

# CANINE CANCER

©VICTORIA SPENCER · BESHKA AFGHANS · FEBRUARY 2003

## Common Forms of the Disease in Dogs and Current Treatments In Use Today

Cancer today is a primary health concern and is one of the leading causes of death in dogs. It remains unknown what causes most types of cancer, and as such, preventive measures and absolute cures do not exist. However, researchers are learning more every day as to the genetic, molecular and cellular basis of cancer and what cancerous cells need to survive. Recent strides in human cancer research have greatly assisted veterinary oncologists in their battle with the disease.

When told of their dog's diagnosis, most owners react in similar ways: a feeling of helplessness, sadness and devastation. No disease evokes as much emotion as cancer. It can be overwhelming for an owner, especially since most cancers seem to occur virtually overnight. Many cancers in dogs are silent in their initial stages and only at intermediate or advanced stages are symptoms shown. After overcoming the shock of the news, the owner is faced with a vast amount of information to absorb, an immediate decision on treatment and the fact that their beloved friend's life may soon be over.

### DESCRIPTION OF CANCER

Cancer consists of a number of diseases, all with the common feature of uncontrolled cell growth and multiplication. This uncontrolled cell growth is the result of an accumulation of mutations (errors in the DNA code) in genes that control cell division and length of cell life. Errors in the DNA code occur during normal cell division; however, most of these errors are harmless and don't prevent the cell's ability to function. There remains a small number of cells whose errors can disable tumor suppressor genes or activate oncogenes that inhibit or promote cell division and survival. Fortunately, the body's defenses usually destroy abnormal cells before cancer can form, but occasionally,

a malignant cell will eliminate or evade these safeguards, allowing this defective cell to replicate and develop into future malignancies.

The disease of cancer is named after the zodiac sign of Cancer, with the crab as its emblem. Cancer, like a crab, has a tough shell and as it grabs on with its pinchers, its grip gets tighter and is very difficult to remove. Today, however, there is a better understanding of the disease, more treatment options and better prospects for long remission or possibly, even a cure.

### DIAGNOSIS

The success of treatment lies in early detection. Nevertheless, early detection is often the most challenging aspect. Some symptoms are directly related to the location of the tumor, others may produce symptoms such as weight loss, fever, muscle weakness, lethargy, loss of appetite and diarrhea, which make it difficult to determine where in the body a tumor lies.

X-rays, CT imaging, MRI and Ultrasound are all effective tools in finding the presence of cancer. Each of these provides a different image of the body to better locate one type of cancer over another.

Once detected, the next step is to determine the extent of the disease throughout the body. This procedure is called "Staging" and is necessary to assess the prognosis and course of treatment. Stage I, II and III indicate local disease, local with some regional spread, and local with extensive regional spread, respectively. Stage IV includes I through III, with distant sites of cancer. The more advanced the stage, the less hopeful prognosis becomes. Stages with (a) mean the dog is asymptomatic, while stages with (b) mean symptoms have appeared (example, Stage III(a)).

Different types of cancer require different forms of treatment. Most sarcomas require several types of drugs combined for the most optimal results. Some tumors

respond better to radiation and/or surgery. Some cancers are very responsive to treatment and are easily controlled, while others are much more difficult, if treatable at all.

The following is an overview of three common types of cancer, all of which have occurred moderately in Afghan Hounds. There have not, to date, been any forms of cancer directly linked to the breed, although Lymphoma appears most frequently. During chemotherapy treatments, Afghans do lose their coats and are more sensitive to anti-cancer drugs than most other breeds.

## COMMON CANINE CANCERS

### LYMPHOMA

Lymphoma may occur in dogs at any age, but is seen more frequently in older dogs. Symptoms are usually enlarged lymph nodes on the neck, chest and behind the knees that appear virtually overnight. Some dogs may show no signs of illness at all. A veterinarian will normally aspirate one of the lymph nodes for lab analysis and do a complete blood test. Once diagnosed, staging and treatment must begin quickly. This is an aggressive form of cancer and if left untreated, most dogs will die within one month. Referral to a board-certified veterinary oncologist is the safest, best course in treatment. The following are other forms of lymphoma:

1) *Gastrointestinal Tract*. A second form is involvement of the gastrointestinal tract. Symptoms include vomiting, weight loss, diarrhea or decreased appetite.

