# The Essential Need for Animals in Medical Research

## Introduction

Dogs and cats together comprise less than ½ of one percent of all laboratory animals used in the U.S. However, their contributions to the various fields of medicine have been very significant.

Dogs played a major role in the development of surgical procedures for heart valve and artery replacement; angioplasty; reconstruction of the gastrointestinal tract, including colostomy; organ transplantation; repair of traumatic injuries; hip-joint replacement, including the testing of prosthetic devices for bone replacement; and medical devices for anesthesia.

Cats have been valuable models for understanding the function of the neuron (nerve cell), the chemical transmission of nerve impulses, and the functional organization of the brain. Neuroscientists studying cats have provided a map of the circuitry of the cerebral cortex revealing the major pathways that send signals from the eye to the brain. Their studies of the visual system have led to the prevention of amblyopia, a serious visual impairment that can cause blindness in one or both eyes and to the discovery of a treatment for strabismus, a misalignment of the eyes or "cross-eye."[1]

## Diabetes

Groundbreaking work on the identification of insulin as the key hormone necessary to sustain diabetic patients was conducted with dogs. Dogs and humans share similar complications of diabetes, including blindness and circulatory failures that can result in amputation. Similar to the treatment prescribed for humans, dogs with diabetes must be given daily injection(s) of insulin to permit the utilization of glucose.

To avoid the daily, lifetime administration of insulin, medical researchers are currently studying methods for transplanting insulin-producing islet cells of the pancreas. Although allogenic islet cells (cells from same species) transplanted to diabetic patients have the potential to reverse diabetes, they must be protected from rejection by the immune system of the (diabetic) recipient. Insulin independence has been achieved in dogs following implantation of devices/capsules to preserve islet cell survival and function (insulin production). However, this technology needs further development before attempting clinical trials on humans.[2]

## Sleep Disorders

Narcolepsy is a neurological disorder that induces extreme daytime sleepiness, sleep paralysis and catalepsy, characterized by sudden episodes of muscular weakness. Dogs are one of the few animals that suffer from narcolepsy. After years of research, sleep scientists have identified the gene for narcolepsy in dogs. It codes for a protein (hypocretin-1) that maintains the waking state.

Finding this gene is expected to increase our understanding of sleep and sleep disorders and provide new insights into the treatment of narcolepsy.

Similarly, researchers have demonstrated that hypocretin-1 plays an important role in both the promotion of wakefulness and the suppression of active sleep in the cat.[3, 4]

## Cardiovascular Disease

In the past, studies with dogs have significantly advanced our understanding of atherosclerosis (narrowed or clogged arteries) and restenosis (renarrowing of coronary arteries after angioplasty). The canine aorta is a relevant model for testing the implantation of devices, such as the polyester-coated stent, designed to prevent the recurrence of arterial narrowing.[5]

## Blindness

Scientists have restored vision to dogs born blind with an incurable form of retinal degeneration known as retinitis pigmentosa. Dogs' eyes were injected in an area behind the retina with copies of a gene [DNA] that converts light into electrical signals. Many questions must be answered before doctors will be able to extend their studies to children.[6]

## AIDS — Acquired Immune Deficiency Syndrome

The feline immunodeficiency virus (FIV) provides an excellent model for AIDS vaccination studies. Like its human counterpart, HIV, the cat virus eventually suppresses the immune system's ability to protect against infections and is a leading cause of death among cats. Researchers have produced a wide variety of vaccines containing either inactivated whole viruses or purified viral proteins, which elicit antiviral responses that limit the FIV burden. The results of the studies are being analyzed to develop effective strategies for vaccines against the human virus.[7]

## References


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