

ANIMAL RESEARCH SUCCESS



FOUNDATION FOR
BIOMEDICAL
RESEARCH



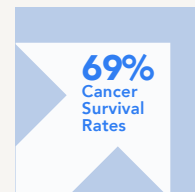
Animal Research

The Foundation of Medicine

Cancer. Heart disease. Diabetes. Alzheimer's. Parkinson's. These are illnesses that touch nearly every family in America. Today, survival rates are higher, treatments are more precise, and cures once thought impossible are becoming reality — because of biomedical research made possible with animals.

Even the most cutting-edge breakthroughs — from gene therapies to regenerative medicine — depend on animal studies to ensure treatments are safe and effective for patients

Animal research has played a vital role in virtually every major medical advance of the last century. From life-saving vaccines to cancer immunotherapies that retrain the immune system to fight tumors, these breakthroughs have transformed once-fatal conditions into treatable or even preventable diseases.



Cancer & Immunotherapy

The cancer survival rate has climbed dramatically, from 49% in the 1970s to nearly 69% today.* Chemotherapy, radiation protocols, targeted therapies and cancer immunotherapies like CAR-T cells were all pioneered with mice, dogs and nonhuman primates. These treatments retrain the immune system to destroy tumors, giving hope to millions of patients.

*Source: Surveillance, Epidemiology and End Results (SEER) Program, National Cancer Institute, 5-Year Relative Survival for All Cancers Combined, United States



Neurological Diseases

Diseases like Alzheimer's, Parkinson's and ALS affect millions of people worldwide. Animal research has been vital in uncovering how these conditions damage the brain and how to slow or reverse their effects. Studies with mice and nonhuman primates led to L-dopa therapy and deep brain stimulation for Parkinson's, while Alzheimer's research with mice revealed beta-amyloid plaques and tau tangles — discoveries now driving new drugs and vaccines to preserve memory and cognition.



Diabetes

Nearly 38 million Americans live with diabetes.** The discovery of insulin with dogs transformed the disease from a fatal diagnosis into a manageable condition. Today, continuous glucose monitors, insulin pumps and the first FDA-approved artificial pancreas — technologies rooted in animal research with rodents and pigs — allow people with diabetes to live longer, healthier lives.

**Source: Centers for Disease Control and Prevention National Diabetes Statistics Report



Heart Disease

Since 1970, U.S. deaths from heart disease have fallen by more than half.*** This is thanks to animal research behind statins, pacemakers, bypass surgery, heart stents and life-saving heart transplants. Today, heart disease is no longer an automatic death sentence.

***Source: Centers for Disease Control Heart Disease Mortality in the United States, 1970 to 2022



Living Longer, Living Better

Thanks to modern medicine, Americans today live more than three decades longer than they did at the turn of the 20th century.

FACT:

Behind every medical milestone is a steady stream of discoveries made possible through animal research.



Life Expectancy: Between 1900 and 2023, average U.S. life expectancy rose from 47 to 78 years.*

HIV/AIDS: HIV/AIDS: Between 2010 and 2022, the U.S. age-adjusted death rate from HIV disease fell by about 50%, reflecting major advances in prevention, diagnosis and treatment.**

Childhood Leukemia: More than 90% of children with acute lymphoblastic leukemia are now cured*** compared to about 14% in the 1960s.

Cancer Survival: The 5-year relative survival rate for all cancers is now 69%, up from 49% in the 1970s.

*Source: Centers for Disease Control and Prevention/National Center for Health Statistics, United States Life Tables

**Source: Centers for Disease Control and Prevention, HIV Mortality Slide Set

***Source: American Cancer Society

Everyday medicines, devices and hospital tools made possible with animal research

When you walk into a hospital or open your medicine cabinet, nearly everything you see exists because of animal research. These discoveries are the backbone of modern medicine.

