PROUD ACHIEVEMENTS

of Animal Research

fbr 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.

- ✓ Since 1900, modern medicine and public health have boosted the average life span in the United States by almost 30 years.
- ✓ Between 2001 and 2007, the overall U.S. five-year survival rate for cancers increased by 67 percent.
- ✓ Between 1950 and 2011, U.S. deaths from stroke and heart disease fell by 70 percent and 63 percent, respectively.
- ✓ Between 2001 and 2011, AIDS-related deaths in the U.S. fell by 25 percent.
- ✓ Safe and effective vaccines have been developed to control the following common diseases, once regarded as "killers": polio, measles, diphtheria, whooping cough, rubella, mumps, tetanus, influenza and pneumococcal pneumonia.

Infant Mortality

In 2010, infant mortality in the US — a key indicator of the nation's health — was measured at fewer than seven 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 and 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

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.

Dogs, cats, sheep and cattle also 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 threatened 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.

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

Find out what researchers have achieved with the help of mice, rats and other rodents.

Stem Cells

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

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.

Anti-Cancer

90.4 PERCENT OF AMERICAN CHILDREN SUFFERING FROM ACUTE LYMPHOCYTIC LEUKEMIA REMAIN IN REMISSION FOR AT LEAST FIVE YEARS.

Dramatic improvement in the treatment regimens with novel anti-cancer drugs permits 90.4 percent of American children suffering from acute lymphocytic leukemia to remain in remission.These long-term survivors often go on to lead normal lives.

Antibiotics

Improvements in antibiotic therapy have helped extend the lives and improve the lung function of some 30,000 young people with cystic fibrosis, a deadly congestive lung disease.

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.

Lower Risks

Fast-acting medications have significantly reduced the risk of death of patients suffering from heart attacks, asthma, and other allergenic diseases.

Paralysis

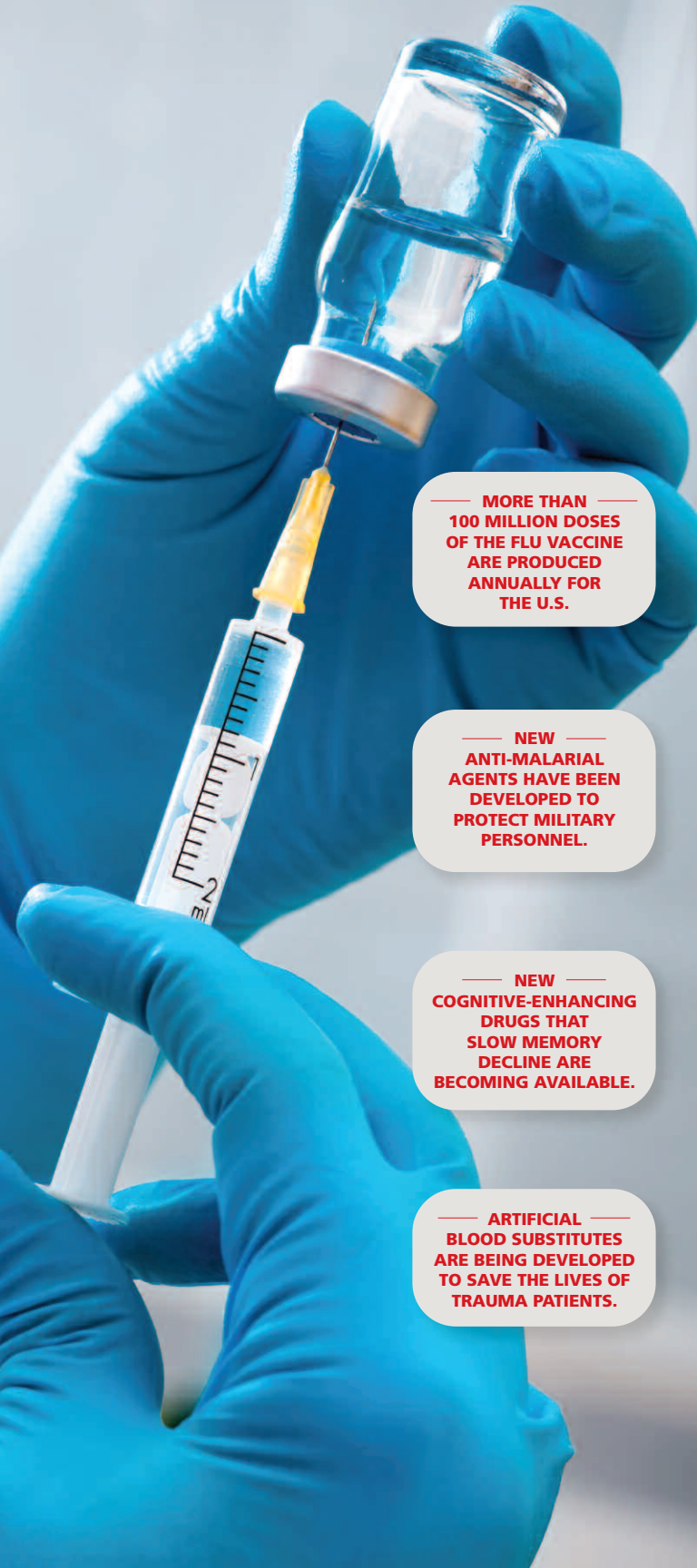
Millions of people, particularly young men, suffer acute spinal cord injuries each year as a result of accidents. Scientists are now finding potential new spinal cord therapies to spur neurons to grow and create new connections, enabling recovery of sensations and motor functions. Eventually, paralysis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

