that carry the mutation also carry other important good genes that shouldn't be lost from the breed.
- **Positive Heterozygous** (1 copy of the mutated gene and 1 copy of a normal gene): Dogs that are positive heterozygous should be carefully evaluated for signs of disease (holter monitor and echocardiogram). If arrhythmia (VPCs) is detected, possible treatment options should be discussed with your vet. Adult dogs that do not show signs of disease and that have other positive attributes could be bred to mutation negative dogs. Puppies may be screened for the mutation and over a few generations, mutation negative puppies may be selected to replace the mutation positive parent and gradually decrease the number of mutation positive dogs in the population.
- **Positive Homozygous** (2 copies of the mutated gene): Breeding not recommended unless they are exceptional members of the breed with exceptional attributes. Be aware that dogs that are homozygous for the mutation appear to have more significant disease and will certainly pass on the mutation; therefore, they should only be bred to a negative dog, and over two generations of negative crosses, a negative puppy could be selected as a replacement.

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IMPORTANT NOTE

This article, like all write-ups appearing in The Boxer Bark, is intended for informational purposes and does not constitute medical advice. For an accurate diagnosis of your pet's condition and treatment options, please start the process by making an appointment with your vet.

ARVC - Boxer Cardiomyopathy

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- **Positive for both ARVC1 and ARVC2 genes**: Dogs that are positive for both mutations ideally should not be bred, as they have the highest chances of passing along a mutation resulting in affected offspring.
- **Negative/Clear**: Dog is negative for the tested genes and will not pass on the ARVC1 or ARVC2 mutations to its offspring.

What are the symptoms of ARVC in Boxers?

For Boxers with cardiomyopathy, symptoms can be very serious and may vary. Clinical signs of ARVC can include:

- Coughing
- Accumulation of fluid in abdomen
- Fainting (syncope)
- Rapid breathing
- Exercise intolerance
- Sudden death
- Collapse (especially during or after exercise)
- Irregular heartbeat (which a vet might notice during routine exam)

How is ARVC in Boxers diagnosed?

Unfortunately, ARVC is difficult to diagnose for a few reasons, but primarily because dogs may be asymptomatic between arrhythmias. The disease can also mimic other cardiac diseases such as dilated cardiomyopathy. Another challenge is that sudden death may be the first and only clinical symptom.

Board-certified veterinary cardiologists will need a thorough history of your pet's health leading up to the onset of symptoms, including any information you may have about your dog's family background.

The following tests and tools to test for and diagnose arrhythmias and ARVC in your Boxer:

- Histopathology (post-mortem)
- Blood tests
- Genetic screening
- Echocardiography (to rule out any other cardiac disease)
- Electrocardiogram
- 24-hour ambulatory ECG Holter monitoring (worn by the dog to record the heart rhythm for 24 hours to up to a few days to detect VPCs)
- Biopsy
- Unfortunately, histopathology, which is conducted post-mortem, is still widely accepted as the best method of diagnosing the disease.
- A thoracic radiograph (chest X-ray) may help to determine whether there is an enlargement of the heart or other evidence of heart failure.

How is ARVC in Boxers treated?

- Your veterinarian will want to try to normalize the heartbeat as one of the first priorities of treatment.
- Generally, treatment consists of antiarrhythmic agents (medications) unless there is evidence of congestive heart failure or other problems with the heart.
- Some dogs seem to show improvement with the use of l-carnitine, a supplement used to increase levels of carnitine, which stimulates fatty-acid oxidation and is essential to a fully functioning body.
- If the disease is causing congestive heart failure, your veterinary cardiologist will likely recommend starting treatment right away.
- If they suspect cardiac disease, a heart monitor may be placed on your dog to determine the complexity and severity of the arrhythmia. This will also provide a baseline for comparison once treatment has started.
- If a dog is not displaying symptoms, the decision to begin treatment is based on the number of abnormal rhythms detected in a 24-hour period. Because antiarrhythmic agents have side effects such as anorexia or gastrointestinal issues, the decision to treat is on a case-by-case basis.
- Your veterinary cardiologist may recommend an implantable cardioverter defibrillator (ICD) as a supplementary treatment option, which has become common in human medicine.

What is the prognosis of Boxers with ARVC?

