



1-1-1991

## 21st Annual Canine Symposium: Your Veterinarian and Your Dog

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*The Twenty-first Annual Symposium Your Veterinarian and Your Dog was held January 26, 1991 at the Veterinary Hospital of the University of Pennsylvania. The program featured four speakers discussing a variety of topics, such as common eye problems in dogs, the Canine Genetic Disease Information System, gastric dilation volvulus, and the canine blood bank at VHUP. Following are summaries of the presentations.*

## Gastric Dilation Volvulus Syndrome

Gastric dilation volvulus syndrome, or bloat, is a life-threatening condition which can occur in all breeds of dogs. Dr. David Holt, lecturer in surgery, discussed the disease, its symptoms, and the current treatment regimen.

It is not known why some dogs develop gastric dilation (distension of the stomach), but it is thought that these dogs are greedy eaters who swallow inordinate amounts of air while eating, and that this air remains in the stomach. There may be a genetic predisposition to gastric dilation volvulus. Dr. Gregory Acland here at Penn has been monitoring a colony of Irish setters for eye diseases and has found a greater incidence of GDV in a line descending from one particular female. However, the inheritance pattern indicates that it is not due to one gene, but rather to a number of genes and, perhaps, environmental factors.

In the past it had been thought that great amounts of food, followed by a large water intake, were the cause of dilation of the stomach. Another theory was that exercise after eating a large meal could cause the condition. However, in a study of 600 dogs, divided into groups, with different diets, large and small water intake and exercise after eating, no significant differences in the occurrence of gastric dilation and volvulus in the various groups were found.

Dilation can occur alone or with volvulus. Volvulus can occur without dilation, but it is thought that dilation will only result in volvulus if the stomach is in an abnormal position prior to distention. Breeds affected are often large and deep chested, although a retrospective epidemiological study of hospital cases here at Penn by Dr. Larry Glickman showed that there was not much bias toward the large breeds.

The first symptoms of GDV owners may notice in their dog are anxiousness and breathlessness. The animal may be restless, salivating and have a distended abdomen. The animal's condition can deteriorate rapidly as it goes into shock. Dr. Holt explained that poor perfusion is caused by compression of the portal vein and the caudal vena cava by the distended stomach. The reduction in blood flow causes a decrease in cardiac output of 64 percent, a decrease in blood pressure by 48 percent and poor tissue perfusion. Poor perfusion and oxygen delivery to the heart muscle result in arrhythmias which may develop up to six to 24 hours after onset of GDV. Another contributing factor to arrhythmias are circulatory cardioactive substances which further compromise the labile state of the heart. The reduction in blood flow also affects the liver, spleen and kidneys and can cause disseminated intravascular coagulation (D.I.C.), a life-threatening complication. The stomach itself is severely compromised in GDV as its blood flow is decreased

up to 80 percent, resulting in death of tissue. In severe cases the stomach can rupture, causing peritonitis.

A dog with gastric dilation needs to be seen by a veterinarian very quickly. Dr. Holt explained that the treatment regimen has changed over the last few years. In the past, animals with GDV were taken straight to surgery for decompression of the stomach and correction of the volvulus. The success rate was about 50 percent.

Now the first step is to prevent or reverse the circulatory collapse by administering fluids intravenously to stabilize the animal. Antibiotics are sometimes given because of the possibility of infection. Radiographs are taken to determine if the stomach has rotated. The stomach is decompressed only after the circulatory system has been stabilized.

Decompression is accomplished by passing a tube into the stomach or, if that is not possible, by using a large gauge needle to let the air escape. Throughout these procedures the dog is carefully monitored for vital signs and blood values as well as cardiac arrhythmias.