INSULIN

SKIN PATCHES, SPRAYS AND INHALERS ARE MAKING LIFE EASIER FOR THOSE WHO LIVE WITH DIABETES.



MORE THAN 100 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

Almost 38 million Americans take a wide variety of new cholesterol-lowering drugs to prevent plaque buildup and reduce the incidence of heart attack, stroke and kidney failure.

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 100 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

A new array of non-invasive devices to monitor glucose levels, and new needle-free systems to deliver insulin, such as skin patches, sprays and inhalers, are making life easier for those who live with diabetes.

Each year, renal dialysis, a procedure that removes toxic waste products from the blood stream, extends the lives of more than 300,000 patients with end-stage kidney failure.

Carefully planned treatment regimens with anti-epileptic drugs can control up to 70 percent of recurrent seizures in the 3 million children and adults living with epilepsy.

Eyes

Amblyopia, or "lazy eye," is a serious visual impairment resulting from inadequate eye use in early childhood. It affects up to three percent of the general population and can lead to blindness if not treated in its early stages. In severe cases, surgical intervention may be required to restore proper vision.

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

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.

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

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.

MORE THAN 1.5 MILLION AMERICANS HAD A CATARACT REMOVED IN A SIMPLE OUT-PATIENT PROCEDURE.

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

New surgical techniques to repair heart defects are being developed to help the approximately 40,000 infants who are born with congenital abnormalities each year.

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 several years ago through worldwide vaccination. Mass vaccination could resume immediately should this deadly virus ever be used by terrorists as a biological weapon.

Polio

Since the World Health Organization (WHO) polio eradication program began in 1988, only four of 125 countries remain endemic for polio. More than 400 million children under the age of five years were immunized against polio during mass vaccination campaigns in 2007. 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. Newly developed vaccines that protect monkeys from simian AIDS are being tested in clinical trials, giving rise to the hope that a safe and effective human AIDS vaccine will be found to control the virus infection.

L-Dopa

Levodopa (L-dopa) provides initial relief from uncontrolled 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 216 million people each year.

Hepatitis B

More than 350 million people around the world 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)

** Denotes Nobel Prize winning work*
+ Denotes work by FBR Board Member

The Foundation for Biomedical Research (FBR) is the nation's oldest and largest organization dedicated to improving human and animal health by promoting public understanding, respect and support for biomedical research in scientific and medical discovery.

Since 1981, FBR has provided continuous service to America's research community.

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