- While treatment with antiarrhythmic agents will decrease the number of episodes in which Boxers collapse, there is no evidence that it impacts long-term survival.
- For Boxers with cardiomyopathy, life expectancy can be difficult to predict as dogs with this disease are always at risk of sudden death. Dogs that have systolic dysfunction (a condition in which the heart contracts and blood is forced into areas where it can cause harm) — do not do as well.
- Despite progress in veterinary medicine, dogs with ARVC are unfortunately still at risk of sudden death and the prognosis may be poor. Some dogs can be asymptomatic and live for years, often with but occasionally without antiarrhythmic medication.

Most of the information in this article is from **The Atlantic Coast New York Veterinary Services** website:
https://www.atlanticcoastvet.com/site/blog-long-island-vet/2023/01/15/cardiomyopathy-boxer-dogs

For more information on ARVC in Boxers visit the links listed below:

ARVC Update-AKC Canine Health Foundation Spring 2022
https://www.akcchf.org/educational-resources/library/articles/Boxer-Update-Spring-2022-ARVC.pdf

North Carolina State University Boxer Cardiomyopathy
Information on testing and the new ARVC 2 gene test
https://hospital.cvm.ncsu.edu/services/small-animals/genetics/boxer-arvc/

Noteworthy: Research on ARVC remains ongoing. While NC State does not have anything in the works directly for the next gene marker (as of March 2023), research is ongoing with other groups, including looking at a potential autoimmune component with ARVC. This may possibly be why the disease is more complicated to diagnose and treat. Read more about the autoimmune approach at the following link:

National Library of Medicine
Evaluation of autoantibodies to desmoglein-2 in dogs with and without cardiac disease:
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10043840/

Canine Lymphoma
aka Lymphosarcoma

Lymphoma is one of the most common types of cancer in dogs, typically affecting middle-aged and older dogs (in rare cases, it can affect younger dogs). It can develop with minimal or no initial symptoms of illness, yet some forms can spread aggressively if not caught early. Boxers are one of several breeds considered to be high-risk for lymphoma.

Lymphoma in dogs is quite similar to the commonly occurring non-Hodgkin's lymphoma in humans. Veterinarians use the term malignant lymphoma to describe a group of cancers of the lymph nodes and lymphatic system, a network of lymph vessels, tissues, and organs throughout the body.

It is characterized by the abnormal growth of lymphocytes, a type of white blood cell that's instrumental in the immune system's ability to fight off various diseases and infections. These cells are highly concentrated in the lymph nodes, spleen, and bone marrow, where most lymphomas develop. The majority of lymphomas are high-grade (also called large-cell lymphoma) and rapidly progress.

Unfortunately, we don't know what causes the abnormal growth of lymphocytes in dogs; hence, the cause of lymphoma in dogs is not known. Despite studies into possible causes (e.g., chemical exposure, environmental factors, bacteria, viruses, genetic factors, etc.), certain evidence of a specific cause remains inconclusive. Therefore, there's currently no way to prevent lymphoma in dogs.

Types of Lymphoma

There are more than 30 different types of lymphoma, but the following account for a vast majority of lymphoma cases in dogs:

- **Multicentric (systemic)**: This most common form accounts for about 80-85 percent of cases in dogs. This type affects lymph nodes throughout the body.
- **Alimentary (gastrointestinal)**: This second most common lymphoma in dogs (less than 10 percent of cases) affects the intestines and/or the stomach.
- **Mediastinal**: Much less common type affecting organs within the chest, such as thymus gland or lymph nodes.
- **Extranodal**: This rare type develops in organs outside of the lymphatic system (eyes, lungs, kidneys, skin, bones, or nervous system).
- **Cutaneous**: This most common extranodal form affects the skin and is rare, accounting for only five percent of lymphomas in dogs.

Symptoms of Lymphoma

The first and most obvious sign of multicentric lymphoma, the most common form of this cancer, is swelling that feels like a hard, rubbery lump in some or multiple lymph nodes. Many dogs don't show other signs of illness, but over time can develop other symptoms such as lethargy, decreased appetite, weight loss, facial or leg swelling, increased thirst and urination.