2) *Mediastinal*. This type involves the lymph tissue in the chest. Dogs with this type of lymphoma have excessive thirst/urination or difficulty breathing.

3) *Skin*. Lymphoma can also start in the skin in what is called cutaneous lymphosarcoma. Symptoms include flaky, scaly, reddened skin. There may also be lumps under the skin. The footpads and

*continued on page 24*



## CANINE CANCER

*continued from page 22*

gums can also be involved. Other organs such as the lymph nodes, liver, spleen and bone marrow are variably involved.

4) *Bone Marrow*. If the cancer is confined to the bone marrow, it is called Leukemia. Signs seen in dogs include decreased numbers of red and increased numbers of white blood cells. Anemia, infections and bleeding are common symptoms.

### CAUSES

Cancer, as described above, generally arises from a single cell that has undergone a series of genetic mutations. As pets live longer lives, the number of times cells divide and replicate increases over time, thereby raising the probability of mutations. The exact cause of lymphoma is unknown, but, it is not genetic. There is some evidence that defects or suppression of the immune system is to blame. Some researchers suspect environmental factors such as weed killers, over-vaccinating or a virus, but no conclusive evidence has been shown.

### TREATMENT

Fortunately, lymphoma responds very well to chemotherapy. On average, up to 80% of dogs will go into remission. Remission is defined as the complete disappearance of detectable cancer. Remission is not a cure, but an extension of life. Lymphoma in dogs, at this date, is not curable. Most will live 1 year with treatment, the emphasis being on quality of life during this time.

There are several chemotherapy protocols available for the treatment of lymphoma. The most successful is the relatively new University at Madison, Wisconsin protocol. This includes the use of 5 different drugs given for consecutive 8 weeks, and then continued every other week for an additional 8 weeks. The survival rate on average for this protocol has been up to 2 years.

Even with treatment and complete remission, some of the cancer cells do survive, but the numbers are too small to detect. Eventually, these cells will replicate and the cancer will become evident again. When this happens, the dog is said to be "out of remission." Sometimes a second remission can be achieved with addi-

tional chemotherapy, but the cancer cells eventually become resistant or insensitive to the drugs and the dog will succumb to the disease.

### NUTRITION

During the past ten years, research done at Colorado State University, College of Veterinary Medicine, by Dr. Gregory Ogilvie and others led to the discovery of the nutritional needs of cancer cells. Their research indicated cancer cells thrive on simple sugars (glucose) and some proteins, creating metabolic chaos for the animal.

Cancer cells use large amounts of carbohydrates (glucose) for energy, which produces the by-product, lactate. The host animal must then convert the lactate back to glucose, expending a high amount of energy, which further drains the animal. Tumor cells have a limited ability to use fat as an energy source, thereby causing the dog to rely solely on fat as its energy source, while the cancer cells deplete its carbohydrate and protein stores. This condition is called "cancer cachexia." Weight loss occurs with muscle wasting and weakness.

To counter this, a diet of 40-45% fat and 30-50% protein starves the cancer cells and thereby slows their production. Hill's Pet Nutrition, Inc., working together with Dr. Ogilvie, has formulated a canned dog food called Prescription Diet N/D which is high in protein and fat. Clinical studies have shown that feeding it can increase survival time and suppress metabolic changes in dogs with cancer. Also recommended is switching to a "performance" type of dry dog food, which has a higher protein and fat content than regular dry food.

Other important nutrients are Omega-3 fatty acids and the amino acid, arginine which have been shown to inhibit tumor growth and extend survival time in animals. However, it is only the Omega-3's found in marine oils such as salmon oil that have this benefit (not flaxseed oil). Omega-3's inhibit the cell-to-cell interactions between tumor cells and platelets in the blood. Omega-6 fatty acids have the opposite effect, with a suppression of the immune system and promoting tumor growth.

