2024 NIH Research Highlights

With NIH support, scientists across the United States and around the world conduct wide-ranging research to discover ways to meet the NIH mission to enhance health, lengthen life, and reduce illness and disability. Groundbreaking NIH-funded research often receives top scientific honors. In 2024, these honors included three NIH-supported scientists who received Nobel Prizes. Here's just a small sample of the NIH-supported research accomplishments in 2024. For more health and medical research findings from NIH, visit *NIH Research Matters*.

Human Health Advances

Disease Prevention, Diagnosis and Treatment

Accurate blood test for Alzheimer's disease

An accurate diagnosis of Alzheimer's disease currently requires either a sample of cerebrospinal fluid or a brain imaging test called a PET scan. Researchers have been working to develop blood tests to simplify this process. In a large clinical trial, one blood test identified Alzheimer's disease correctly in older adults with about 90% accuracy. Such tests could help speed diagnoses and help more people access earlier treatments.

Blood test predicts 30-year cardiovascular disease risks for women

More than 800,000 people nationwide die of cardiovascular diseases, including heart attack and stroke, every year. Researchers found that a blood test to measure levels of three compounds, including a marker of inflammation, could predict a woman's risk for cardiovascular disease decades later. Identifying people at high risk of cardiovascular disease earlier in their lives could lead to more opportunities for prevention.

Preventing and treating peanut allergy

Food allergies can be dangerous or even fatal. Millions of people in the U.S. live with a peanut allergy, which often develops in childhood. A long-term study found that children who regularly ate peanut-containing foods beginning as early as four to six months of age had a greatly reduced risk of developing peanut allergy into adolescence. For kids who already have a food allergy, a drug used to treat allergic asthma reduced the risk of reactions to peanuts and other common foods.

Brain-computer interface helps paralyzed man speak
Researchers developed a highly accurate brain-computer interface that allowed a man to communicate after his ability to speak was impaired by amyotrophic lateral sclerosis (ALS). The system used an array of microelectrodes in the brain to decode neural signals. Within 16 hours of use, the system could decode about 98% of words correctly. Such devices could eventually allow people with paralysis to converse with family and friends.

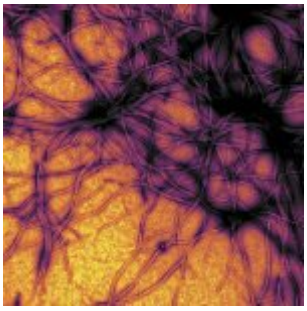
Quick test could help reduce dementia care disparities
More than 6 million older adults in the U.S. are living with dementia. But signs of cognitive impairment are often missed by health care providers in busy primary care settings. This is especially true among older Black and Hispanic Americans. A five-minute, culturally neutral test for cognitive problems improved dementia detection and management in older adults. The simple tool could help increase access to dementia care, including in disadvantaged areas.

Promising Medical Findings
Results with Potential for Enhancing Human Health

Insight into mechanisms of ME/CFS
Myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS) is a poorly understood condition that leads to debilitating fatigue, intolerance to exercise, and cognitive problems. It often develops after an infection. Researchers compared people with and without post-infectious ME/CFS and found important differences in their brains and other body systems. The findings point to potential mechanisms for ME/CFS as well as therapeutic targets.

Skin test detects evidence of Parkinson's and related disorders

Parkinson's disease is the most common of a set of neurodegenerative conditions known as synucleinopathies. It has been difficult to detect these conditions and measure their severity. Scientists showed that a simple skin biopsy could identify people who had synucleinopathies with a high degree of accuracy. The findings could lead to earlier and more accurate diagnoses of these conditions.

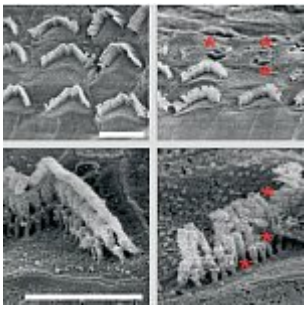


Developing treatments for prion diseases

No treatments are available for the devastating brain disorders known as prion diseases. These arise when normal prion proteins misfold and form toxic clumps that destroy brain cells. Prion proteins aren't essential for survival, so scientists developed a way to safely turn off the prion-producing gene in mice. It reduced prion protein levels by up to 80%. The finding suggests an approach for treating prion diseases in people.