Because many dogs with lymphoma show minor to no signs of being ill, it can be helpful to check your dog's lymph nodes regularly for any swelling or hardness. Keep in mind, however, that swollen lymph nodes can also be symptomatic of other conditions. Checking for swelling will at least give you a heads-up to consult with your veterinarian. The following link is helpful in showing you exactly where to find all of your dog's lymph nodes:

YouTube - Dr. Sue Cancer Vet - March 19, 2018

In the less common types of lymphoma (15-20 percent of all cases), symptoms depend on the affected organ:

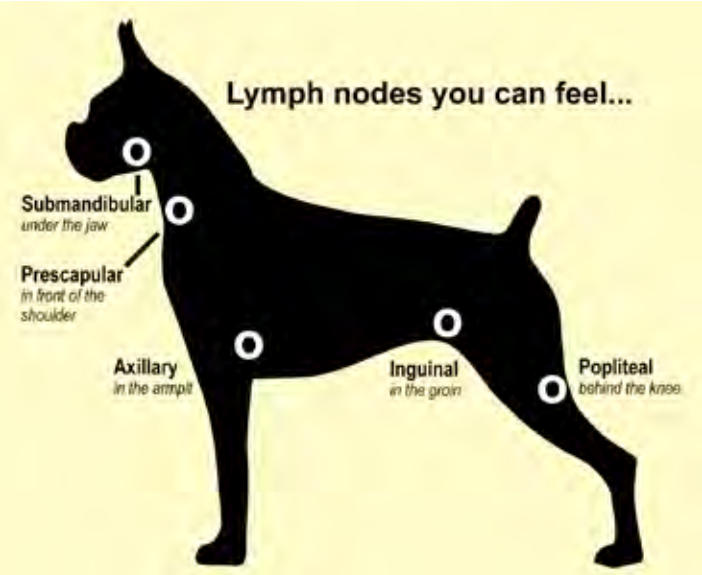
- **Alimentary (gastrointestinal)**: watery, dark, foul-smelling diarrhea, vomiting, weight loss.
- **Mediastinal**: breathing problems and coughing, swelling of face or front legs, increased thirst and urination.
- **Extranodal**: respiratory distress, kidney failure, blindness, seizures, bone fractures and pain, depending on the affected organ.
- **Cutaneous**: thickened lumps or dry, scaly, red areas, itchy patches of skin anywhere on the body or in the mouth. As it progresses, these patches become moist, ulcerated, and extremely red. Masses in the skin can also occur. Beware: cutaneous lymphoma can often be mistaken and treated as an infection or allergy; when it occurs in the mouth (often affecting the gums, lips, and the roof of the mouth) it can often be mistaken for periodontal disease or gingivitis.

Diagnosis

The most common tool for diagnosing lymphoma is a fine-needle aspiration cytology (FNAC) performed by your primary/general veterinarian. Cells from your dog's suspect lump(s) are extracted by a needle, put on slides, and sent to a pathology laboratory for cytologic evaluation. FNACs are minimally invasive, quick, and are a starting point for a diagnosis.

Cytology looks at individual cells or clusters of cells. Cells are retrieved via fine needle aspiration, mounted on slides and sent to a pathology laboratory. A trained clinical pathologist can often confirm a diagnosis of lymphoma based on cytology, though some variations of lymphoma are more difficult (intermediate or small cell lymphomas) and may require additional diagnostic methods such as histology.

Histology involves examining an entire section of tissue, which contains many types of cells and allows microscopic examination of cell and tissue structure. Collection of suspect tissue(s) is usually accomplished via minor surgical procedures such as Tru-cut/core needle biopsy, incisional wedge biopsy, or removal of an entire lymph node (excisional biopsy). The larger the biopsy sample, the better the chance for an accurate diagnosis.



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Canine Lymphoma

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Beyond Diagnosis

A lymphoma diagnosis usually results in a recommendation that the owner initiate consultation with a cancer specialist…the veterinary oncologist, who will be able to recommend steps to help identify what stage (spread) of lymphoma is present.

