

NIH News in Health

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Shedding Light on Health Research Helps People and Pets

Where would we be without our furry friends? Pet dogs and cats stand by us with love and loyalty, sharing our lives' ups and downs. Our beloved pets can also share many of the same medical problems that we have, like asthma, diabetes, and even cancer. Doctors, veterinarians, and scientists work together to study diseases that affect both pets and people. The aim is to improve medical care for people as well as our companion animals.

More than half of U.S. households have at least one pet. In 2011, we had more than 144 million pet dogs and cats. Many people consider pets to be part of their family. And like any family member, pets can get sick.

"Our pets live in our houses. They drink the same water and eat some of the same foods. They're exposed to many of the same environmental risks. They share many of the same **genes**, which is why they get many of the same diseases," says Dr. Amy LeBlanc, a veterinarian and cancer expert at the University of Tennessee.

Pet dogs, for instance, can develop cancer naturally just as people do. "Tumors in dogs tend to spread the same way that our tumors spread. And they respond to therapies the same way that our cancers respond to treatments like chemotherapy and radiation," says LeBlanc.

Pet cats, too, might inherit genes that raise their risk for conditions—like severe kidney disease—that can be similar to human disease. "Cats get asthma just like we do, and they can be allergic to dust mites just like us," says Dr. Leslie Lyons, an expert in cat genetics at the University of Missouri. "Cats can become obese from eating the wrong kinds of foods and just sitting around the house, which can raise the risk for diabetes, just like us."

Over the years, NIH-funded studies of dogs and cats with naturally occurring diseases have led to improved therapies for both people and pets. For example, researchers studied an aggressive type of childhood bone cancer that's rare in people (affecting about 600 children and teens a year) but common in dogs (affecting up to 15,000 a year). The cancer, called osteosarcoma, arises in large bones in the arms and upper legs. By studying pet dogs and people, researchers developed techniques that are now being used to prevent arm and leg amputations and sometimes cure the cancer.

In other research, NIH-funded scientists studied pet dogs with blood cancer to develop better treatments based on bone marrow transplants or stem cell therapies. The improved techniques have now been widely adopted for treating human cancers across the country. The therapies are also used to treat cancer in dogs at some veterinary hospitals.



These types of medical advances are made possible because owners of sick pets enrolled them in veterinary clinical trials. Such trials can help speed the discovery of new and effective therapies for human patients and ultimately improve care for pets too. As in human clinical studies, cats or dogs might receive experimental treatments for cancer or other conditions. Some veterinary clinical studies evaluate different types of imaging techniques that might help humans and animals. Others study the biology of certain genetic conditions that pass down from dogs and cats to their puppies or kittens.

"The idea is that human medicine can learn from the work we do in the *continued on page 2*



Definitions

Genes

Stretches of DNA, a substance you inherit from your parents, that define characteristics such as how likely you are to get certain diseases.

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veterinary sciences, and vice versa. We can learn from each other," says LeBlanc. "It's a concept that's called 'one medicine.' It's a mutual exchange of discovery."

"This isn't a new philosophy; certainly this type of comparative research has been going on for decades," adds Dr. David Vail, a veterinarian and cancer specialist at the University of Wisconsin-Madison. "But, it's probably been just in the last 10 years that clinical trials involving pets have become well-organized."



Wise Choices Healthy Pets and You

Whether human or pet, basic steps for staying healthy can be similar:

- **Get plenty of physical activity.** Activity can strengthen joints and muscles and improve heart health. Walk or run with your dog. Play often with your cat.
- **Maintain a healthy weight.** Excess weight in pets can raise the risk for some of the same conditions that can affect overweight humans: diabetes, joint problems, and certain cancers.
- **Eat a healthy diet, or a specialized diet if needed.** Ask your veterinarian about the right diet for your pet. Some "people foods" can be dangerous for pets.
- **Don't smoke.** Secondhand smoke can harm your pets just like it does people.

In 2003, NIH launched a program—called the Comparative Oncology Program—to learn more about the biology and treatment of cancer. Scientists compare natural cancers in people and in animals (mostly pet dogs). Today, the program runs a research network that includes 20 veterinary centers across the United States and in Canada.

Pet dogs with different types of cancer can receive cutting-edge treatments at these centers that might save their lives. At the same time, the studies add to our understanding of cancer in all creatures.

"Because NIH is concerned with human health, the goal of these studies is to develop therapies for people," says Vail. "But at the end of the day, I'm a veterinarian, and so the two-way flow of information is important to me. I want these treatments to come back to my veterinary clinic."

Pets participating in NIH-sponsored veterinary clinical studies get a lot of oversight and care. "We spend time talking with pet owners to make sure they understand possible risks and benefits of the study," LeBlanc says. As in human studies, a data safety and monitoring board tracks the trial's progress. If serious side effects or other problems arise, the trial will be halted or altered, just as in human studies.