If volvulus has occurred, surgery is necessary to reposition the stomach. Here the surgeon often finds unpleasant surprises such as dead stomach tissue, necessitating partial removal of the organ. Sometimes splenic vessels are thrombosed and the spleen needs to be removed. To prevent a recurrence of volvulus, the stomach is "pexied" to the abdominal wall. A tube is placed in the stomach, exiting through the abdominal wall. Stitches are placed at the juncture of the tube, stomach and abdominal wall. As the animal heals the stomach wall and the abdominal wall form adhesions, holding the stomach firmly in place. This procedure will not prevent subsequent dilation, but it will prevent volvulus. The tube remains in place for ten days and is then removed. The wound heals quickly. If dogs suffer from frequent gastric dilation, such surgery should be considered to prevent volvulus.

**In a dog lying on its back:**



**the picture a normal stomach presents**



**the picture a volvulus presents.**

After surgery the patient is moved to the Intensive Care Unit for about two to three days. The first 24 hours can be critical as arrhythmias and D.I.C. may develop. The patient is connected to heart and blood pressure monitors and receives intravenous fluids. Transfusion of blood may also be required. Rehydration and stabilization prior to surgery have reduced the mortality rate to about 15 percent. Some dogs may develop pneumonia as a result of having aspirated stomach fluids. They are treated with antibiotics, nebulization and coupage. These dogs often require a longer stay in ICU. Solid food is gradually reintroduced once the dogs are able

to eat on their own. When the patients return home, they receive their regular diet, though frequent small meals are recommended.

Dr. Holt feels that a dog's best chance of surviving gastric dilation volvulus is early recognition of the problem and aggressive use of rehydration prior to surgery.

He recommends that greedy eaters be fed small portions and that measures are taken to slow down the gulping of food. He advised owners to be alert to the first signs of the disease and to get these animals to the veterinarian quickly because delays in seeking veterinary care mean more severe complications of GDV.

## Control of Genetic Disease in Purebred Dogs: Role of the Canine Genetic Disease Information System

Dr. Donald F. Patterson, Charlotte Newton Sheppard Professor of Medicine and Chief, Section of Medical Genetics, together with Ms. Patricia Green of his staff, discussed the Canine Genetic Disease Information System (CGDIS), a unique computerized reference program containing comprehensive information on canine genetic diseases. The CGDIS is designed to assist veterinarians and breeders in the quest to accurately diagnose and reduce the incidence of genetic disease in dogs. The project is supported by the American Kennel Club.

Advances in veterinary medicine during the last 30 years have greatly decreased the morbidity and mortality rates in dogs from diseases caused by infectious agents, malnutrition and parasites. There is now an increased awareness of disorders caused by congenital malformations, growth related deformities, metabolic defects, disorders of the immune system and cancer, all of which have important genetic components. While there presently is no cure for most genetic disease, most can be prevented, or at least reduced in incidence, through selective breeding practices. It is for the recognition of inherited diseases and the development of such breeding strategies that the CGDIS is important.

Dr. Patterson explained that mammalian species have about 50,000 genes and the function of most genes is the production of a specific protein. If a disruption in the gene occurs, disease may result. In many diseases environmental factors play an important role in the severity of the disease. At one end of the scale are diseases that cause mortality mainly due to defective genes while at the other end are diseases caused mainly by environmental factors such as viruses. However, even here genes enter the picture as some animals, due to their genetic make-up, are more resistant to viral infections than others. For example, it has been shown that Doberman pinschers and Rottweilers are more severely affected by parvovirus infections than other breeds; this susceptibility has a genetic basis.

By 1988 researchers had recognized 281 genetic diseases in the dog, since then ten to 12 new canine genetic diseases are described annually. The number now stands at over 300. This does not mean that new genetic diseases are constantly developing. Rather, discovery of additional genetic diseases is due to increased sophistication of veterinary medicine and improved diagnostic tests.

Genetic diseases may involve any of the body



systems. At this time the largest group of diseases identified is that of bones and joints, followed by diseases of the neuro-muscular system. This is understandable as such disorders are easier to recognize than a genetic defect of metabolism, for example.

