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The Five Most Expensive Diseases and the Animals Helping to Combat Them

Health care costs have been a hot button topic in recent years, and rightfully so. The United States spends an extraordinary [amount of money](#) on health care each year – \$9,523 for every man, woman and child to be exact. This totals over [1 trillion dollars](#), accounting for roughly 17 percent of the United States' gross domestic product (GDP). The federal government spends 27 percent of its total budget on health care. Astonishingly more than it spends on the military, food and agriculture, education, transportation, and international affairs combined. So where is all the money going? Strangely enough, to combat just a few diseases.

The five most expensive diseases account for over 80 percent of all health care spending. They collectively cost the United States \$832 billion per year, and this number is climbing. As the United States population ages, weights rise, and mental health moves into the spotlight, animal research will be essential to keeping the price of health care down. The following list explores the current and future role of animal research in combating the top five most expensive diseases.

Heart Disease – \$193 Billion

Nearly everyone knows someone who has been affected by heart disease. In addition to being the most-deadly disease, it also tops the charts as the most expensive one – covering a number of conditions, including coronary artery disease, stroke, sudden cardiac arrest, and heart failure. With 735,000 heart attacks and 610,000 deaths from heart disease each year, the cost is understandably high. In fact, the total cost is estimated at \$315 billion, with \$193.4 billion attributed to direct medical costs. These numbers translate to an astounding \$1 billion per day spent on heart disease. Thankfully, the mortality rate of heart disease has been cut by half in the past 30 years, in large part due to coronary bypass surgery, a procedure developed through research with dogs. Furthermore, animal research has played a key role in driving down the cost of treatment for heart disease.

Prevention is the most cost-effective way to combat any disease. By identifying risk factors such as high blood pressure, high cholesterol, and diabetes, scientists have and will continue to develop effective medications to prevent heart disease. This allows doctors to treat precursors to the disease, rather than the disease itself, reducing the

costs of more expensive medications and surgical treatments.

Animal studies undertaken by [Dr. Akira Endo](#) played a key role in demonstrating that the class of drugs known as statins could lower cholesterol circulation by blocking cholesterol production. Sir James Black formed another important class of drugs, beta-blockers. These drugs lower blood pressure as demonstrated in studies with guinea pigs and cats. Additionally, research with dogs by Kevin Ng and John Vane led to the discovery and development of Captopril, another drug used to treat high blood pressure. All [three types of medications](#) originated with the help of animal research and significantly reduce the threat of heart disease in at-risk individuals.

Diabetes – \$176 Billion

According to the [American Diabetes Association \(ADA\)](#), over 29 million people suffer from diabetes, a metabolic disease related to the body's production of or resistance to insulin. The vast majority of these people, almost 95 percent, have type II diabetes, which mainly affects overweight adults. The total annual cost of diagnosed diabetes in the United States is estimated at \$245 billion – \$176 billion in direct medical costs and \$69 billion in reduced productivity. However, the cost may be even higher as diabetes is a “gateway disease.” It is linked to heart and kidney disease, as well as nerve damage and high blood pressure, among other conditions. Thus, its prevention and treatment are paramount to lowering overall health care costs.

Animal research may have the answers, and has already contributed immensely to [understanding diabetes](#). Research with dogs led to the discovery of insulin and to its purification by Frederick Banting and Charles Best. Current studies in rodents are investigating the genetics of diabetes and its link to other diseases, especially obesity. One promising method entering clinical trials now is gene therapy. Through [testing in rats and dogs](#), researchers have found a chemical that blocks the breakdown of proteins needed to make insulin, reversing type II diabetes.

Animal research in the treatment of diabetes extends beyond the benefits to humans. Because all mammals produce insulin, diabetes research also benefits our four-legged friends. One in 50 pets may suffer from diabetes, and insulin injections for cats and dogs are a common treatment administered by veterinarians.

Dementia – \$159 Billion

The cost of dementia is quickly growing as the United States population ages; by 2040 it

is expected to double. Unlike other expensive diseases, however, the greatest economic costs of dementia are related to institutional and home-based long-term care. It is considered the disease with the highest cost per person, with average annual costs of over \$50,000. Between 75% and 85% of dementia-related costs are made up of nursing home care and formal and informal home-based care because there is no known cure or effective treatment for dementia; those living with dementia require assistance for the remainder of their lives. As such, a cure is desperately needed, and research with animal models is under way to find one.

Early diagnosis is critical to halting the disease's progress, and recent [studies in mice and primates](#) show promise that a range of chemicals known as radiopharmaceuticals may be able to identify characteristics of dementia in the brain. Animal research also resulted in development of several possible medical treatments for dementia, which have had encouraging results in human trials. Lastly, animal research has led to multiple new therapies, such as cognitive stimulation therapy (CST), which stimulates the brain and strengthens neural pathways through word games, categorizing objects, and reactive activities. Such therapies help combat dementia and allow sufferers to manage their disease without the need for institutional or constant home-based care.

Cancer – \$157 Billion

The survival rate for cancer patients has doubled in the past 40 years, thanks in part to [decades of animal research](#). Unfortunately, the [cost of cancer medications](#) has doubled as well, in just the past four years the total estimated cost has risen to \$895 billion annually.

The American Cancer Society (ACS) argues that with dietary changes, increased physical activity, and additional screening, roughly two thirds of all cancer deaths might be prevented. Animal studies linking cancer to various lifestyle practices – smoking, drinking, a high-fat diet, too much sun exposure, not enough physical activity, among others – may help to increase awareness of how specific lifestyle choices can affect health. Furthermore, it was testing in mice that led to the development of effective screening methods for cancer. Studies in rodents have also led to introduction of cancer preventing drugs, such as tamoxifen and raloxifene for breast cancer risk reduction in women. Additionally, recent laboratory studies with mice and primates have demonstrated the effectiveness of a new immunotherapy treatment, PVSRIPO, which uses a modified version of poliovirus to cause an individual's own immune system to kill cancer cells. The results of this drug have been astounding. It can reduce the size of certain brain tumors in mice in hours, making it a stunning breakthrough in the fight against cancer.

Obesity – \$147 Billion

It is commonly said that the United States is the fattest country in the world. While not exactly true, the [U.S. still ranks high among Western nations](#), with 66.3 percent of Americans considered obese or overweight. More disturbing is the annual estimate of how much obesity costs the United States– the numbers range from \$147 billion to \$210 billion. In addition to health care costs, job absenteeism and reduced work productivity add to the price tag.

Animal models have provided the foundation of scientists’ knowledge of how living systems regulate energy intake and expenditure. Obesity is, simply put, an imbalance in the amount of energy consumed and the amount used. [Mice and rats are the primary models](#) used by scientists to study obesity and obesity-related metabolic diseases, as they exhibit obesity for both genetic and dietary reasons. The effects of many diets as well as the creation of multiple weight loss medications have been tested in rodents. Researchers are studying the genetic components of obesity, too. The MC4R gene, also known as the appetite gene, has been found to slow down brain signals that tell the body it is full. Using this data, doctors and dieticians can use an obese patient’s genetic code to create the most effective diet plan with the goal of returning patients to a healthy and manageable weight. Medical professionals can use this information to help their patients prevent other diseases that can result from obesity, such as diabetes and heart disease, further driving down the costs of health care.

Animal research is a subject rarely discussed when it comes to how much health care costs the United States. However, it is undoubtedly clear that without significant research, including the important role animals play in that research, costs will continue to rise. And that is something we simply cannot afford.