- **Identification** the specific type of lymphoma present; if not already done, a histological study of affected lymph node(s) and/or suspect organ(s) will be in order
- Use of **immunophenotyping** to identify the subtype of lymphoma (B-cell, T-cell, or neither), which affects drug treatment choices as well as overall prognosis (forecast of the likely course/outcome of a disease)
- Obtaining complete **full blood work and urinalysis** to assess organ function to handle anticipated chemotherapy, and to also identify if the lymphoma already presents possible bone marrow and/or organ involvement
- Obtaining **thoracic radiographs (x-rays) and/or abdominal ultrasound and/or bone marrow aspiration** on a case-by-case basis based on lymphoma type; these procedures can provide valuable baseline images to assess spread or determine whether the dog has other conditions that may affect treatment decisions or overall prognosis

Stages of Lymphoma

There are five stages of canine lymphoma:

- **Stage I**: Only one lymph node is affected.
- **Stage II**: More than one lymph node is affected but only on one side of the body (front or rear).
- **Stage III**: Multiple nodes are affected in the front and back of the body.
- **Stage IV**: Lymphoma is present in the spleen and/or liver.
- **Stage V**: Bone marrow, nervous system, intestines, skin, or other locations are affected.

Each of the above stages can be further divided into two substages:

- **Substage A**: patient feels well
- **Substage B**: patient is ill

If an owner is open to considering treatment, staging is a must. In general, the more places the lymphoma has spread to, the poorer the dog's prognosis.

Treatment

Chemotherapy (oral and/or intravenous) is the standard and most effective treatment for canine lymphoma. It can extend a dog's life but it cannot cure the disease; at best, it can allow a dog to reach complete or partial remission (reduction of the signs and symptoms of the cancer). The types of chemotherapy drugs used depend on the type of lymphoma. In some cases, surgery and/or radiation may be recommended.

Treatment of multicentric lymphoma with systemic chemotherapies is typically highly rewarding with the majority of dogs (90-plus percent) responding positively (i.e., complete remission).

Treatment of lymphoma types other than multicentric (i.e., gastrointestinal/alimentary, mediastinal, cutaneous, and other extranodal lymphomas) are often more difficult and less rewarding, sometimes involving surgery and/or radiation therapy in addition to chemotherapy.

It should also be noted that a 2019 study indicated that Boxers are predisposed (i.e., an increased chance or likelihood of developing a given disease) to T-cell lymphoma and it is possible that Boxers may respond less favorably to chemotherapy than patients of other breeds.

Prognosis

There's no easy answer as to survival rates for canine lymphoma; much depends on the type, phenotype, and stage of the disease. B-cell lymphoma is more responsive to treatment and affected dogs usually survive longer than dogs with T-cell lymphoma. However, individual responses and survival times vary. Some dogs with T-cell lymphoma achieve durable remissions. Some dogs with B-cell lymphoma do not. In general:

- Without treatment, life expectancy in dogs with lymphomas is 4-6 weeks.
- With treatment of oral steroids alone, the prognosis is 1-2 months.
- With chemotherapy, dogs with B-cell lymphoma have a median survival time of 12 months; dogs with T-cell lymphoma have a median survival of 6-9 months. Median survival means 50 percent of pets live less than that time point and 50 percent live longer.
- More than 90 percent of dogs with multicentric canine lymphoma (most common form) treated with chemotherapy achieve complete remission. Complete remission means that all symptoms and signs have become undetectable, but cancer could still be lurking in the body.
- Although initial response rates to systemic chemotherapies are high, the vast majority of dogs will ultimately relapse. Further chemotherapy can bring a dog back to remission, but it usually doesn't last as long as the first remission. Eventually, most lymphomas develop resistance to all chemotherapy medications.

*BUT WAIT…*What About Bone Marrow Transplantion (BMT) *aka* Blood Haematopoietic (Stem) Cell Transplantation (HCT)?

In the 1960s-70s, BMTs were performed on dogs in a research setting prior to using the techniques in human patients. The information from these studies, combined with advancements in technology, has allowed canine bone marrow transplantation procedures to move from the laboratory to clinical practice.

Currently, there is only one private-practice veterinary clinic in Bellingham WA regularly offering bone marrow transplantation for canine B-cell lymphoma.

Up until February 2023, North Carolina State University College of Veterinary Medicine offered bone marrow transplantation through its Bone Marrow Transplant Unit, successfully treating canine lymphoma and curing 33 percent of dogs with B-cell lymphoma and 19 percent of dogs with T-cell lymphoma. Unfortunately, NC State suddenly paused their BMT program in February of this year, in part, "to proactively conduct an external review of the novel program. Through this review, we want to carefully understand the risks versus rewards of this treatment." At present, the program is still under review and, according to NC State's spokesperson, "The results of our review will determine next steps."