The development of an effective program to reduce the frequency of genetic diseases requires three ingredients:

1. Knowledge of the clinical signs, laboratory tests, and pathology characteristics of the disease.
2. Knowledge of the mode of inheritance.
3. A program to prevent affected animals and carriers of the mutant genes from breeding.

It is here that the CGDIS becomes invaluable. It is a central repository for all known canine genetic diseases and it will be continually updated. The data base contains not only the information on breeds affected, but such information as symptoms or clinical signs, age of onset, primary and secondary body systems affected, available diagnostic tests, pathology findings, individuals or institutions with special expertise for the disease, genetics and mode of inheritance, recommended methods of control, and published literature (several 1,000 references). The CGDIS does not contain specific dogs, pedigrees or breeders' names. It does, however, cover all known breeds of dogs, ranging from rare breeds not even seen in this country to the AKC recognized breeds.

The system is microcomputer based and will run on the recent IBM compatible systems available in many offices and homes. The information in the data base is assembled from published literature and from veterinary institutions. At this point information on over 200 diseases has been entered into the system. Each disease is reviewed by the members of the School's Section of Medical Genetics during weekly meetings, the pertinent facts, descriptive paragraphs and reference lists are assembled. This material is edited repeatedly before it is entered into the computer in a time-consuming process. Dr. Patterson hopes to add information from individual breed club genetics committees to the database at a later date. While such information would not always have scientific verification, it could serve as "an early warning system" to veterinarians and breeders.

The system can search the data base for information in a variety of ways. One can ask it for diseases affecting a specific breed and then obtain information on each individual disease. Or one can enter a disease and then ask which breeds are affected. The system also permits a search by disease characteristics. It can also be used to obtain a complete list of all genetic diseases affecting a particular breed. Dr. Patterson pointed out that this system will be very useful to veterinarians and that it will enable a veterinarian to hand a client a print-out in lay language providing information about the specific diseases found in any breed. It will also enable the veterinarian to better advise clients on how to reduce the incidence of a specific disorder through selective breeding.

The CGDIS will pave the way for a comprehensive certification program for breeding stock as all the information about canine genetic diseases will finally be easy to access. And, as the system will be continually updated, it will provide veterinarians and breeders with the most up-to-date information.

The CGDIS will be field tested later this year and will be available for purchase sometime in 1992.

## Common Eye Problems Important to Dog Owners and Breeders

Dr. Stephen Gross, a board certified ophthalmologist, began his presentation by stressing the importance of the Canine Eye Registry Foundation (CERF) which oversees the canine eye certification program. Dogs should be examined for eye defects at age 1 1/2 years and then annually thereafter. The eye exam is performed by a board certified ophthalmologist, usually during eye clinics sponsored by dog clubs. Unfortunately many of the inherited eye diseases in dogs are apparent at different ages, some forms of cataracts may be evident very early while others cannot be detected until the animal is four or five years old. The same is true for progressive retinal atrophy, thus, Dr. Gross stressed, conscientious breeders have these exams performed until dogs reach the age of eight to ten years, depending on the breed.

Dr. Gross explained that the anatomy of the dog's eye is similar to that of the human eye, though the lens is three times as large and the dog has a third eyelid. The dog also has a reflective surface in the back of the eye, the tapetum, which is common in all species with highly developed night vision. The outer surface of the eye is the cornea; the next layer is the fluid-filled anterior chamber, then comes the lens, a clear crystal-like structure which focuses the image the dog sees, much like in a camera; followed by the vitreous, a gel-like substance, and the retina, a layer of nervous tissue at the back of the eye. The optic nerve transmits the image from the retina to the brain. Dogs, unlike people, can pull back the eye if it is painful, the third eye lid then slides into place, protecting it.

The parts of the eye are delicate and microsurgery is performed with special instruments and a biomicroscope. Stitches are numerous and tiny. Dr. Gross stressed the importance of seeking an experienced specialist for any kind of canine eye surgery.