Although much NIH-funded research focuses on dogs, cats are also important in helping to understand human disease. Lyons studies cats with a condition called polycystic kidney disease (PKD). "It's one of the more common inherited diseases



Web Links

For more about pets in clinical studies, click the "Links" tab at:

<http://newsinhealth.nih.gov/issue/May2014/Feature1>

in cats, especially Persian cats, and it's a common inherited trait in humans," Lyons says. PKD leads to harmful buildup of fluid-filled cysts on the kidneys.

PKD can hit cats hard when they're about 7 years old. But it takes much longer to be noticed in people.

"In humans, the condition generally leads to kidney failure later in life, when people are in their 50s or 60s," says Lyons. "We can't stop this disease. There are no effective treatments that have been approved for humans that will slow progression of the cysts and delay the onset of kidney failure."

Lyons and her team are now working to set up veterinary clinical trials for PKD. "If we could find a therapy that helps fix PKD in cats, we could make a lot of cats better. And then, most important, we may be able to develop effective treatments for humans," says Lyons.

"When owners enroll their pets in a trial, they often hope their pet will benefit. But they also like that they're contributing to the greater good," LeBlanc says. "A drug that's tested in dogs or cats might one day help a very sick person or maybe help some other pets."

Not all pets can qualify for veterinary clinical research. The pet's condition needs to match the type of research study under way. If approved for a study, pets often receive medical care free of charge.

To learn about NIH-sponsored comparative studies of cancer, visit <http://ccr.cancer.gov/resources/cop/public.asp>. Your veterinarian might also be able to help you find veterinary clinical trials. Or try looking at the websites of local veterinary schools, which often list ongoing studies of pets. ■

NIH News in Health (ISSN 1556-3898)

National Institutes of Health

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Tick Talk

Block Tick Bites and Lyme Disease

When warm weather arrives, you might get the urge to walk barefoot through the grass. But before you stroll through your lawn or head out on a hiking trail, you'll want to protect yourself and your loved ones from ticks that often lurk in tall grass, thick brush, and wooded areas. Many ticks carry disease, so do what you can to keep ticks from taking a bite out of you.

Tick-borne diseases are found in many areas across the country, and they're on the rise. The diseases are often clustered in specific regions. Rocky Mountain spotted fever, for instance, occurs mainly in the mid-Atlantic and southern states.

Lyme disease is the most common tick-borne illness. It's found mainly in the Northeast and upper Midwest. Each year, more than 30,000 cases are reported in the United States, and many more likely go unreported. The U.S. Centers for Disease Control and Prevention (CDC) estimates that as many as 300,000 Americans get Lyme disease each year.



Wise Choices To Remove a Tick

Promptly remove ticks to reduce the risk of tick-borne diseases.

- Use fine-tipped tweezers.
- Grab the tick close to the skin and gently pull upward to remove the entire tick.
- Don't use home remedies like petroleum jelly, nail polish, or a lit match to try to detach ticks.
- After removing the tick, clean the bite area and wash your hands thoroughly.
- If you develop a fever, severe headaches, or a rash within weeks of removing the tick, see a doctor.

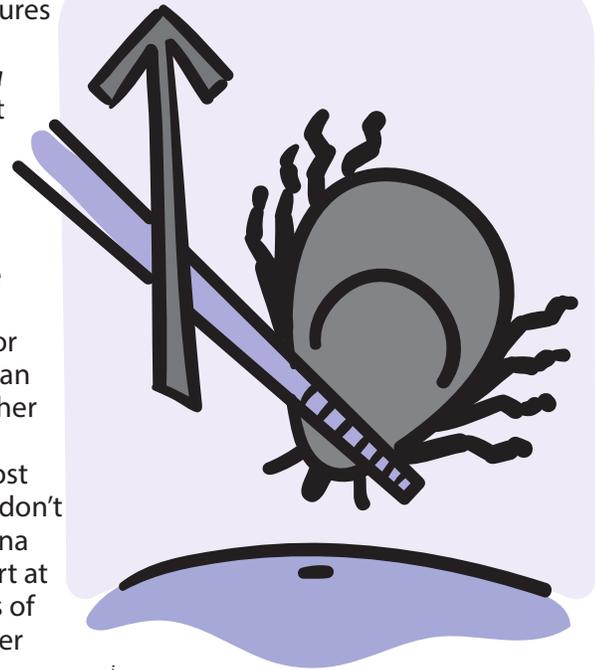
Ticks are tiny 8-legged creatures that can be hard to see. Deer ticks—which can carry *Borrelia burgdorferi*, the bacterium that causes Lyme disease—are especially small. The young “nymphs” are only the size of poppy seeds. Adult deer ticks aren't much larger—about the size of a sesame seed. If an infected deer tick chooses you for its next blood meal, that bite can transmit Lyme disease or another infection to you.

“Ticks can be so tiny that most people who get Lyme disease don't recall a tick bite,” says Dr. Adriana Marques, a Lyme disease expert at NIH. But if you have symptoms of the disease, she says, “the earlier you get treated, the better.”

