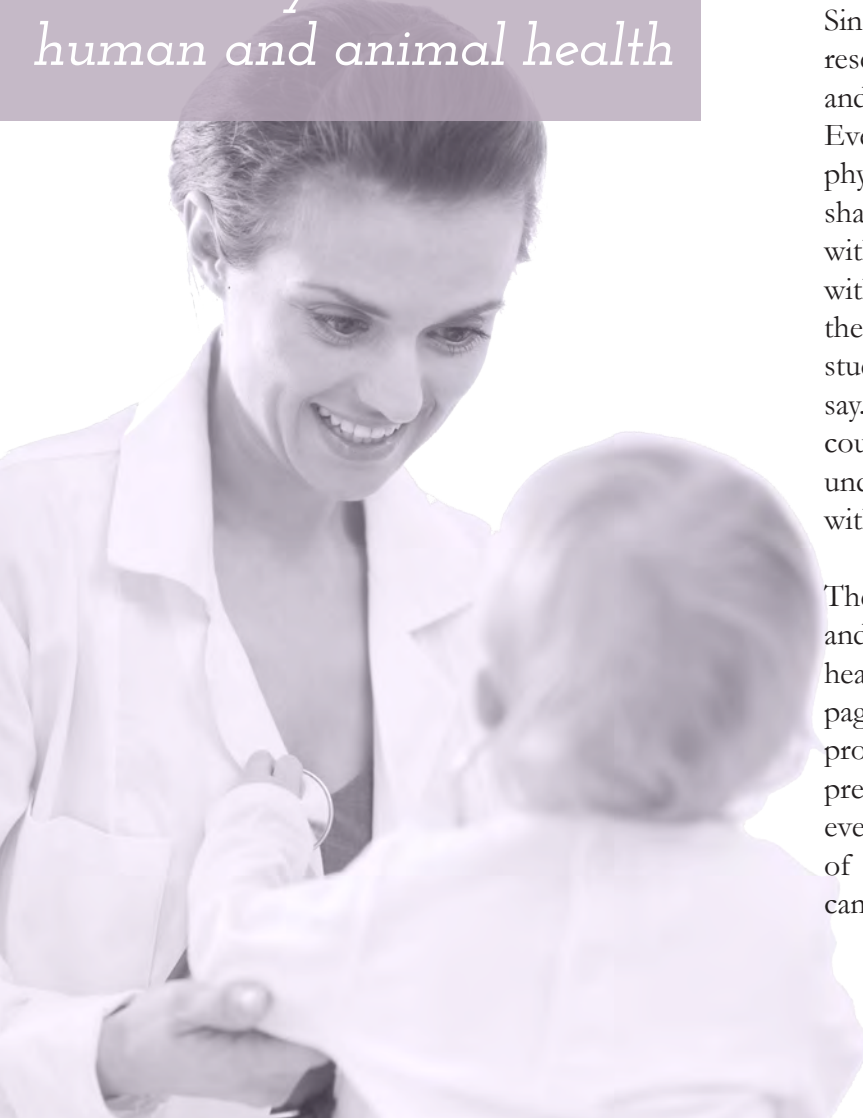


PROUD ACHIEVEMENTS
— of —
ANIMAL RESEARCH



FOUNDATION FOR
BIOMEDICAL RESEARCH

Animal research has played a vital role in virtually every major medical advance of the last century - for both human and animal health



From the discovery of antibiotics, analgesics, antidepressants, and anesthetics, to the successful development of organ transplants, bypass surgery, heart catheterization, and joint replacement – practically every present-day protocol for the prevention, control, cure of disease and relief of pain is based on knowledge attained – directly or indirectly – through research with animals.

Since the dawn of medical science, physicians and researchers have been struck by the physiological and genetic similarities between humans and animals. Even a tiny creature like a fruit fly, which is so physically different from a human in many ways, still shares many genetic and physiological similarities with humans. Incredible insights drawn from studies with lab animals have been critically important in the design and proper interpretation of human studies, despite what some opposing forces may say. Studies of human populations and clinical cases could not be interpreted without the basic scientific understanding that came from centuries of research with animals.

