



Analyzing Cancers in Cats

By Heidi Jeter

Though cats don't seem to be as susceptible to cancer as dogs, many cat owners have become concerned in recent years about injection-site tumors that may be linked to vaccination. These tumors, most commonly called fibrosarcomas, can arise at any injection site, vaccine-related or otherwise. The good news for cat owners is that given the number of vaccines administered each year, injection-site fibrosarcomas aren't terribly common. The bad news is that they appear to need much more aggressive treatment than conventional, spontaneously occurring tumors.

Currently, treating a cat with any sarcoma involves radiation followed by tumor removal. If the tumor is found early, when it is small, the required surgery is usually less invasive. Injection-site tumors are often difficult to remove surgically, largely due to their anatomical location. They occur under the skin and grow along the surface of the muscles and soft tissue. These tumors can develop to become very large and can spread quickly.

Since it is vital to ensure that all tumor tissue is eliminated, in order to reduce the risk of recurrence, their removal requires extensive surgeries, taking margins up to 5 cm wide to ensure complete excision. Depending on the location of the tumor, the best course of action may unfortunately be amputation of an entire limb.

Researchers don't yet understand the mechanisms that cause injection-site tumors to develop. They do know that tumors associated with injection sites are typically much more locally aggressive, are more prone to recurrence and have lower survival rates, compared to fibrosarcomas that develop spontaneously. That's why developing a way to determine whether a tumor is caused by an injection is critical to ensuring the cat gets the appropriate treatment.

MAF TAKES ACTION

Two Morris Animal Foundation-funded studies are looking at how injection-site tumors develop. Drs. Marlene Hauck and Rachael Thomas, along with her mentor Dr Matthew Breen, at North Carolina State University, are taking different approaches, but their research studies complement each other, and both make use of exciting developments in microarray-based technology.

Dr. Thomas is looking at tumors at the chromosomal level. She explains that when tumor cells develop they frequently show abnormalities in the number and structure of the chromosomes they contain.

Certain patterns of chromosomal abnormalities appear to be linked to specific types of tumors. Dr. Thomas hopes to establish whether injection-associated sarcomas demonstrate specific chromosome abnormalities that might help to distinguish them from spontaneously developing sarcomas, which may not require such aggressive treatment.

“Ultimately we hope to develop additional diagnostic information that would better inform an owner of the likely clinical course of the disease and how to best treat it,” Dr. Thomas says. “If there is evidence of an injection association, then the treatment could be tailored more appropriately to that individual patient.”

NEW LEVELS OF ANALYSIS

For her part, Dr. Hauck is looking at gene expression in cats using microarray technology. For any given condition, genes are either turned off or on (expressed). Dr. Hauck is using microarray analysis to analyze which genes are expressed. She and her team are comparing normal tissues in the lymph nodes and muscle with those same tissues at injection-site reactions and injection-site sarcomas. By doing so, they hope to understand which genes are altered when a tissue develops a tumor.

By studying the same samples from different approaches, Dr. Hauck’s method goes hand in hand with Dr. Thomas’ because if she sees abnormal gene expression in a tumor, Dr. Thomas can investigate whether the tissue also has chromosomal abnormalities that may involve that same gene. In many human tumors, such abnormalities can help to predict tumor behavior.

“If we can look at the same tumor, we can see which genes really are important because they are involved on a chromosomal level as well,” Dr. Hauck says. “We may see multiple chromosomal abnormalities and by comparing to gene expression, we can determine what genes are involved.”

The complementary approach may also help researchers develop cancer therapies for cats that focus specifically on what is wrong on the cellular and genetic levels of an individual tumor. Both researchers agree that science is some way off from individualized therapies, but these studies offer valuable first steps.

POTENTIAL BEYOND CANCER TREATMENT

What’s more, the techniques being used aren’t specific to studying feline sarcomas. The microarray-based techniques being used by Drs. Hauck and Thomas are equally applicable to a wide range of cancers as well as other diseases. Together, these scientists are putting together tools that could be used by researchers looking at numerous diseases. Veterinarians in the future may be able to provide targeted therapy based on an individual animal and that animal’s disease. It’s an amazing concept.

So what should concerned cat owners do until that time? While they should be aware of the potential risks of vaccinations, that doesn't mean they should stop vaccinating.

Vaccinations play an important role in controlling infectious diseases. Both Drs. Thomas and Hauck emphasize that vaccines save more lives than they cause cancer. In addition, vaccines are legally required in most cities. Cat owners should know the vaccination laws in their city and talk to their cat's veterinarian to determine what is best for their pet based on its lifestyle and risk factors. In 2006 the American Association of Feline Practitioners updated its vaccine recommendations for cats, including advice on selecting specific anatomical sites for vaccine administration that would facilitate surgery in the unlikely event of a tumor developing. The full report is available at <http://www.aafponline.org>.

LEARN MORE. MAF is funding a number of feline cancer studies. [Click here](#) to see our current studies.