Tick-borne diseases tend to share certain symptoms. Symptoms can include fever, headache, muscle or joint pain, and extreme fatigue. People with Lyme disease usually get an expanding red rash that sometimes resembles a bull's-eye. “The rash is usually tender, not painful or itchy, so people may not realize they're sick,” says Marques.

If left untreated, the infection can spread and cause rashes in other parts of the body. Some people may develop nerve problems, arthritis, or other disorders. But even if Lyme disease isn't caught until later stages, most people fully recover after treatment with **antibiotics**.

Of course, the best way to avoid Lyme and other tick-borne diseases is to prevent tick bites in the first place. Most bites from disease-causing ticks occur in the spring and summer



months, when ticks are most active and when people are spending more time outside.

Help keep ticks off your skin by wearing long sleeves, long pants, and long socks. You can also ward off ticks by using an insect repellent that contains at least 20% DEET (for the skin) or permethrin (for clothes). To avoid ticks, walk in the center of trails and steer clear of tall vegetation.

If you've been in an area where ticks are common, bathe or shower as soon as possible, and wash or tumble your clothes in a dryer on high heat. Check your body carefully for ticks. They dig and burrow into the skin before they bite and feed. Removing ticks right away can help prevent disease. If you develop a rash or fever after removing a tick, see your doctor.

So watch out for ticks! Make a habit of tick prevention as you venture into the great outdoors. ■



Definitions

Antibiotics

Prescription medications used to treat bacterial infections such as Lyme disease.



Web Links

For more about tick-borne diseases, click the “Links” tab at:

<http://newsinhealth.nih.gov/issue/May2014/Feature2>

Health Capsules

For links to more information, see these stories online:
<http://newsinhealth.nih.gov/issue/May2014/Capsule1>

Exercise Brings Bone Benefits that Last

Building bone as a young adult can have benefits that last a lifetime, a new study showed. The research also confirmed that physical activity as we get older can help us maintain bone strength.

Bone is a living tissue. It responds to physical activity by becoming heavier, bigger, and stronger. It does this best when we're young. Bone mass usually peaks when we're in our 20s. After that, we often begin to lose bone.

Studies of animals have shown that exercise during periods of rapid growth can lead to lifelong benefits in bone size and strength.

To see if the same holds true for humans, a team of NIH-funded scientists studied more than 100

professional baseball players at different stages of their careers. Baseball players were ideal subjects, because their throwing arms get a lot more action than their non-throwing arms. Baseball players also tend to retire from stressful throwing activities once they stop professional play. This allowed the scientists to look at the effects of physical activity long after intense throwing had ended.

The researchers found that the upper bones in the throwing arms of players were nearly twice as strong as the bones in non-throwing arms. Throwing arm bones had about 50% greater mass, size (total cross-sectional area), and thickness.

As players got older, the bone mass benefits from throwing were

gradually lost. But about half the bone size benefits and one-third of the bone strength benefits were maintained lifelong. Players who continued throwing during aging lost less bone and kept even more of the strength benefits.

"Exercise during youth adds extra layers to the outer surface of a bone to essentially make the bone bigger," says study leader Dr. Stuart J. Warden of Indiana University. "The bigger bone generated by physical activity when young has a means of sticking around long term to keep the skeleton stronger." ■

Paralyzed Men Regain Movement

Four young men paralyzed below the chest because of spinal injuries regained some movement after receiving an experimental treatment. If confirmed in larger studies, this type of therapy may improve outcomes for people living with paralysis.

NIH-funded researchers studied 4 men who had been paralyzed for more than 2 years. A small set of electrodes was implanted atop each man's spinal cord just below his injury. The implant sends electrical signals that help evoke muscle activity.

Three of the men were tested just a few days after receiving spinal stimulation. All 3 had regained some voluntary control of muscles that had been paralyzed.

With daily spinal stimulation and physical training, all 4 treated patients gained better control of voluntary movement over time. It's not clear if these improvements were due to the physical training, the spinal stimulation, or both.

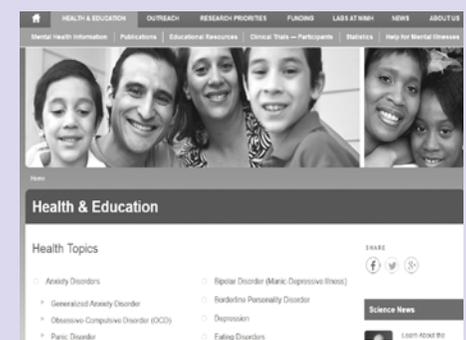
The researchers are continuing clinical studies of additional patients to gather more data.

"Right now, the clinical perspective for individuals with complete motor paralysis is that there is nothing we can do. I think we need to rethink that," says study co-author Dr. Susan Harkema of the University of Louisville. "In our study, we demonstrated potential beyond any expectation." ■

Featured Website Mental Health Topics

www.nimh.nih.gov/health/index.shtml

Mental health affects how we think, feel, and act as we cope with life. This NIH site links to a wealth of information on mental health and disorders such as anxiety, autism, eating disorders, and schizophrenia. Learn about treatment options, and link to clinical research studies related to mental health.



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