The essential need for animal research is recognized and supported by scientists, medical societies, and health agencies around the world. The following pages represent a brief chronicle of the dramatic progress in recent years that has been made in the prevention and treatment of a myriad of diseases. In every case, critical steps in the basic understanding of the disease and knowledge of how to combat it came from animal-based research.



Infant Mortality

In 2010, infant mortality in the US — a key indicator of the nation's health — was measured at fewer than 5.2 deaths per 1,000 live births compared to 47 deaths per 1,000 live births in 1940. Much of this progress came from knowledge gained through animal research.

Vaccines & Survival

Many diseases that once killed millions of people every year are now either preventable, treatable or have been eradicated altogether. Immunizations against polio, diphtheria, mumps, rubella and hepatitis have saved countless lives. Animal research played a crucial role in developing these vaccines. The survival rates for many other major diseases are at an all-time high thanks to the discovery of powerful new drugs, the development of new surgical procedures and the design of sophisticated medical devices.


Animal Research Helps Animals

Dogs, cats, sheep and cattle are living longer and healthier lives thanks to vaccines for rabies, distemper, parvo virus (infectious diarrhea), infectious hepatitis, anthrax, tetanus and feline leukemia. And new treatments for glaucoma, heart disease, cancer, hip dysplasia and traumatic injuries are saving, extending and enhancing the lives of beloved companion animals while advanced reproductive techniques are helping to preserve and protect threat-

ANIMAL RESEARCH FOR ANIMAL HEALTH ALSO HAS RESULTED IN MANY REMARKABLE LIFESAVING AND LIFE-EXTENDING TREATMENTS FOR CATS, DOGS, FARM ANIMALS, WILDLIFE AND ENDANGERED SPECIES.

ened species. Pacemakers, artificial joints, organ transplants and freedom from arthritic pain are just a few of the breakthroughs made in veterinary medicine thanks to animal research.

- ✓ Since 1900, modern medicine and public health have boosted the average life span in the United States by more than 30 years.
- ✓ The 5-year relative survival rate for all cancers diagnosed in 2004-2010 was 68%, up from 49% in 1975-1977. The improvement in survival reflects both the earlier diagnosis of certain cancers and improvements in treatment.
- ✓ Between 2001 and 2011, AIDS-related deaths in the U.S. fell by 35 percent.



Mice, rats and other rodents make up the vast majority of lab animals.

— PARALYSIS FROM ACUTE SPINAL CORD INJURIES MAY EVENTUALLY BE REVERSED BY NEW SPINAL CORD THERAPIES.

Stem Cells

Teams of scientists are now identifying the therapeutic potential for transplanting both embryonic and adult stem cells for a wide range of therapies in such devastating diseases as cancer, Alzheimer's and Parkinson's disease.

Leukemia

Thanks to dramatic improvements in treatment, about 98 percent of children with acute lymphocytic leukemia go into remission within weeks after starting treatment. About 90 percent of those children can be cured.

Cystic Fibrosis

A treatment to help those with cystic fibrosis may be available within five years, say scientists who have been working for decades to develop a gene therapy for the disease, thanks to basic research with mice.

Anti-Psychotics

As many as two million Americans living with bipolar disorder (manic-depression) and schizophrenia can function normally, thanks to a variety of new, long-acting anti-psychotic drug therapies.

Paralysis

Millions of people, particularly young men, suffer acute spinal cord injuries each year as a result of accidents. Scientists are now finding potential new spinal cord therapies to spur neurons to grow and create new connections, enabling recovery of sensations and motor functions. Eventually, paralysis may be reversed.

Statins

A widely prescribed class of drugs known as "statins" can block plaque buildup in arterial walls and reduce the incidence of heart attacks. Newer "statins" with improved efficacy show beneficial secondary effects in the treatment of coronary heart disease, stroke, multiple sclerosis, osteoporosis and Alzheimer's disease.



