

Celebrating Medical Advancements Due to Animals

By Dr. Laura Hady

As we enter the month of school graduations marked by academic achievements, it seems an appropriate time to honor our animal friends for their medical achievements contributing to human health. If you are a pet's parent, you probably already know that our animals help to lower blood pressure, reduce stress hormones and depression, and contribute to a happier and more active lifestyle. However, you may not be aware of the important role that animals have played in cutting-edge medical advances. Here are just a few ways that animals have helped saved countless human lives.

1) Cancer research. My surgical oncology professor at Colorado State University, Stephen Withrow, helped to develop in the 1980s a limb-sparing technique for dogs suffering from bone cancer (osteosarcoma). This served as a model treatment for children with the same devastating disease, which can spread to the lungs or other body parts. It affects 400-800 young people in the

United States each year. At CSU's Flint Animal Center, dogs with osteosarcoma that has spread to the lungs have also been recently used in clinical trials for a new two-drug regimen. This drug combination has been shown to shrink or stabilize bone tumors in 50 percent of dogs, with about 30 percent of them experiencing regression. Due to the promising results, studies are now underway in bone cancer patients who have not responded to conventional treatments.

2) Give it up for the pigs. Pig heart valves have been used to replace damaged human heart valves for decades. Last October, surgeons were finally able to transplant a pig heart into a man from Maryland who then went on to live for two months. The biggest hurdle his doctor's faced was how to overcome rejection of the pig heart by the patient's body. Researchers accomplished this by removing a gene in the pig that produces a certain type of sugar that is incompatible in the human body. This breakthrough may help relieve the human organ shortage. According to organdonor.gov, there are 100,000



Bone cancer survivors Solei (human) and Alba (dog) who both had limb-spare surgeries for osteosarcoma.

people in the U.S. waiting for an organ, and 6,000 of them die each year before getting one.

3) Cats, coronavirus, COVID, and the brain. Cats have their own unique coronavirus that causes a condition called feline infectious peritonitis. This can lead to an overwhelming immune response and death in about 10 percent of the population. Research on this condition led to the development of remdesivir, a drug to treat COVID-19 by targeting viral replication. While cats have fewer chromosomes than humans, they have 16,000 genes that are nearly identical to ours. Cats with cognitive disorder can serve as a model for Alzheimer's disease because they develop brain-impairing proteins similar to humans with who suffer from it and because they share a similar home environment.

4) Sheep as human protein factories. Cloned sheep are now able to produce some blood clotting factors to keep humans from bleeding when injured, proteins to help emphysema patients breathe more easily, and enzymes to help dissolve deadly emboli (blood clots in the

brain) involved in strokes. However, some people wonder why we just can't produce these compounds in a lab. The reason is that it is so expensive that a patient may have to pay more than \$100,000 for a year's supply of these compounds. I believe that these sheep are truly worth their weight in gold.

5) Safe until the cows come home. In 1757, an 8-year-old boy named Edward Jenner had the discharge from smallpox lesions rubbed on his arms, developed a mild case and then was immune to the disease. While doctors did not understand how this procedure worked, it was a common practice of the time and was thought to protect people from dying of the disease. Jenner grew up to become a doctor and learned that dairymaids were in some way protected from smallpox. He also learned that cowpox could be transmitted from person to person as a means of protection. The Latin word for cowpox is called vaccinia, hence the word vaccination. By the 1800s, vaccination became commonplace in England and spread to most European countries.

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