Potential target for cataract drug development

Cataracts are a common cause of vision loss in older adults. The only available treatment is removing and replacing the clouded lens. By studying ground squirrels that temporarily develop cataracts during hibernation, scientists found a protein that allows their eyes to rapidly clear cataracts after hibernation. Rats and fish given this protein also cleared cataracts, suggesting a potential drug treatment strategy for people.

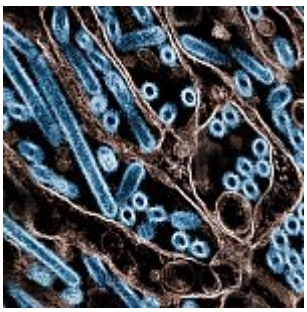


Genome editing restores hearing in mice

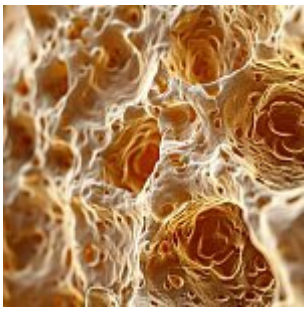
For over half of children born with hearing loss, a single genetic abnormality is to blame. This is called inherited deafness, or genetic deafness. Scientists developed a genome editing method that restored hearing in adult mice with a rare type of genetic hearing loss. With additional study, this type of approach might help to reverse some types of inherited hearing loss in people.

Basic Research Insights

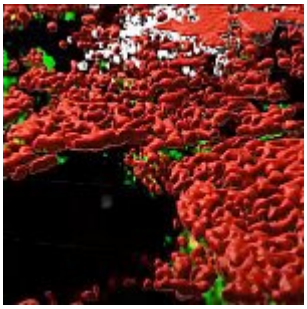
Noteworthy Advances in Fundamental Research



H5N1 avian influenza transmission
Researchers gained insights into whether the H5N1 flu outbreak in cows could lead to a human pandemic. H5N1 survived in raw dairy milk kept under refrigerated conditions for at least five weeks. When mice consumed infected raw milk, they showed signs of illness. This suggests that drinking raw milk may pose a risk for people. But pasteurization-like treatment significantly reduced levels of the virus. An H5N1 virus taken from cows was able to infect mice and ferrets, but airborne transmission wasn't very efficient. Another H5N1 virus, from an infected farm worker, could transmit through airborne droplets and was lethal in mice and ferrets. The findings emphasize the risks from the current outbreak and the need for continued monitoring and testing.



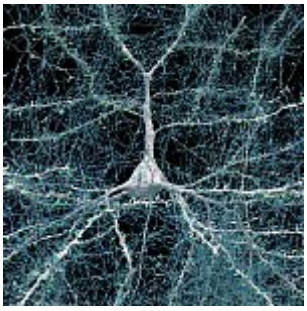
Why protective antibodies fade after COVID-19 vaccines
Mature and durable antibody-producing cells are key to providing long-lasting immunity against infection. Researchers looked in the bone marrow of healthy, vaccinated adults and found such cells targeting tetanus and influenza, but not SARS-CoV-2. The findings could help explain why protection from COVID-19 vaccines tends to decline over time. A better understanding of how these long-lived immune cells are formed could lead to improved vaccines that provide enduring protection.



Mapping how cancers form and spread
3D maps of cancer from an NIH initiative provided critical information about how tumors develop, spread, and respond to treatments. Researchers were able to identify distinct substructures, called microregions, within many tumors. Cells in different microregions often behaved differently. These maps provide a better understanding of the development and progression of cancer. This could eventually lead to new prevention and treatment strategies.

Understanding how exercise affects the body

Exercise is one of the most beneficial activities that people can engage in. But exactly how exercise exerts its positive effects hasn't been well understood. A study of endurance training in rats found molecular changes throughout the body that could help explain the beneficial effects of exercise on health. Large differences were seen between male and female rats, highlighting the need to include both women and men in exercise studies.



Advances in understanding the brain

Scientists generated a high-resolution map of all the cells and connections in a single cubic millimeter of the human brain. The map revealed details of brain structure never seen before. Other researchers fully mapped the connections between neurons for an entire adult fruit fly brain. This map is a stepping stone to creating whole brain maps in larger animals. Both maps can improve our understanding of brain function and provide resources for further studies. Researchers also created massive, advanced maps of the complex networks that regulate gene function in the brains of people with and without mental disorders. Their findings offer new insights into how gene activities affect the brain, which could lead to improved treatments for mental health conditions.