### HOLISTIC REMEDIES

Many Veterinary Oncologists recommend

the use of holistic remedies in conjunction with conventional treatment, with the view that many can help and most won't hurt the patient.

Holistic veterinarians can be located by an internet search or by referral from your regular veterinarian or oncologist. Most will prescribe herbs, vitamins and supplements to enhance the immune system and lessen the effects of chemotherapy or radiation.

### NEW TREATMENTS

New treatments on the horizon include half-body radiation for patients with circulating types of cancer, such as lymphoma. Full body radiation proved dangerous in its extensive damage to bone marrow tissue. Half of the body is treated at one time and the other half at a later date. The cancer must already be in remission with chemotherapy before this treatment is done. Half-body radiation treatment is still in the experimental stages, but with good, optimistic results.

### OSTEOSARCOMA (BONE CANCER)

Osteosarcoma is the most common and aggressive form of primary bone tumors in dogs. It is also the most painful. Other primary bone tumors include chondrosarcoma, fibrosarcoma, and hemangiosarcoma.

As with most types of cancer, the cause of osteosarcoma is unknown, but there is some speculation as to a viral cause, as yet unproven. It occurs most frequently in larger breed dogs, middle aged or older, with 75% of osteosarcomas forming in the long bones of the skeleton. There are some strong breed correlations and those include St. Bernards, Dobermans, Greyhounds and Golden Retrievers, but research has found that gender and breed are not as significant as breed size. Reasons for this are possibly due to rapid growth that occurs in young larger breed dogs.

Osteosarcoma is most frequently found in fiber, cartilage and bone cells and can begin in utero. Nearly 90% of bone cancer is osteosarcoma, with highly invasive and malignant tumors. These tumors are usually present in the bones of the front legs, but can occur in any bone. Commonly, by the time the dog is presented for diagnosis, the disease has already metastasized (spread), most often to the lungs. This occurs in virtually 95%

*continued on page 26*



## CANINE CANCER

*continued from page 24*

of the cases.

The first signs of the disease are persistent lameness, bone swelling, inability to place weight on the leg or a non-traumatic fracture of the bone. If any of these symptoms occur, a veterinary check up should be done immediately, preferably at a clinic with high quality radiograph equipment.

### DIAGNOSIS

A biopsy of a small sample of bone is initially done to confirm any diagnosis. After diagnosis, chest X-rays are taken to confirm any spread of the disease to the lungs. However, because of the small initial size of the metastases, less than 10% of dogs will initially show obvious signs of cancer on the chest X-ray. With such a high incidence of metastasis, all dogs are treated as if the disease has already metastasized to the lungs, regardless of the X-ray findings. The tumor is then staged to provide a framework for treatment and planning.

### TREATMENT

Treatment options for osteosarcoma include amputation alone, amputation followed by chemotherapy, limb-sparing procedure or palliative radiation therapy.

Amputation is almost always performed immediately to remove the pain the dog is experiencing. Amputation alone will not increase the survival time of the patient. Chemotherapy is needed to extend the life of the dog to control the metastasis. Median survival with this type of treatment is around 1 year, while 25% of animals will survive 2 years.

Limb sparing treatment is reserved for those dogs with orthopedic problems that preclude amputation. This procedure is the surgical removal of the affected area of bone, which is replaced with a bone graft from another limb or bone bank. However, complication rates are high with this procedure, due primarily to infection associated with the bone graft and/or recurrence of the tumor.

Finally, for some dogs, extensive treatment is not an option. Reasons for this could be the advanced stage of the tumor,

age, difficulty in surgical removal of the tumor due to its location or insensitivity to chemotherapy protocols. For these patients, palliative treatment is recommended for pain management and to maintain quality of life.

In these circumstances, control of symptoms may improve the quality of life remaining, without attempting to prolong it. In the latter stages, there may also be a loss of appetite and significant weight loss. This may be due to suppressant factors released by the tumor or due only to pain. Medication to control pain and radiation therapy are often used in such cases.