The first eye problem discussed was the dermoid, a developmental defect. A tiny piece of skin grows on the cornea. Although it does not impair vision, it often causes irritation because it contains hair follicles. It is easily repaired by surgery. Dr. Gross feels that dogs which have dermoids should not be bred.

Faulty eyelids can cause quite a few problems for dogs. Quite a number of breeds, particularly brachycephalic ones, have rather large, protruding eyes, making the organ prone to injury. In extreme cases the eye can pop out of its socket when the upper eyelid slides behind the eye. This injury can be surgically repaired, however, vision is often lost in the eye because the optical nerve has been damaged. Surgery to correct too large an eye opening involves stitching together the eyelids at the corners of the eye.

Eyelashes usually grow on the skin side of the eyelid. But they can grow right at the edge, rubbing against the eye and causing irritation. They can also grow on the inside of the eyelid, causing great discomfort and, in some cases, ulceration of the cornea. Sometimes a dog can have normal eyelashes and then a second row inside the lid. All these defects must be surgically corrected to prevent damage to the eye and to make the dog comfortable. The surgeon removes the follicles by microsurgery to prevent regrowth of the hair.

Entropion is another disorder where hair causes discomfort, though it is the fur around the eye which irritates. The eyelids roll in and the fur rubs against the eye. This is quite common in breeds that are heavily wrinkled, particularly on the forehead. In extreme cases, the disorder is evident as early as 12 to 14 days of age. In young pups the eyelids can be tacked up to give the dog time to grow. Dr. Gross explained that the corrective microsurgery, involving a complete restructuring of the eyelids, is normally done at four to six months of age, but in extreme cases it can be performed earlier. If not treated, the constant irritation causes ulceration of the cornea and great discomfort.



Corneal ulcer

Cataracts are not painful, but they cause impairment or loss of vision. A cataract is defined as any opacity on the lens. They are common in many breeds and are mostly inherited, though the mode of inheritance is not clearly understood in many breeds. Cataracts also can be caused by trauma, and, in young puppies, by milk replacer. Dr. Gross explained that the lens develops in layers as the animal grows, thus the location of a cataract provides important clues to its nature. Cataracts which developed in the fetus have a different location than those developing at a later age. Cataracts range in size, density and rate of growth and must be observed over a period of months. Cataracts can be surgically removed, though this depends on the patient. If the animal is old and not very active, it is often best to not perform surgery, particularly if the cataracts had a gradual onset and the animal has adjusted to its limited vision. The pupil can be dilated with medication to enlarge the dog's limited vision. Dr. Gross stressed that dogs can get along well with seeing just from one eye or with limited vision. Usually cataract surgery is performed once the second eye becomes affected.

Cataract surgery in the dog is more complicated than in humans because of the larger size of the lens and the full anesthesia required. Also, dogs' eyes react to surgery with greater scarring than human eyes. There are different techniques employed by the surgeon. The entire lens can be removed or a technique called phacoemulsification can be used. A tiny incision is made through the cornea and an ultrasound probe is inserted and used to shatter the cataract. The pieces are removed and the incision is closed. However, this technique doesn't work for all types of cataracts.

Dr. Gross explained that a dog can see without a lens, though it is not able to see small things, but it can observe a room and large objects. He also mentioned that ophthalmologists have begun to implant lenses, but this treatment is quite costly. A soft contact lens is used in the treatment of recurrent corneal abrasions, a condition in older dogs where spontaneous abrasions of the cornea develop. These are very slow to heal and quite painful. The contact lens facilitates healing and makes the eye more comfortable.

Corneal abrasions can also be caused by lack of tears. This is often manifested by an eye with a red film and copious amounts of mucous. It is thought that the lack of tears is due to an inappropriate immune attack on the tear glands. Each eye has two such glands, one is quite familiar to dog owners as it can pop up from its place behind the third eyelid giving the appearance of "cherry eye." In the past, surgeons removed the gland, but now it is stitched back into place to preserve the tear gland. Lack of tears is treated with a specially formulated ointment and drops.

