

# Veterinary Epidemiology— *studying naturally occurring diseases*

**C**onstantly, scientists are searching for alternatives to the use of laboratory animals in the study of diseases. According to Dr.

Lawrence T. Glickman, associate professor of epidemiology at the University of Pennsylvania

School of Veterinary Medicine, epidemiologic studies of pet animals with spontaneously occurring diseases may just be one such alternative.

"Pets share an environment with people," said Dr. Glickman. "They have many of the diseases that affect people. The lifespan of dogs and cats is shorter, and this permits studying the entire course of a disease. By examining pet populations with specific diseases, we may not only get answers which will help humans, but we may also be able to help the animals."

Dr. Glickman pointed out that epidemiology is the basic science of disease prevention. "We try to determine why a disease occurs, how it is spread, and its distribution in a population. For the infectious diseases, once these factors are determined, we try to develop a preventive protocol which may involve vaccination programs, isolation, or strict hygienic measures. For noninfectious diseases, we try to determine

tries of defined populations in specific geographic areas. Through study of these data it has been found that the sex-specific pattern of breast cancer in humans and dogs is very similar. It was also found that a significant correlation existed between canine bladder cancer and the overall industrial activity in the counties where the animals lived. "Mortality from bladder cancer among white men and women in the same counties showed similar correlations with industrial activity," said Dr. Glickman. "The similar pattern in humans and animals suggests that environmental exposures are more important than occupational exposures in developing bladder cancer, and that the dog may be a sensitive sentinel for the presence of bladder carcinogens. However, additional studies are needed to identify specific residential and environmental exposure such as smoking habits of their owners that might be associated with an increased risk of canine bladder cancer."

Dr. Glickman and his associates have studied the occurrence of mesothelioma in canine patients presented at VHUP. This lung tumor is associated with exposure to asbestos. In humans it usually develops twenty or more years following exposure to the mineral fibers. The study identified 18 dogs with con-

use in the development of the disease in dogs. This study encompasses a group of 450 dogs (150 animals with diagnosed breast cancer, 150 with other cancers, and 150 with other diseases). "Through a carefully designed questionnaire and a lengthy interview with the owners, we are asking about the food used, the brand, quantity, and whether table food is fed," he said. "We calculate the protein, fat, and carbohydrate content of the diet. We have found that the fat content of food given to dogs varies considerably, ranging from 10 to 70 percent. Although the study is not yet complete, eventually we do hope to determine the role of nutrition in puppies and adults in the development of canine mammary cancer."

Pets may also be used to discover health problems resulting from the introduction of chemicals into the environment. "Animals have long been recognized as a sensitive indicator," Dr. Glickman said. "Think of the role of the canary in the mine." He pointed out that with increasing awareness of chemical leaks or spills into the environment, animals could be used as sentinels. "We hope to study pets in an area where PCBs have leaked into the ground. By examining tissues and blood samples from these pets, we might be able to get an indication of the seriousness of the contamination and what effect it has on animals." Dr. Glickman said that in addition to such studies there would also be a questionnaire and an interview with the owners to correlate exposure history and levels of chemicals in the animal's blood and tissue.

Pet animals can also serve as sentinels to warn of the presence of bacterial disease that could also affect humans. "We are looking at dogs to determine whether Lyme disease could be a problem here in the Delaware Valley," said Dr. Glickman. Lyme disease, an illness caused by a spirochete, is transmitted through tick bites. In humans, it causes a rash at the bite site and, if untreated, can develop into arthritis or neurologic and cardiac abnormalities. The disease is treatable with antibiotics. In dogs, Lyme disease can result in intermittent lameness and arthritis.