Radiation treatment is usually administered at the site to control pain. Palliative radiation involves delivering a few large doses of radiation to the site over a period of several weeks. In most cases, this treatment is a one-time course and cannot be repeated. Each treatment requires light anesthesia as the patient must be completely still during the procedure. Side

effects are minimal - the radiated area may become red and hair loss can occur at the site. These treatments are usually success-

ful in maintaining a good quality of life in the remaining weeks or months of the patient's life.

### NEW TREATMENTS

New treatments for osteosarcoma are being focused on irradiation and new chemotherapy protocols involving Interleukin-12 are being tested at the National Cancer Institute, but to date no new therapies have emerged. Experimental treatments are currently being conducted at the University of Minnesota on lungs where cancer has metastasized and have experienced good results.

The current protocol used today is a combination of the chemotherapy drugs Adriamycin and Carboplatin every three weeks for a total of 6 treatments. This treatment targets cancerous nodules found in the lungs. The life expectancy is approximately 12 months after treatment.

Dr. Ogilvie and his colleagues at Colorado State University have also pioneered a new form of limb-sparing treat-

ment, calling it "flip and nuke." This procedure involves removing the affected piece of bone with the joint attached, irradiating it and replacing it back into the body. This has reduced infection rates overall, but the survival rate has remained the same.

### CANINE MELANOMA

Melanoma is a type of cancer that commonly occurs in dogs with pigmented (dark) skin. Melanomas can arise in areas of skin covered with hair, causing small, dark lumps to form, but can also appear as large, flat wrinkled masses. Melanomas can also occur in the mouth, toes and behind the eye. Overall, skin melanomas tend to be benign and those in the mouth, toes and eyes, as malignant. Tumors of the mouth, toes and eyes generally metastasize throughout the body, first appearing in the lymph nodes and then the lungs. This type of cancer is typically unresponsive to chemotherapy and radiation treatments. The most essential factors in prognosis are tumor stage, size, growth or recurrence after prior treatment. Metastasis to the lungs and regional lymph nodes occurs in at least 50% of oral melanomas. Any lumps or bumps found anywhere on a dog should be immediately checked by a veterinarian.

### TREATMENT

The most successful treatment is surgical removal of the tumor and surrounding tissues. A combination treatment of radiation and Carboplatin has also met with some success. Enhancing therapies, such as radiation, chemotherapy, immunotherapy and experimental gene therapy are often applied due to the high rate of metastasis. Survival time for dogs with melanoma is very low. Overall, close to 25% of dogs with oral melanomas will survive one year or more. Melanomas most frequently occur in older, male dogs.

Common signs of oral melanoma are drooling (sometimes with bloody saliva), decreased appetite and halitosis (extreme bad breath). Other signs may include coughing, swallowing difficulties and weight loss. Tumors smaller than 1 centimeter tend to have the best prognosis, since larger melanomas often have metastasized in the early stages. If the disease has already metastasized at the time of

*continued on page 28*



## CANINE CANCER

*continued from page 26*

diagnosis, the disease is advanced and prognosis is extremely poor.

In humans, melanoma frequently arises due to mutations made by repeated, intense ultraviolet light (sun tanning) to melanocytes, cells that impart pigment to the skin, but this does not seem to be a factor in dogs. However, pigment cells divide every time there is an injury to the skin or if there is constant trauma, such as constant licking or scratching. In spite of this, risk factors for canine melanoma are not well recognized.

### NEW TREATMENTS

Studies at the University of Wisconsin-Madison School of Veterinary Medicine are providing encouraging results from immunotherapy treatment. The treatment is based upon improving the immune system's ability to fight cancer using gene therapy. The new cancer vaccine was developed to help the animal's immune system recognize and attack cancer cells on its own.

After surgical removal of the tumor, cells of the tumor are extracted and purified. DNA is injected into these cells that accelerate the production of chemicals called cytokines. Cytokines stimulate production of certain white cells in the body. These altered cells are then injected back into the patient in the form of a vaccine.

The vaccine is given by a "gene gun" that inserts genetic material into cells. Using air pressure, the gun shoots millions of microscopic gold beads coated with DNA into cells, which are then injected back into the patient. The cells penetrated with the gold beads then produce new genetic material and cytokines are produced. This treatment improves the dog's immune response by the increase in cytokine production. The cytokines "train" the immune system to recognize and kill tumor cells.