During the question and answer period Dr. Gross explained that cholesterol or lipid deposits in the eye are not cataracts and that they are due to past injury, dryness or scarring. He said that they do not severely impair vision. He mentioned that one should check the dog's eyes frequently and if sudden squinting or discharge occurs, a veterinarian should be consulted. The statement that any surgical repair would render a dog ineligible for AKC shows was also addressed. Dr. Gross stressed that these repairs are necessary for the comfort and health of the animal and that it is up to the owner's ethics whether or not the dog will be shown.

## Transfusion Medicine and the Blood Bank at VHUP

Transfusion medicine is a relatively new field in veterinary medicine and blood transfusions are becoming an increasingly important treatment modality. They are the number one tissue transplant procedure in humans and animals. Donna Oakley, VHUP head nurse and blood bank coordinator, provided an overview of transfusion medicine and the canine blood donor program at the Veterinary Hospital of the University of Pennsylvania.

She mentioned that the first reported canine blood transfusion was performed in the late 1800s by surgically attaching the artery of one dog to the vein of another. Today blood is transfused through IV catheters and, in most cases, whole blood is not administered, just the required specific components of blood.

Blood is composed of a liquid portion, the plasma, and a cellular portion consisting of different cell types: red blood cells carrying oxygen; white cells serving as a defense mechanism producing antibodies and locating, engulfing, and destroying foreign material; platelets with strong adhesive properties facilitating clotting. Plasma consists of water, salt and proteins (albumin, clotting factors, etc.). A unit of blood can be separated into its different components, allowing treatment of specific diseases with specific blood products.

For example, a red cell transfusion may be needed if an animal has become anemic due to *Babesia canis* (a protozoa) infection or from heavy flea infestation. Red cells are also needed for the crisis management of hemolytic anemia before the dog can receive drugs to correct its over-reactive immune system. Clotting factors are administered if an animal has a bleeding episode due to von Willebrand's disease. By using these specific components, exposure to volume overload and the incidence of transfusion reactions can be greatly reduced.

Blood for any transfusion is crossmatched to determine whether donor and recipient are compatible. It is thought that dogs have as many as 13 different blood groups, however, as Ms. Oakley pointed out, it is possible that many more groups will be discovered as the study of canine blood continues. Three groups cause the most severe reactions due to incompatibility. Two types of transfusion reactions



Collecting blood from a donor

can occur: immune mediated reaction where the body destroys red cells because of antibodies present in the recipient; and non-immune mediated reaction which occurs when the blood products being transfused are defective, due to an improperly collected, stored or administered product. Both reactions are severe and can occur for up to three weeks after the transfusion, requiring close monitoring of transfusion patients. At VHUP all blood and blood products are stored in state-of-the-art refrigerators and freezers designed to keep the required temperatures at all times. All blood transfused here is passed through special filters to remove clots or other debris.

Ms. Oakley briefly mentioned some blood transfusion alternatives reducing adverse transfusion reactions: concentrated hemoglobin transfusion or a hormone treatment that stimulates production of red blood cells; preoperative autologous donation where, prior to elective surgery, the animal donates its own blood which is available later if needed; acute normovolemic hemodilution for long procedures where blood loss is anticipated. This last alternative involves removing multiple units of blood which are replaced by intravenous fluids to dilute the blood prior to surgery. Post-operatively, the patient is transfused with its own blood, eliminating the chance of transfusion reaction to a foreign donor.

VHUP performs between three and six transfusions daily. Blood is always needed and three years ago a program was initiated where students,

faculty and staff brought in their dogs to donate blood. Soon it was realized that these animals could not meet the demand, and Donna Oakley reached out to dog clubs and breeders in the tri-state area. Today almost 500 dogs are enrolled in VHUP's canine blood donor program. These animals are brought to VHUP regularly to give blood to help sick patients.