Drugs and Therapies

- Antibiotics
- Insulin
- Statins
- Chemotherapy
- CAR-T therapy
- Immunotherapy checkpoint inhibitors
- Antidepressants
- Antipsychotics
- Anti-anxiety medications
- Antivirals (including HIV treatments)
- Antimalarials
- Anesthetics
- Painkillers
- Dialysis drugs
- Organ rejection drugs
- Alzheimer's and Parkinson's therapies
- Epilepsy treatments
- Vaccines for polio, HPV, influenza, RSV, hepatitis, Ebola, rabies, distemper, parvo, anthrax, tetanus and more

Devices and Procedures

- Pacemakers
- Heart stents
- Coronary bypass surgery
- Joint replacements
- Organ transplants (heart, kidney, liver)
- Cataract surgery
- Ventilators
- MRI imaging
- Artificial pancreas
- Artificial joints
- Artificial blood substitutes
- Deep brain stimulation for Parkinson's
- Spinal cord injury therapies
- Gene therapies for blindness, sickle cell disease and hearing loss



For Animals, Too

Vaccines and treatments that protect companion animals from rabies, parvo, distemper, feline leukemia, hip dysplasia, glaucoma and cancer — plus reproductive technologies that help preserve endangered species. From the simplest antibiotic to the most advanced gene therapy, animal research has made it possible.

Lifesaving Breakthroughs in Childhood Diseases

Leukemia

Thanks to decades of research, including studies involving mice and rats, children with acute lymphoblastic leukemia now have a 90% cure* rate, a significant improvement from the approximately 14% survival rate in the 1960s. Animal studies have played a crucial role in developing effective chemotherapy protocols and targeted therapies that save thousands of young lives each year.

Cystic Fibrosis

Gene therapy for cystic fibrosis is on the horizon, built on decades of mouse research. These advances offer hope to children and adults living with a disease that was once fatal in early childhood.

Infant Survival

Research with rodents and primates underpinned vaccines and treatments that have dramatically reduced infant mortality in the U.S., from **47 deaths per 1,000 live births in 1940 to 5.61 in 2023.****

*Source: American Cancer Society
**Source: Centers for Disease Control and Prevention (CDC), National Vital Statistics Reports and CDC MMWR Weekly™ QuickStats



ANIMAL SPOTLIGHT:
Mice, rats and other rodents are the backbone of pediatric disease research.



Brain-behavior Disorders

Parkinson's Disease

Nobel-winning work with rabbits laid the foundation for L-dopa, a drug that provides initial relief from tremors. Long-term research with primates has enabled innovations like deep brain stimulation to improve quality of life.

Neurobehavioral Development

Research with nonhuman primates has been critical for understanding how early environmental factors influence neurobehavioral development throughout life.

Traumatic Brain Injury

Rodents, pigs and nonhuman primates are essential to understand human brain injuries like concussions and contusions. Scientists study neuroinflammation and evaluate treatments at the preclinical level before moving on to human patients.



ANIMAL SPOTLIGHT:
Mice, nonhuman primates, rats and zebrafish helped — and still help — develop neurorestorative medications.



Neurological and Cognitive Health

Alzheimer's Disease

Animal studies revealed the role of beta-amyloid plaques in Alzheimer's disease, guiding research toward vaccines and cognitive-enhancing drugs that slow memory decline.

Epilepsy

Zebrafish, fruit flies and rodents are key models for developing seizure-controlling medications and advanced gene therapies that improve quality of life for millions.

Cognitive Enhancements

Research with rodents contributes to new therapies that preserve or improve memory and cognitive function in aging populations.

ANIMAL SPOTLIGHT:
Zebrafish, fruit flies and rodents accelerate neuroscience and cognitive research.



Cardiovascular and Metabolic Health



Heart Disease

Statins, pacemakers, bypass surgery and heart stents — all tested with animals — have dramatically reduced U.S. deaths from heart disease by more than half since the 1960s.

Diabetes

Insulin therapy, insulin pumps, continuous glucose monitors and the first FDA-approved artificial pancreas were all developed through studies with dogs, rodents and pigs. These treatments allow people with diabetes to live longer, healthier lives.