*ONE MORE QUESTION…*Is There a Screening Test for Lymphoma?

Yes. One such test called OncoK9 multi-cancer early detection (MCED) can detect 30 types of canine cancer, including some

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Canine Lymphoma

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specific lymphoma types. An owner can seek this test through their veterinarian. It involves a blood draw and interpretation via Antech or Idexx diagnostic laboratories.

The approximate cost for the OncoK9 MCED test is high, approximately $400, according to this writer's internet search. The test also has MANY LIMITATIONS & RISKS. You can learn more about this at: https://petdx.com/oncok9-test-limitations-and-risks/

SUMMARY

- Lymphoma is one of the most common cancers seen in dogs.
- Boxers are high-risk for lymphoma.
- FNAC (fine needle aspiration cytology) is the most common test used to diagnose lymphoma.
- Once diagnosed, owners will likely be advised to seek the consultation of a veterinarian oncologist.
- If treatment is a consideration, the oncologist will seek further diagnostic testing to determine the extent/spread, type, and phenotype of the dog's lymphoma.
- The standard treatment for lymphoma is chemotherapy.
- In some cases, surgery and/or radiation are needed in addition to chemotherapy.
- Without treatment, prognosis is four to six weeks.
- With oral steroids alone, prognosis is one to two months.
- With chemotherapy, prognosis for B-cell lymphoma is about 12 months, and 6-9 months for T-cell lymphoma.
- Complete remission is most possible with multicentric lymphoma, but relapses are not uncommon.
- Bone marrow transplantation can offer a cure for lymphoma; however, BMT for lymphoma is still considered a "novel" treatment; proximity to qualified treatment venues is extremely limited, costs for the total BMT process can reach tens of thousands of dollars, and cure rates are not especially high.
- Annual screening for some specific lymphoma types exists, but is expensive with many limitations and risks.
- As always, your Boxer's health and care is best handled between you and your veterinarian. There is ample information about canine lymphoma online; but remember, the information you gather should always be used as a basis for asking questions of and seeking recommendations from your vet in order to provide the best care for your Boxer.
- Lastly, be aware that symptoms presented here can be indicative of other health conditions; only your vet can work with you and your Boxer towards a correct diagnosis.

ARTICLE SOURCES

https://www.caninejournal.com/lymphoma-in-dogs/

https://www.morrisanimalfoundation.org/article/understanding-diagnosis-canine-lymphoma

https://vet.purdue.edu/wcorc/cancer-research/canine-lymphoma-research.php

https://www.isvma.org/wp-content/uploads/2021/09/CanineLymphomaAPracticalDiagnositcApproachtoyourWorkup.pdf

https://www.vetoncologyconsults.com/b-vs-t-cell-lymphoma/

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https://www.medvetforpets.com/news/medvet-columbus-successfully-completes-7th-bone-marrow-transplant-dog-lymphoma/

https://hospital.vetmed.wsu.edu/2021/05/24/lymphoma-in-dogs/

https://www.newsobserver.com/news/local/article272801825.html

https://bhamvet.com/service/bone-marrow-transplant/

https://vcahospitals.com/know-your-pet/lymphoma-in-dogs#:~:text=It%20is%20most%20common%20in,Basset%20Hound

Re: OncoK9 MCED test: https://petdx.com/

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VETERINARY TRANSPLANT SERVICES, INC.

The World's First Veterinary Tissue Bank

VTS was founded in 1996 and is well-known worldwide for supplying aseptically processed allograft tissues and providing tens of thousands of grafts for veterinary patients. Working with various clinics and rescue groups in Washington state and Northern Oregon, VTS offers owners and their pets the opportunity to leave a legacy of healing and renewed health for other animals through their Pets Helping Pets program.

