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A Glimpse Into the Future

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By Allen Arndt

In 50 years, pet health insurance will be nearly universal in the United States, with deep implications for both the practice of veterinary medicine and veterinary research.

That is just one prediction offered by the School's four department chairs and two hospital directors when *Bellwether* asked them to peer 50 years into the future of veterinary medicine and research.

Their vision finds veterinarians playing a leading role in protecting public health and developing advances in healthcare for animals and humans alike.

And progress in genetic research could eliminate genetic diseases while paving the way for new treatments for a range of other diseases and conditions.

But despite the dramatic advances on the horizon, the need for veterinarians and the skills they wield will not subside.

"Animals will likely still be getting traumatized," says **Dr. Gail Smith, V'74**, chair of the Department of Clinical Studies in Philadelphia. "There will still be bones to fix, although the rate of bone healing will be hastened by application of osteogenic factors."

A Surge in Pet Health Insurance

A rapidly growing number of pets with health insurance will drive many changes in veterinary medicine, predicts **Barry Stupine**, vice dean and director of VHUP.

"In the next 50 years, pet insurance will become as common in the United States as it is in Europe today," giving vets and pet owners the freedom to provide first-class care regardless of out-of-pocket costs, Stupine says. "Vets want to help animals and it is very frustrating when they can't because of cost. No vet wants to put an animal down."

With insurance defraying the cost, sophisticated diagnostic and medical procedures will be performed more frequently. As a result, the cost to perform these procedures will fall as innovations develop at a quickening rate.

"We're already performing sophisticated procedures, such as CT scans, hip replacements and kidney transplants," Stupine says. "Such procedures will become more common and, as they do, they'll become cheaper to perform."

Dr. Narayan Avadhani, chair of the Department of Animal Biology, also sees pet health insurance becoming commonplace, providing

financial resources for new veterinary research.

"Human disease research is flourishing because hospitals generate a lot of revenue and at least part of that money goes into research," Avadhani says. "Pet health insurance will definitely drive new veterinary research."

But Stupine anticipates a downside to the proliferation of pet health insurance. As veterinarians perform sophisticated procedures more frequently, the cost of malpractice insurance will increase.

"We are likely to see more lawsuits and bigger damage awards pushing increases in malpractice insurance premiums," he says.

One factor in damage awards that will undoubtedly change, according to Stupine, is the legal view of the relationship people have with their pets. Currently, the legal system does not allow for damages for emotional suffering resulting from the loss of a pet.

"We're learning a lot about the beneficial relationship people have with their pets," he says. "It's just a matter of time before a judge, for the first time, awards damages in a malpractice suit for emotional suffering resulting from the loss of a pet."

Another trend to watch, Stupine says, is economic forces—including pet health insurance—driving veterinarians into larger and larger group practices as solo and small group practices diminish. Those same economic forces will also likely result in more specialists in veterinary medicine.

"In an economic sense, veterinary medicine follows human medicine by a few years," he says. Just as the insurance industry has prompted medical practitioners to seek efficiencies and economies of scale, so too will pet health insurance force veterinary practitioners to seek similar efficiencies.

Protecting Public Health

The next 50 years will see a growing public awareness that veterinary medicine is the leader in public health issues ranging from communicable diseases to food safety, according to **Bruce Rappoport**, associate dean of New Bolton Center and director of the Widener Hospital for Large Animals.

"Veterinary medicine benefits everyone, whether they have animals, whether they are in agriculture or not," he says. "Things like Lyme disease, rabies and West Nile virus aren't just animal issues. They are public health issues,

and veterinary medicine will be the leader in solving these public health problems."

Dr. David Nunamaker, V'68, chair of the Department of Clinical Studies at New Bolton Center, agrees, saying that veterinary medicine will be on the forefront of solving the world's expected shortfall of energy and food supply, as well as making that food supply safer.

"In Great Britain, for instance, Foot and Mouth disease and Mad Cow disease were both big problems," Nunamaker says. "And with threats from E. coli and salmonella—things that need constant attention—veterinary medicine will play a much bigger role in solving."

Similarly, veterinary research will contribute not just to animal health, but also to human health, according to **Dr. Phillip Scott**, chair of the Department of Pathobiology.

"Veterinary medicine is where advances will happen, because veterinary training is a broader training and a more rigorous scientific training than medical training," Scott says. "Veterinary medicine shouldn't be marginalized as a type of research. It's an important part of understanding how things work in a biomedical sense."

The veterinary school trains scientists in comparative medicine in order to understand comparisons between species while providing a broad background in many animals—a background that is much broader than that provided to those who are trained in treating humans, he says.

"Vets are trained in such a way that they will understand linkages in diverse fields," Scott says. "Those veterinarians who choose to have a scientific career should be making great contributions in biomedicine—contributions that can be applied to humans."

Indeed, at least one portion of the federal government will soon change its view of veterinary research, reflecting the growing role veterinary research plays in developing advances in human medicine, according to Avadhani.

"Currently, the National Institutes of Health will only fund research focused on human diseases," Avadhani says, "but within 10 years I predict that the NIH will recognize that veterinary medicine and research is an important component of disease research and allow funding for veterinary research and training."

Cancer is one area of research where veterinarians are likely to develop innovations that can be applied to humans.