Cholesterol & Stroke Prevention

Animal research helped uncover cholesterol's role in heart disease and stroke, enabling the development of statins and new therapies with broad cardiovascular benefits.

ANIMAL SPOTLIGHT:
Dogs, rodents and pigs made these life-saving treatments possible.



ANIMAL SPOTLIGHT:
Monkeys, mice and rats are essential for vaccine and antiviral research.



Vaccines and Infectious Disease

Smallpox & Polio

Vaccines developed with cows, monkeys and rodents led to the eradication of smallpox and nearly eliminated polio worldwide.

HIV/AIDS

Preclinical research with monkeys laid the foundation for life-saving anti-HIV drugs and PrEP, preventing infections in high-risk populations. Gene therapy studies with animal models have shown promise for preventing HIV infection, offering hope for future strategies to protect infants and high-risk populations.

Malaria & Hepatitis B

Rodent and primate research enabled new antimalarial drugs and vaccines that protect millions globally. Hepatitis B vaccination, developed with animal studies, prevents chronic liver disease and cancer.

Vision, Surgery, Transplants and Prosthetics

Vision Restoration

Gene therapy with mice and nonhuman primates shows promise for treating blindness caused by retinal disease. Ophthalmic surgery innovations now allow millions to regain vision through cataract removal.

Gene therapy continues to show promise in helping restore vision in age-related eye conditions, such as age-related macular degeneration and glaucoma. Eye geneticists are studying apple snails because of their ability to regrow their eyes, offering insights into potential human applications.

Thanks to recent advances in ophthalmologic surgery, more than 4 million Americans undergo cataract removal in a simple out-patient procedure that prevents vision loss.

Transplants & Surgery

Kidney, liver and heart transplants — plus immunosuppressive drugs to prevent rejection — rely on decades of research with dogs, pigs and nonhuman primates. Surgical advances like open-heart surgery, valve replacement and joint replacements improve daily life for thousands.

Combat Wounds & Prosthetic Innovation

Animal research has enabled the development of advanced prosthetics and brain-computer interfaces for veterans recovering from combat injuries. Following the Gulf War, approximately 1,700 U.S. service members required limb amputations. Studies with nonhuman primates, rodents and other models contributed to prosthetic limb control, nerve regeneration therapies and innovations that restore mobility and independence.

ANIMAL SPOTLIGHT:
Dogs, pigs, nonhuman primates and rodents accelerate surgical, transplant and prosthetic innovations.



Cancer Therapies

Chemotherapy & Targeted Therapies

Rodent and nonhuman primate models led to life-saving chemotherapy protocols and targeted therapies that shrink tumors while minimizing side effects.

Immunotherapy & CAR-T

CAR-T therapy, approved for pediatric leukemia, was developed with mice and tested for safety with nonhuman primates, showing the power of the immune system to destroy cancer cells.

Anti-Angiogenesis & Tumor Suppression

Studies with mice enabled drugs that cut off tumor blood supply, offering new hope for lymphoma and other cancers.

ANIMAL SPOTLIGHT:
Mice and nonhuman primates drive breakthrough cancer research.



ANIMAL SPOTLIGHT:
Rodents, pigs, nonhuman primates and zebrafish accelerate cutting-edge gene and regenerative therapies.



Emerging Technologies & Gene Therapy

CRISPR & Gene Editing

Gene therapies for sickle cell disease, cystic fibrosis and other conditions were developed with mice, rats, pigs and nonhuman primates.

Hearing Restoration

Preclinical animal studies enabled gene therapy to restore hearing in infants, opening possibilities for future pediatric treatments.

Regenerative Medicine

Zebrafish and other animals are being studied at the single-cell level to understand tissue regeneration, advancing therapies for injuries and degenerative diseases.

Ensuring Humane Animal Care in Research

Scientific research involving animals is regulated in the United States by multiple layers of oversight, from federal agencies to institutional committees working together to ensure humane care and rigorous review of the care and use of research animals.

This system requires researchers to carefully review their studies, consider alternatives whenever possible and follow strict standards for animal welfare.