**MORE THAN
170 MILLION DOSES
OF THE FLU VACCINE
ARE PRODUCED
ANNUALLY FOR
THE U.S**

**NEW
ANTI-MALARIAL
AGENTS HAVE BEEN
DEVELOPED TO
PROTECT MILITARY
PERSONNEL.**

**NEW
COGNITIVE-ENHANCING
DRUGS THAT
SLOW MEMORY
DECLINE ARE
BECOMING AVAILABLE.**

**ARTIFICIAL
BLOOD SUBSTITUTES
ARE BEING DEVELOPED
TO SAVE THE LIVES OF
TRAUMA PATIENTS.**

Cholesterol

The percentage of adults aged 40 and older taking drugs that combat high cholesterol rose from 20 percent to 28 percent between 2003 and 2012, according to the U.S. Centers for Disease Control and Prevention. Moreover, the use of statins increased from 18 percent to 26 percent, making them the most commonly used cholesterol-lowering drugs. By 2011-12, 93 percent of adults using a cholesterol-lowering medication used a statin.

Alzheimer's

The accumulation of beta amyloid containing plaques in the brain correlates with the onset and progression of Alzheimer's disease (AD), a disorder characterized by progressive loss of memory and dementia. Researchers are attempting to develop a vaccine that can help the brain destroy plaques and reduce their production.

Artificial Blood

Artificial blood substitutes are being developed for transfusions to save the lives of trauma patients in emergencies as well as those undergoing lengthy, complex surgical procedures.

Flu Vaccine

More than 170 million vaccine doses of influenza virus strains are produced annually for the U.S. to prevent outbreaks and reduce the impact of this disease on the national population. Certain strains of influenza can have serious consequences, even death, for high-risk persons, especially children and the elderly.

Cancer

Drugs that effectively shrink cancerous tumors (anti-angiogenesis) by cutting off their blood supply are being used to treat lymphomas and other discrete types of cancers.



Diabetes, Epilepsy, Dialysis

Animal research was key to the discovery and development of a variety of treatments for diabetes, which affects 29 million Americans each year.

Prior to the 1960s, kidney disease was almost uniformly fatal and resulted in the death of about 20,000 Americans annually, making it the fourth leading cause of death among young adults. Virtually all of the recent improvements in the care of patients with kidney disease have resulted from basic research involving the use of laboratory animals, including shunts, transplant rejection, blood pressure management, immunosuppression drugs, and kidney stone removal.

After nearly 20 years without the introduction of any new medications to treat epilepsy, doctors now have several medicines and surgical techniques that help control seizures in approximately 80 percent of those diagnosed with epilepsy. None of these new treatments would be approved for human use unless their safety had first been tested in animals.

Vision

A team of Swiss scientists recently restored sight in blind lab mice by injecting new, light-sensing cells into their eyes. They're working to develop a cure for acquired blindness in people.

Thanks to recent advances in ophthalmologic surgery, more than 1.5 million Americans undergo cataract removal in a simple out-patient procedure that prevents vision loss.

— FOR OVER —
3 MILLION CHILDREN
AND ADULTS, ANTI-
EPILEPTIC DRUGS
CAN HELP CONTROL
RECURRENT SEIZURES.

Transplants, Surgery, Joint Replacements

The lives of thousands of kidney, liver and heart transplant recipients were prolonged and enhanced thanks to surgical advances and the development of effective immunosuppressive drugs that prevent organ rejection.

Open heart surgery, coronary artery bypass, valve replacement and repair of congenital defects is becoming a common practice. In many cases, patients can return to normal daily activities.

— GENE —
TRANSFER OFFERS A NEW
STRATEGY FOR TREATING
GENETIC DISEASES LIKE
SICKLE CELL ANEMIA AND
CYSTIC FIBROSIS.

The majority of patients who undergo successful hip and knee replacements each year no longer face confinement in wheelchairs and experience less pain when walking.



Smallpox

Smallpox was eradicated in 1980 through worldwide vaccination. Mass vaccination could resume immediately should this deadly virus ever be used by terrorists as a biological weapon.

Polio

We are 99% of the way to eradicating polio globally. In 1988, when the Global Polio Eradication Initiative was formed, polio paralyzed more than 350,000 people a year. Since that time, polio case numbers have decreased by more than 99% (with only 416 polio cases reported in 2013). Poliovirus, the causative agent of paralytic poliomyelitis, essentially has been wiped out in North America.

HIV

Many different anti-HIV drugs approved for human use have led to dramatic declines in AIDS-related diseases and deaths. Clinical trials, building on previous research with monkeys, are showing that pre-exposure prophylaxis (PrEP) is highly effective in preventing infection in high risk groups which could change the face of AIDS.