- Dogs, and even horses, can donate tissues to help other animals.
- VTS is the link between the gift of tissue donation and patients who need bone and soft tissue transplants in orthopedics, ophthalmology, and dentistry.
- VTS provides bone grafts, tendons and other soft tissues, corneas, other tissues, as well as synthetic versions of these grafts for veterinary patients.
- In addition to musculoskeletal and ocular tissues, VTS can process and preserve a wide variety of cells and tissues; these include skin grafts, heart valves, bone marrow, cartilage, cord blood, amnion, and pancreatic islets.
- Grafts help treat a variety of disorders and injuries.
- Fractured or diseased bones can be mended and limbs spared from amputation.
- Deformed or degenerative joints can be repaired.
- Blindness for some pets can be prevented.
- Loose teeth can be saved rather than pulled.

Donor Criteria

- Donors are young to middle-age pets who have passed away (canines: less than 10 years old; equines: less than 25 years).
- Donors are in generally good systemic health (canines: current on vaccines at least for rabies, distemper, hepatitis, and parvo-virus; equines: vaccinated preferably for rabies and tetanus).
- Weight factors: canines should be 40+ pounds or greater (at ideal body weight); equines should be normal body weight for their age/breed.
- VTS tests for transmissible diseases in the same way blood donors are tested. Canines: CBC and Chemistry Screen as well as PCR tests for Anaplasma, Mycoplasma, Rickettsia, Ehrlichia, Leishmania, Babesia and Bartonella species. Equines: Brucellosis, Potomac Horse Fever (neorickettsia sp.), EVA, an equine respiratory panel for EHV1 & 4, Influenza A, among others, a SHI test (Corynebacterium), Babesia sp., EIA (Coggins test), VEE, and a neurologic panel including EEE, WEE, WNV, EHV1, et al.
- Exclusions: Malignancies, septicemia, bacteremia, autoimmune disorders, ingestion of toxic substances, recent exposure to or history of rabies, distemper, or parvovirus, general unexplained lethargy or malaise. Note: Animals with acute trauma (including fractures), hip dysplasia, or other bone-involved conditions such as osteochondritis dessicans may be acceptable as bone donors, as long as the condition is not contagious or transmissible.

The Process of Tissue Donation Begins With Your Vet

Your veterinarian can help evaluate your pet's health history, discuss donor criteria in more detail, and help determine if tissue donation is the right option for you and your pet. If they are not yet familiar with VTS' donor program, they can call VTS for guidance through the process. If VTS confirms with your vet that your pet is eligible for tissue donation, the following steps are taken:

- VTS will instruct your vet on the required blood draw so they can run their tests.
- Your vet will have you sign a VTS-provided consent form.
- There is no cost to the owner for choosing tissue donation; VTS covers all costs related to testing and tissue recovery.
- The donation process begins only after the time of death so there is no discomfort or pain.
- When in the care of VTS, your pet is treated at all times with care and respect.
- The gift of donation does not affect pawprint memorials or private cremation; VTS can arrange for your pet's ashes to be returned to you following the donation.

PETS HELPING PETS + VETERINARY TRANSPLANT SERVICES, INC.

When faced with the loss of your pet, consider the renewed health other animals may gain through tissue donation.

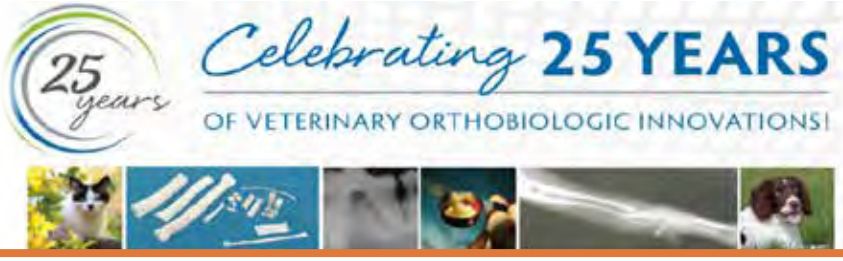
Paying It Forward…

As a thank you to the vet clinic for assisting and in honor of each tissue donor, VTS makes a charitable contribution to Old Dog Haven who provides final refuge care for dogs.

And, as a tribute to the life of each tissue donor, VTS also makes a donation to the Arbor Day Foundation who plants a tree in one of our National Forests in honor of the donor and their family.

Listen to a radio interview with Dr. Helen Newman on VTS' Tissue Donor Program:

PLAY INTERVIEW



Veterinary Transplant Services, Inc.

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