A System of Strong Oversight

Animal research in the United States operates under a comprehensive oversight system that includes federal laws, institutional review committees and voluntary accreditation.

Federal Laws and Regulations

Research involving animals must comply with federal regulations designed to protect animal welfare.

Animal Welfare Act (AWA): Enforced by the U.S. Department of Agriculture

(USDA), the AWA establishes standards for housing, veterinary care, sanitation, handling and transportation of research animals. It also requires that pain and distress be minimized whenever possible.

Public Health Service (PHS) Policy: Research funded by the National Institutes of Health and other federal research agencies must follow additional policies governing the humane care and use of animals. These policies rely on the Guide for the Care and Use of Laboratory Animals (the Guide).

Institutional Animal Care and Use Committees (IACUCs)

Every institution that conducts animal research must have an Institutional Animal Care and Use Committee (IACUC).

These committees include scientists, veterinarians, a nonscientist and at least one unaffiliated community member who represents the public.

IACUCs are responsible for:

- Reviewing and approving all proposed activities involving research animals before a study begins
- Ensuring the number and species of animals is justified

- Confirming that pain and distress are minimized and that a veterinarian is consulted when procedures may cause more than slight pain or distress
- Inspecting animal facilities and reviewing programs at least twice each year
- Investigating concerns about animal care and use

The committee has the authority to require modifications to proposed activities and to suspend activities that do not meet required standards.





Federal and Independent Oversight

In addition to institutional review, animal research programs are monitored by federal agencies and independent accreditation organizations.

Office of Laboratory Animal Welfare (OLAW)

The NIH Office of Laboratory Animal Welfare oversees institutions that receive federal (PHS) funding for animal research. Institutions must submit formal assurances that they will comply with federal policies and maintain proper oversight systems.

PHS-funded institutions must report non-compliances with PHS Policy, serious deviations from the Guide, and IACUC-mandated protocol suspensions to OLAW.

United States Department of Agriculture (USDA)

The USDA enforces the Animal Welfare Act through inspections and regulatory oversight. Research facilities with

AWA-covered species are subject to unannounced inspections. They must maintain detailed records and file an annual report.

AAALAC International Accreditation

Many research institutions voluntarily seek accreditation from AAALAC International, an independent nonprofit organization that evaluates animal care and use programs against recognized global standards.

This voluntary accreditation demonstrates a commitment to high standards of animal welfare beyond regulatory requirements.

The 3Rs: Guiding Principles for Responsible Research

The 3Rs are internationally recognized principles that guide responsible animal research. These principles help ensure that animals are used only when necessary and that their care and welfare remain a top priority.

Replacement

Whenever possible, scientists use non-animal methods such as computer modeling, cell cultures or advanced laboratory systems instead of animals.

Reduction

Researchers design studies carefully with the minimal number of animals necessary to obtain reliable scientific results.

Refinement

Methods are continually improved to enhance the welfare of animals in research, including remote home cage monitoring and computerized pain assessment technologies.

A Commitment to Sound Science

The combination of federal regulations, institutional oversight, professional veterinary care and ethical principles creates a robust system to safeguard animal welfare while facilitating research. These protections ensure that biomedical research involving animals is conducted responsibly, with the goal of advancing knowledge, improving health and benefiting both humans and animals.