Parkinson's Disease

Nobel Prize-winning work with rabbits tells us much about the drug L-dopa, which provides initial relief from tremors in patients suffering the debilitating symptoms of Parkinson's disease. In the long term, some victims may benefit from the implantation of an electronic stimulator in the region of the brain that controls body movements.

Malaria

Malaria is a chronic, sometimes fatal disease caused by a parasite that is transmitted to humans by mosquitoes. A new generation of drugs has been developed to fight the most severe forms of this disease, which can infect up to 238 million people each year.

Hepatitis B

More than 350 million people around the world, including 1.25 million people in the United States, are chronic carriers of hepatitis B. This virus can cause long-term, chronic illness that leads to cirrhosis of the liver, liver cancer and death. Hepatitis B virus infections can be prevented by vaccination and controlled by precautionary treatments.

Animal research achievements through the years

- 1796** Vaccine for smallpox developed (Cow)
- 1881** Vaccine for anthrax developed (Sheep)
- 1885** Vaccine for rabies developed (Dog, Rabbit)
- 1902** Malarial life cycle discovered (Pigeon)*
- 1905** Pathogenesis of tuberculosis discovered (Cow, Sheep)*
- 1919** Mechanisms of immunity discovered (Guinea Pig, Horse, Rabbit)*
- 1921** Insulin discovered (Dog, Fish)*
- 1928** Pathogenesis of typhus discovered (Guinea Pig, Rat, Mouse)*
- 1929** Vitamins supporting nerve growth discovered (Chicken)*
- 1932** Function of neurons discovered (Cat, Dog)*
- 1933** Vaccine for tetanus developed (Horse)
- 1939** Anticoagulants developed (Cat)
- 1942** The Rh factor discovered (Monkey)
- 1943** Vitamin K discovered (Rat, Dog, Chick, Mouse)*
- 1945** Penicillin tested (Mouse)*
- 1954** Polio vaccine developed (Mouse, Monkey)*
- 1956** Open heart surgery and cardiac pacemakers developed (Dog)
- 1964** Regulation of cholesterol discovered (Rat)*
- 1968** Rubella vaccine developed (Monkey)
- 1970** Lithium approved (Rat, Guinea Pig)
- 1973** Animal social and behavior patterns discovered (Bee, Fish, Bird)*
- 1975** Interaction between tumor viruses and genetic material discovered (Monkey, Horse, Chicken, Mouse)*
- 1982** Treatment for leprosy developed (Armadillo)

- 1984** Monoclonal antibodies developed (Mouse)*
- 1990** Organ transplantation techniques advanced (Dog, Sheep, Cow, Pig)*
- 1992** Laparoscopic surgical techniques advanced (Pig)
- 1995** Gene transfer for cystic fibrosis developed (Mouse, Non-Human Primate)
- 1997** Prions discovered and characterized (Hamster, Mouse)*
- 1998** Nitric oxide as signaling molecule in cardiovascular system discovered (Rabbit)*
- 2000** Brain signal transduction discovered (Mouse, Rat, Sea Slug)*
- 2002** Mechanism of cell death discovered (Worm)*
- 2003** Non-invasive imaging methods (MRI) for medical diagnosis developed (Clam, Rat)*
- 2004** Odorant receptors and the organization of the olfactory system discovered (Mouse)*
- 2005** A bacterium that leads to gastritis and peptic ulcer disease discovered (Gerbil)*
- 2006** RNA interference, or gene silencing, by double-stranded RNA discovered (Roundworm)*
- 2007** Principles for introducing specific gene modifications in mice and the use of embryonic stem cells discovered (Mouse)*
- 2008** Spinal cord regeneration techniques advanced by growth-promoting chemicals and grafts of nerve fibers (Rat)
- 2009** Autism gene discovered (Mouse)
- 2010** Scientists develop safer, more efficient technique for inducing pluripotency in stem cells (Mouse)
- 2011** Scientists develop thought-powered prosthetic limbs (Monkey)
- 2012** First clinical trials of Schwann cell transplant to restore movement in patients with spinal cord injuries (Rat, Mouse, Pig, Monkey)
- 2013** Discoveries of machinery regulating vesicle traffic (Hamster, Mouse, Rat)*
- 2014** Workings of the inner GPS of the brain (Rat)*

* Denotes Nobel Prize winning work



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