Canine donors must be at least one year of age and should not be older than 10 years. They must weigh at least 50 pounds and cannot be on medication other than heartworm preventive. When they come to VHUP, a complete blood count and heartworm test are performed to ensure adequate health status. The collection process takes about five minutes. The animal is placed on its side on a table. The owner is usually present, helping to keep the dog in position. Blood is collected from the jugular vein and removed by means of a pump to speed up the process. According to Ms. Oakley, dogs don't mind the collection process, though some get a bit impatient for having to remain still for the five minutes.

After the pint has been collected, the dog is taken from the table, offered a light meal and water. It also receives a blood donor ID card and the owner is instructed to limit exercise for 24 hours. Six weeks later the dog can again donate blood.

The program at Penn's Veterinary School is the largest in the country. Ms. Oakley hopes that soon owners and their dogs will not need to travel to VHUP as the School will be obtaining a mobile unit to serve as a blood collecting station on wheels. It will be equipped with an exam table, cooling unit, microhematocrit centrifuge, hemoglobinometer, gram scale, and other blood collecting and processing equipment. The mobile blood unit will enable VHUP's transfusion medicine specialists to visit large breeding kennels and kennel club-organized blood drives in outlying areas where blood can be collected from canine donors, making the donation of blood much more convenient for dogs and their owners.

The acquisition of the vehicle and its equipment is made possible through the generous donations of the Bernice Barbour Foundation, Dr. Daniel Bleicher, Officer Dan Buckley, Chester Valley Kennel Club, Delaware Valley German Shepherd Dog Club, Devon Dog Show Association, Mr. and Mrs. Peter Nero, Penn Ridge Kennel Club, Penn Treaty Kennel Club, Southern New Jersey German Shepherd Dog Club, and Mrs. Ferdinand White.

## Roger Caras Honored



The Maryland Veterinary Medical Society held a "roast" for Dr. Roger A. Caras in Baltimore in October. At the end of the evening Dr. Caras was lauded for his many contributions to wildlife, animal welfare, and the veterinary profession at large. Dean Andrews presented the School's Centennial Medal to Dr. Caras. Following is the laudation, composed by Dr. Donald A. Abt, that was read during the presentation:

"Distinguished spokesman for and champion of all animal life, large and small, domestic or wild, traveling the world over to share your love and devotion for animals with your fellow human beings through authorship of highly respected and widely read books and magazine articles; notable radio and television presenter; tireless personal contributor of talent, time and energy to a legion of worthy organizations dedicated to the well being of animals; and wise counselor to those in need. World traveler from the plains of Africa to the islands of Greece, to the Far East, to Prince William Sound and even to the South Pole, to identify but a few of the sites where your concern for animals and society has drawn you.

From each location, you brought back a new and vital appreciation for and understanding of the fragile balance within which our non-human neighbors live. Your eloquent voice then focused our attention, with clarity and respect, on the needs and

plight of those deserving our concern. You have brought constructive awareness of our responsibilities to all segments of our society.

In particular, you have served the School of Veterinary Medicine at the University of Pennsylvania with great distinction both as a member of its Board of Overseers and as a deeply involved participatory member of the adjunctive faculty. As an Overseer, you have provided your fellow Board members with the interactions of animals and mankind thereby facilitating enlightened decisions crucial to the advancement of the School. As a teacher, you have paved the way for essential broadening of our students' horizons. Your course dealing with the diverse interactions of veterinary medicine and society became a bench mark to which others aspired as it led our students into uncharted waters. The ever-increasing requests for enrollment were a testament to the value of your contribution and signified the forethought you exhibited by seeking the opportunity to present such a course. What was once unorthodox has now become common place through your concerns and gift of sharing. To share oneself through the education of our youth is truly a noble gift.

In recognition of your extensive contributions to our School and the veterinary profession at large, we are honored to present you this, the Centennial Medal of the School of Veterinary Medicine."