Animal Research Achievements Through the Years

1796	Vaccine for smallpox developed (Cow)	1990	Organ transplantation techniques advanced (Dog, Sheep, Cow, Pig)*
1881	Vaccine for anthrax developed (Sheep)	1992	Laparoscopic surgical techniques advanced (Pig)
1885	Vaccine for rabies developed (Dog, Rabbit)	1995	Gene transfer for cystic fibrosis developed (Mouse, Nonhuman Primate)
1902	Malarial life cycle discovered (Pigeon)*	1997	Prions discovered and characterized (Hamster, Mouse)*
1905	Pathogenesis of tuberculosis discovered (Cow, Sheep)*	1998	Nitric oxide as signaling molecule in cardiovascular system discovered (Rabbit)*
1919	Mechanisms of immunity discovered (Guinea Pig, Horse, Rabbit)*	2000	Brain signal transduction discovered (Mouse, Rat, Sea Slug)*
1921	Insulin discovered (Dog, Fish)*	2002	Mechanism of cell death discovered (Worm)*
1928	Pathogenesis of typhus discovered (Guinea Pig, Rat, Mouse)*	2003	Non-invasive imaging methods (MRI) for medical diagnosis developed (Clam, Rat)*
1929	Vitamins supporting nerve growth discovered (Chicken)*	2004	Odorant receptors and the organization of the olfactory system discovered (Mouse)*
1932	Function of neurons discovered (Cat, Dog)*	2005	A bacterium that leads to gastritis and peptic ulcer disease discovered (Gerbil)*
1933	Vaccine for tetanus developed (Horse)	2006	RNA interference, or gene silencing, by double-stranded RNA discovered (Roundworm)*
1939	Anticoagulants developed (Cat)	2007	Principles for introducing specific gene modifications in mice and the use of embryonic stem cells discovered (Mouse)*
1942	The Rh factor discovered (Monkey)	2008	Spinal cord regeneration techniques advanced by growth-promoting chemicals and grafts of nerve fibers (Rat)
1943	Vitamin K discovered (Rat, Dog, Chick, Mouse)*	2009	Autism gene discovered (Mouse)
1945	Penicillin tested (Mouse)*	2010	Scientists develop safer, more efficient technique for inducing pluripotency in stem cells (Mouse)
1954	Polio vaccine developed (Mouse, Monkey)*	2011	Thought-powered prosthetic limbs developed (Monkey)
1956	Open heart surgery and cardiac pacemakers developed (Dog)	2012	First clinical trials of Schwann cell transplant to restore movement in patients with spinal cord injuries (Rat, Mouse, Pig, Monkey)
1964	Regulation of cholesterol discovered (Rat)*	2013	Machinery regulating vesicle traffic discovered (Hamster, Mouse, Rat)*
1968	Rubella vaccine developed (Monkey)	2014	Workings of the inner GPS of the brain (Rat)*
1970	Lithium approved (Rat, Guinea Pig)	2016	First artificial pancreas brought to market. Animal models including rodents and pigs contributed to diabetes research and artificial pancreas technology (Mouse, Rat, Dog, Pig, Nonhuman Primate)
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)*		