"Cancer diagnosis and treatment is becom-

ing a greater concern for both people and animals,” says Dr. Smith of the Department of Clinical Studies in Philadelphia.

He predicts that biomedicine will advance to a point where a simple blood test can detect biomarkers of many different cancers in both animals and humans. “Similar to the PSA test for prostate cancer in humans, I believe we’ll get to a point where there will be tests like that for early diagnosis of many types of cancer.”

Similar advances will be made in treating cancer. Current chemotherapy techniques, for example, destroy harmless cells along with cancerous cells. Smith points to research in targeted chemotherapy, where molecular-level treatments are designed to attack just the cells that have been identified as cancerous.

It is natural for these advances to come from veterinary research, Scott says.

“Working on humans has real limitations, just as working on mice has limitations,” he says. “One can study cancer in mice, but those aren’t spontaneous tumors. And cancer research on humans is limited for ethical reasons. But a small mammal, such as a dog, is a good model because the tumor is spontaneous. It’s a good place to study.”

Cracking the Genetic Code

Within 50 years, researchers will sequence the complete genome for most common animals, leading to new treatments for genetic diseases and changing the way medication is prescribed or administered, predicts Avadhani.

“Gene therapy and stem cell therapy will be commonly used to treat various diseases in animals, including diseases of the muscles and neurosystem as well as cancer and cardiac diseases,” Avadhani says.

Genetic research will also help determine the efficacy of drugs, as researchers studying pharmacogenomics uncover the genetic variations that result in different responses to various drugs.

“Some people show resistance to certain drugs while others are more sensitive,” explains Avadhani. “This is a very important factor in both human medicine and veterinary medicine. Even within a given breed of animal, minor mutations in genes can make one either more or less responsive to a particular drug.”

In the future, healthcare providers will be able to perform a genetic analysis on an individual patient in order to find genetic variations that might cause the patient to respond differently to various drugs. The result will be drug

therapy designed specifically for that patient.

Smith sees even more applications for genetic research. For example, DNA analysis will soon allow breeders to pick better breeding candidates using genetic analysis rather than the macro-screening processes currently in use.

Likewise, Smith foresees a day when a genetic analysis will be routinely performed on an individual pet before it is purchased, allowing potential owners to make purchasing decisions based on genetic vulnerabilities uncovered by the analysis.

And advancements in genetic research will ultimately lead to the ability to create transgenic animals—animals created as a result of splicing a new piece of DNA in place of an existing portion in order to correct a problem or make an animal that is less disease-prone, Smith says.

“This is uncharted territory and it is our obligation to inform the public and heed the opinions of ethicists as we progress.”

Regardless, Nunamaker predicts that the ability to create transgenic animals will help bring infectious diseases under control.

From the Bench to the Clinics

Nunamaker also sees research discoveries making their way into clinical practice much faster than today, a trend he says the School, bolstered by the planned Teaching and Research Building, will lead.

“The new facility will be a vibrant teaching component that will allow us to develop new modes of teaching using the Internet and other technologies,” Nunamaker says.

For Scott, the new building will strengthen both the most basic research and translational research.

“For example, in my lab, if I’m working on vaccine development, I might do some studies and find out that the right kind of protection will develop if I immunize in a certain way,” Scott says. “This may work with experimental model, but the key to translational research is taking something that you’ve learned at the bench and applying it in a way that will be useful in the clinics.”

“Translational research provides the underpinning of everything we do in the clinics,” Smith says. “In clinical studies, my goal here is to pursue specialization to the ultimate endpoint and to make those specializations every bit as sophisticated as they are in human medicine.”

Smith has a no-less ambitious vision for the hospital.

“I want our hospital here to become the Mayo Clinic of veterinary medicine, a place where not only pet owners bring their pets, but where other veterinary professionals and specialists send animals to receive the ultimate in veterinary care.”

Living Longer, Healthier

“Animal welfare will take a larger place in our thinking as a society,” Smith predicts. “Not just companion animals, but agricultural animals as well. It makes sense that this thinking be centered in the veterinary school.”

Companion animals feed our sense of self and our emotional well being, Smith says. “During the next 50 years it will become clear that companion animals have a huge benefit to people and the public. We’ll recognize the health benefits that pet ownership brings to people.”

Smith believes that pet sitters will be as common as baby sitters, supplemented by electronic monitoring devices.

“We know that pets are traumatized by getting out of their contained environment,” Smith says. “Electronic monitoring will be a common tool used to keep pets from physical harm. We can’t do this to people, but we could, for example, implant a microchip in an animal in order to identify it from a great distance.”

While researchers seek ways to use technology to protect animals from physical harm, others are studying how lifestyle habits influence the health and longevity of animals.

In a study Smith just completed, for example, he found that diet is an important factor in protecting the health of smaller mammals. “They benefit greatly from staying lean. They live longer and have a much lower frequency of health problems.”

The key, he says, is developing diets that make animals feel full without making them fat.

Because of these many factors—from pets with health insurance and electronic tracking devices to gene therapies and lean diets—animals will be living longer and healthier lives

“Animal life span will increase substantially, perhaps as much as 25 to 30 percent longer,” Avadhani says. “Cats and dogs particularly will live much longer.”

Still, despite these advances, the need for veterinarians will not subside. After all, Smith says, there will still be bones to fix.