The vaccine has shown great promise in helping animals live longer and has shrunk tumors in nearly 20% of the animals treated. This treatment could provide a new approach to fighting cancer with fewer side effects opposed to chemotherapy or radiation therapy. Studies are continuing with dogs, as well as in humans.

### FUTURE OUTLOOK OF CANCER TREATMENT

Hopefully, in the near future, we will be able to look back with deference, possibly even disdain, at the primitive methods employed to fight cancer today. At this time, there is still little understanding of the exact causes of the disease, so preventative measures and cures are distant. In the battle with this disease, the disease almost always wins and the battle is short. Nevertheless, large grants and funding for new research is greatly assisting the latest studies and clinical trials, which could lead to enormous advances in the entire approach to fighting the disease. With such extensive research, these advances could be achieved very soon.

Dogs with cancer today have a much better prognosis than those of yesteryear. Yet until a cure can be achieved, the treatments being offered today are the only weapons available in the current battle with the disease.

Hopefully, as our progress continues, children will one day only read in textbooks about an old, but deadly disease called cancer - one that was wiped out early in the 21st century.

### INFORMATION ON CANINE CANCER, TREATMENT AND GRIEF SUPPORT

#### BOOKS AND WEBSITES:

*Pets Living With Cancer*, by Robin Downing, DVM, AAHA Press, 2000. A short, but comprehensive guide to cancer from diagnosis and treatment, nutrition and hospice.

*Why Is Cancer Killing Our Pets?*, by Deborah Straw, Healing Arts, 2000. A thorough guide to cancer in pets, conventional and alternative treatments and caring for a sick animal.

*Without Regret: A Handbook for Owners of Canine Amputees*, by Susan Neal, Doral Publishing, 2002. Stories from owners who made the decision and dogs who continue to live normal lives.

Doctors Foster and Smith:  
[www.DrsFosterSmith.com](http://www.DrsFosterSmith.com) or  
[www.PetEducation.com](http://www.PetEducation.com)

B-Naturals. Natural and Holistic Supplements for Dogs and Cats:

[www.B-Naturals.com](http://www.B-Naturals.com). (Product Information and Consultations: (281) 392-3935)

#### FINDING A VETERINARY ONCOLOGIST IN YOUR AREA:

American College of Veterinary Medicine:  
[www.acvim.org/wwwfp/onco/acvimoncol.htm](http://www.acvim.org/wwwfp/onco/acvimoncol.htm). Phone: 1-800-245-9081

#### BEREAVEMENT AND GRIEF COUNSELING:

Argus Institute for Families and Veterinary Medicine at Colorado State University: (970) 491-4143. Staffed by professional grief therapists.  
Website: [www.argustinstitute.colostate.edu](http://www.argustinstitute.colostate.edu)

American Veterinary Medical Association:  
Website: <http://www.avma.org/careforanimals/animatedjourneys/goodbyefriend/goodbye.asp>

Support Group for Owners of Pets with Cancer: Endless Love. Website:  
[www.geocities.com/Heartland/Hills/7205/endlesslove](http://www.geocities.com/Heartland/Hills/7205/endlesslove)

Pet Loss.Net. A State-by-State Guide to Support Groups, Counselors  
<http://www.pet-loss.net>

Our Pals. Grief Support and Memorial Products <http://www.ourpals.com>

Pet Vets: Coping with Pet Loss for Children; the Grieving Process.  
<http://petvets.com/petloss/>

VETERINARY SCHOOL GRIEF SUPPORT HOTLINES AROUND THE COUNTRY:  
Cornell University College of Veterinary Medicine. <http://www.vet.cornell.edu/public/petloss/> (607) 253-3932 (limited hours). This hotline is operated by veterinary student volunteers trained in grief counseling to help owners cope with their loss.

University of California at Davis School of Veterinary Medicine. <http://www.vetmed.ucdavis.edu/petloss/index.htm> (530) 752-4200, or toll free (800) 565-1526. Staffed by University of California-Davis veterinary students.

