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As Director of the Research Animal Resource Center, Neil Lipman ensures the welfare of the Center's research animals. Since joining Memorial Sloan Kettering in 1996, he has expanded facilities, technology, and services to help Memorial Sloan Kettering investigators drive their research forward. We spoke with Dr. Lipman in 2009, when he became director of the newly created Center of Comparative Medicine and Pathology.

Growing up, I was always surrounded by pets. The great pleasure I had in breeding and caring for my dog, a Saint Bernard, inspired me to become a companion-animal veterinarian, one who takes care of dogs and cats.

But I discovered a different career path that intrigued me while studying veterinary medicine at the University of Pennsylvania. I did a summer fellowship at the Massachusetts Institute of Technology (MIT), which had an excellent training program in comparative and laboratory animal medicine, a specialty that is not taught routinely in veterinary school. After graduating, I returned to MIT for my postdoctoral work.

## Exactng Standards in Animal Research

By the time I joined Memorial Sloan Kettering, in 1996, I had more than ten years of experience working in and subsequently heading animal research programs, first at Brown University, then at MIT and the University of Chicago. Memorial Sloan Kettering is exceptional in terms of the investments it makes in caring for its animals and ensuring that the research it contributes to is conducted at the highest standard. And our environment is unique in that we have three eminent research institutions right next to each other — Memorial Sloan Kettering, Weill Cornell Medical College, and The Rockefeller University — and a veterinary teaching hospital, the Animal Medical Center, nearby. This offers great advantages for developing research infrastructure, collaborations, and academic training.

I'm responsible for animal research at both Memorial Sloan Kettering and Weill Cornell, which jointly operate a number of state-of-the-art facilities with a staff of more than 150 employees. Besides caring for our animals, our professional staff are involved in a number of collaborative research projects to address issues related to the use and care of research animals. For example, we are studying an infectious bacterial disease that occurs commonly in mouse strains lacking a functional immune system, which many Memorial Sloan Kettering investigators use for modeling cancer. We are also developing new and better methods for pain control in mice.

For every new discovery that comes out of our facilities and programs, my staff and I take great pride in having participated in the process.

All of the Center's animal use is overseen by an independent committee of community representatives, veterinarians, and scientists. Their main goals are to ensure that the use of animals is necessary and that the fewest numbers of animals of the most appropriate species are utilized, and to eliminate or minimize any discomfort or pain our animals may experience during the course of an experiment. They also ensure that all staff using animals have the appropriate training and experience.

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## Mice as the Mainstay

Mice are our most important research animals by far, and their value keeps rising as new technologies emerge. With genetic engineering, we can now create mouse models that more precisely mimic human cancers. For instance, instead of transplanting human cancer cells into mice, we can create mice that develop tumors spontaneously in specific organs. These models are used by the Center's scientists and physicians to dissect the function of individual genes and disease pathways and to test new drugs designed to specifically target them.

New imaging technologies have also improved the way we use mice for cancer research. Memorial Sloan Kettering's Small Animal Imaging Facility supports various imaging modalities such as CT, MRI, and PET scans for imaging tumors in rodents. This allows us to study the different stages of a tumor's growth and progression and to use fewer animals in each experiment. Rather than using different animals for each question we need to address, we can now study many aspects of cancer — for instance, how a tumor spreads or how it interacts with the body's immune system — in the same animal.

Today, 98 percent of our research animals are mice, but alternative animal models are emerging. Zebrafish show particular promise for cancer research. There are genetically engineered zebrafish that are transparent, allowing scientists to directly observe biological processes, such as those involved in tumor growth and metastasis, taking place inside them. We are now training our staff and developing facilities to support zebrafish studies.

We are also using larger animals for preclinical research. Currently, we are working with our radiologists and surgeons on a new minimally invasive, image-guided technique in which probes that deliver short pulses of electric current are used to create small holes in cells to destroy a tumor or tissue. We are testing its safety and efficacy in swine, which share anatomic similarities with humans, as this is a necessary step before we introduce the technique in the clinic.

The utility of animals in science has evolved rapidly over the past decade, and so have the ways in which my staff and I serve the Center. For example, our Laboratory of Comparative Pathology provides expert analysis of laboratory animals and their tissues for Memorial Sloan Kettering's scientists. The laboratory has highly qualified veterinary pathologists, microbiologists, and medical technologists who assist in identifying and interpreting changes that occur within cells, organs, and systems.

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## Training the Next Generation



The [Center of Comparative Medicine and Pathology](#) (CCMP) is now being launched to support animal model development and use, education of veterinary specialists, and collaborative interactions at Memorial Sloan Kettering and Weill Cornell. The CCMP organizes a number of training programs to give qualified veterinarians the knowledge and technical skills necessary for a successful career in biomedical research. The increasing need for professionals with this expertise is apparent not only here at Memorial Sloan Kettering, but at academic and industrial biomedical research centers across the globe. Our broadest training initiative is a postgraduate program in laboratory animal medicine and science supported by Memorial Sloan Kettering, Weill Cornell, and Rockefeller. During this three-year program, veterinary fellows participate in a variety of clinical rotations, research projects, and courses at the three institutions.

Another training program we recently initiated is a one-year fellowship in comparative pathology. This specialty can help bridge the gaps between research performed in different animal models and in patients, and is a good illustration of a veterinarian's role at a place like Memorial Sloan Kettering. A comparative pathologist helps other scientists interpret their experiments by considering how anatomical and biological functions compare between animals and humans. Vertebrate species like man and mouse are similar in many ways, but there are differences that must be taken into consideration when we model a human condition in an animal. There are examples in the literature where scientists have drawn the wrong conclusions because they didn't have sufficient experience to understand the species they were using.

Each day at Memorial Sloan Kettering has been exciting and rewarding. I feel fortunate to be working with a great team of dedicated professionals, whose hard work makes our efforts successful, and with the highest quality of scientists. For every new discovery that comes out of our facilities and programs, my staff and I take great pride in having participated in the process.

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