"We took blood samples from 39 dogs at an SPCA in the suburbs," he said. "We found that 25 percent of the animals had antibodies for Lyme disease, which is indicative of previous infection. Since ticks in the area carry the disease, physicians should be aware of the possibility of Lyme disease occurring in their patients in the Delaware Valley." Dr. Glickman feels that the incidence of Lyme disease may rise, particularly in areas with large deer populations, as deer harbor infected ticks. The study is continuing and the researchers plan to pinpoint those areas where people are most likely to be exposed to the spirochete-carrying ticks.

Epidemiologic studies of the pet population with spontaneously occurring diseases will not totally eliminate the need for research using laboratory animals. However, for many diseases it can reduce the number of laboratory studies needed. Thus, cats and dogs not only serve as companions but also help us to gain in-depth knowledge about diseases that affect a variety of animal species, including humans.

The researchers responsible for the studies discussed above include Dr. L. Glickman, chief of the section of epidemiology; Linda Domanski, a research coordinator and computer specialist; Dr. Fran Shafer, an instructor in epidemiology; and Beth Sonnenschein, a registered nurse who is completing an ALPO-supported doctoral dissertation on the relationship of diet to the risk of canine breast cancer. The dogs and cats used in these studies were seen at VHUP or were those whose tissues were submitted to the laboratory of Dr. Michael Goldschmidt for histologic examination.



Asbestos fibers



Spirochete



Skin lesion at the bite site from a tick carrying Lyme disease

what host or environmental factors predispose to disease and alter the animal's husbandry or lifestyle accordingly." Epidemiologists do not perform surgery or treat patients; instead they gather their data through observation, questionnaires, and the systematic study of case records. When such studies are conducted, they usually consist not only of a group of affected individuals but also of control groups.

When studying human populations it is often difficult to obtain accurate information about exposure to environmental factors as humans move between home and work as well as from one area of the country to another. Also, in the case of cancer, the disease often occurs long after initial exposure to suspected cancer causing substances. Studies are further complicated by the use of alcohol, cigarettes, and other carcinogenic substances consumed by humans.

Pets, by contrast, typically remain in the home environment but are not directly exposed to factors such as alcohol or cigarettes. Also, the pet's diet remains relatively constant throughout its life. Diet plays an important part in some of the most commonly occurring cancers, though no specific causes of cancer have yet been incriminated. Pets may prove useful models because of their relatively stable diet, short lifespan, and the ease of obtaining accurate dietary histories from the owners.

According to Dr. Glickman, pets may serve as sentinels for environmental hazards. To this end, a Veterinary Medical Data Program was established, sponsored by the National Cancer Institute, to collect and analyze data pertaining to morbidity and mortality of animals seen at about 15 veterinary teaching hospitals. There are also several canine and feline neoplasm regis-

tered mesothelioma. It was found that the exposure of the pets to asbestos at their owner's workplace or through an owner's hobby at home was significantly associated with an increased risk of mesothelioma.

Researchers learned that exposure included a household member with an asbestos-related occupation or hobby for nine dogs, home remodeling or addition of home insulation for five dogs, and the use of flea powder or sprays for five dogs. Quite a number of the owners worked in auto repair shops; a number worked in construction involving work with gypsum wall board and spackling. Some owners had done extensive home remodeling and others lived near demolition and construction sites. One dog accompanied its owner to work, which was adjacent to a shipyard. Three of the dogs had no known exposure to asbestos, but they had been treated regularly with flea powder and sprays which have been shown to contain asbestos-like fibers.

The mean age of the animals with mesothelioma was eight years; this corresponds to middle age in humans, when most asbestos-related diseases are first diagnosed. The asbestos fiber level in the lungs of the affected dogs was similar to the level reported in humans with mesothelioma who had had occupational exposure to asbestos.

Owners of dogs with mesothelioma were made aware of these findings. "They need to have their lungs examined regularly," said Dr. Glickman. "And if they are smokers, they should stop, as smoking greatly increases the risk of asbestos-caused lung cancer."

Currently the Epidemiology Section at VHUP is conducting a breast cancer study to assess the risk of nutritional factors, previous hormone use, and drug