* Denotes Nobel Prize winning work

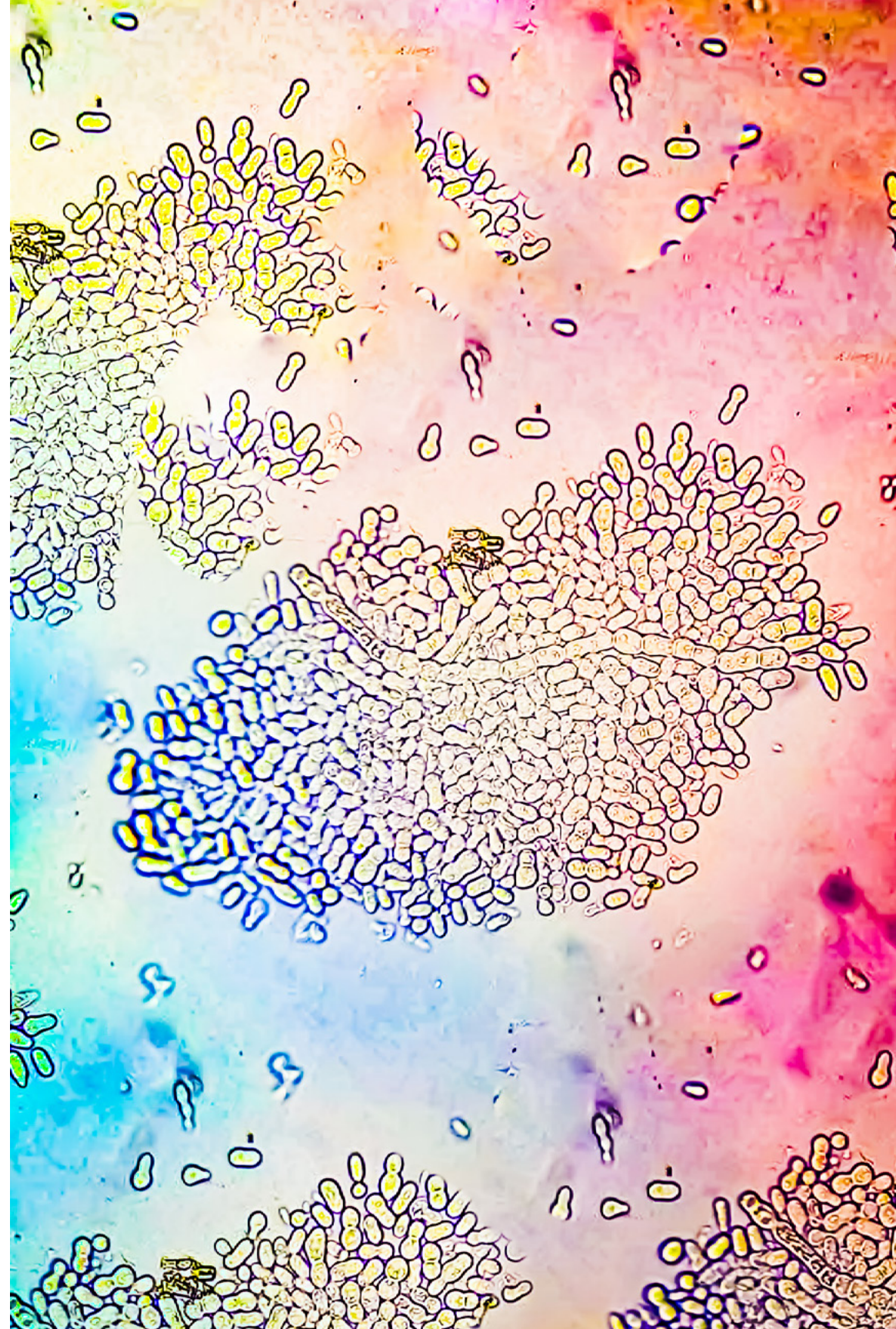
- 2017** First FDA-approved CAR-T cell therapy for pediatric and young adult leukemia (Mouse, Rat, Nonhuman Primate)
- 2021** Partial vision restoration in a blind man, thanks to gene therapy based on preclinical studies with mice and nonhuman primates (Mouse, Nonhuman Primate)
- 2023** Approval of the world's first CRISPR therapy for sickle cell disease (Mouse, Rat, Pig, Nonhuman Primate)
- 2023** Brain-computer interfaces (BCIs) that translate brain signals into speech enabled two speech-disabled patients to produce words (Mouse, Rat, Nonhuman Primate)
- 2024** Gene therapy restored hearing in an 18-month-old toddler (Mouse, Nonhuman Primate)
- 2025** NIH-funded researchers published the most detailed map of neuronal connections in the mouse brain's visual cortex (Mouse)
- 2025** Scientists studied zebrafish and other animals at the single-cell level helping advance regenerative medicine (Zebrafish, Mouse, Axolotl)

New Approach Methodologies (NAMs) and Alternatives: Advances in cell cultures, organ-on-a-chip systems, computer modeling, digital measures and AI are providing scientists with new human-relevant ways to study disease. These approaches currently complement rather than replace the complexity of whole living systems. The medical breakthroughs and discovery work featured in this brochure build on the foundation of animal research to ensure safety, effectiveness and biological understanding that translates across species. Together, NAMs and animal studies form a continuum and represent an integrated research ecosystem that strengthens confidence in scientific findings and accelerates the development of safe, effective and ethical medical innovations for people and animals alike.



Learn more about how animal research has contributed to medical advancements at fbresearch.org.

Microscopic fungi Malassezia furfur, showing yeast cells and hyphae





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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