University of Florida College of Veterinary Medicine. Pet Grief Support of America, [www.flahf.org](http://www.flahf.org) (352) 392-4700; then dial



## CANINE CANCER

*continued from page 26*

1 and 4080. Staffed by University of Florida veterinary students...

Michigan State University Veterinary College, (517) 432-2696, staffed by Michigan State veterinary students.

Virginia-Maryland Regional College of Veterinary Medicine, (540) 231-8038 Staffed by their Veterinary students.

Ohio State University, (614) 292-1823, staffed by The Ohio State University veterinary students.

Tufts University School of Veterinary Medicine (508) 839-7966, Staffed by Tufts University veterinary students, <http://www.tufts.edu/vet/petloss/>

Iowa State University College of Veterinary Medicine (888) ISU-PLSH (toll-free) Pet Loss Support Hotline hosted by the Iowa State University College of Veterinary Medicine. <http://www.vetmed.iastate.edu/animals/petloss/>

University of Illinois College of Veterinary Medicine. (217) 244-2273 or toll-free (877) 394-2273(CARE). Staffed by University of Illinois veterinary students. Leave voicemail message. <http://www.cvm.uiuc.edu/CARE/>

Washington State University, College of Veterinary Medicine. (509) 335-5704, Pet

Loss Hotline. Staffed by Washington State University Washington State University, College of Veterinary Medicine (509) 335-5704, Pet Loss Hotline. Staffed by Washington State University veterinary students. <http://www.vetmed.wsu.edu/PLHL/index.htm>

### OTHER CANINE CANCER RESOURCES ON THE WEB:

Wing and Waves Lab's site. One of the best overviews on cancer. [www.labbies.com/cancerintro.htm](http://www.labbies.com/cancerintro.htm)

Robin's Canine Cancer Files. Information on several different types of cancer, owner's accounts of their battles with cancer, conventional and holistic treatments, diet and nutrition. [www.members.aol.com/pbl2/cancerfiles.htm](http://www.members.aol.com/pbl2/cancerfiles.htm)

### PET LOSS MEMORIALS:

Animal News. Pet Remembrances and Support: <http://www.animalnews.com/memorial/>

The NEPA Network: Cherished Keepsakes. Memorial Products. <http://www.nepanet-work.com/keepsakes>

FINDING AN HOLISTIC VETERINARIAN: American Holistic Veterinary Medical Association: [www.altvetmed.com](http://www.altvetmed.com)

Dr. Sean Messonnier. Holistic Veterinarian in the Dallas area. Dr. Messonnier is also the author of several books and a syndicated columnist for several newspapers around the country. Phone: (972) 867-8800. Website: [www.petcarenaturally.com](http://www.petcarenaturally.com)

### HOLISTIC VETERINARY BOOKS:

Dr. Pitcairn's Complete Guide to Natural Health for Dogs and Cats, by Richard H. Pitcairn, D.V.M., Ph.D and Susan Hubble Pitcairn, Rodale Press, 1995. A classic book on natural therapies and holistic guidance.

The Nature of Animal Healing, by Martin Goldstein, D.V.M. Ballantine Publishing Group, 1999. An up to date complete guide to natural veterinary medicine.

TOP TEN WARNING SIGNS OF CANCER The Veterinary Cancer Society has developed a list of the top warning signs for cancer in animals:

1. Abnormal lumps or bumps that persist or continue to grow;
2. Sores that do not heal;
3. Unexplained weight loss;
4. Loss of appetite;
5. Bleeding or discharge from any body opening;
6. Offensive odor, especially bad breath;
7. Difficulty eating or swallowing;
8. Hesitation to exercise or loss of stamina;
9. Persistent lameness or stiffness;
10. Difficulty breathing, urinating or defecating

### COLORADO STATE UNIVERSITY RESOURCES:

Robert H. & Mary G. Flint Animal Cancer Center. Consultation Coordinator 970-491-4195 <http://www.csuanimalcancercenter.org>

College of Veterinary Medicine and Biomedical Sciences <http://www.cvmb.colostate.edu/>

