

NIH RESEARCH MATTERS

## 2023 NIH Research Highlights

With NIH support, scientists across the United States and around the world conduct wide-ranging research to discover ways to enhance health, lengthen life and reduce illness and disability. Groundbreaking NIH-funded research often receives top scientific honors. In 2023, these honors included [two NIH-supported scientists who received Nobel Prizes](#). Here's just a small sample of the NIH-supported research accomplishments in 2023. For more health and medical research findings from NIH, visit [NIH Research Matters](#).

### Human Health Advances Disease Prevention, Diagnosis and Treatment



#### [Antibiotic can help prevent common sexually transmitted infections](#)

Sexually transmitted infections (STIs) have been on the rise. Untreated STIs can lead to serious health issues, such as blindness or brain and nerve problems. A study of men who had sex with men and transgender women at high risk for bacterial STIs showed that taking an oral antibiotic within three days after unprotected sex reduced the risk of STIs. This preventive approach, called doxy-PEP, cut the incidence of syphilis, gonorrhea, and chlamydia by two-thirds compared to standard care.



#### [An mRNA vaccine to treat pancreatic cancer](#)

Scientists developed a method for creating personalized mRNA vaccines to treat a deadly type of pancreatic cancer. In a small study, 18 patients had pancreatic tumors removed and analyzed to identify proteins that could provoke an immune response. Each then received personalized vaccines that targeted their proteins. The vaccines triggered a strong anti-tumor immune response in half the participants. Over a year later, their cancers hadn't returned.



#### [Bivalent vaccines provide better protection against severe COVID-19](#)

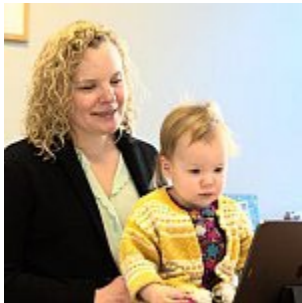
The original COVID-19 vaccines saved many lives. As later variants of the SARS-CoV-2 virus emerged, updated vaccines were released in September 2022. These bivalent vaccines targeted both the original strain and the Omicron variant. Researchers showed that these updated vaccines were significantly more effective at reducing the risk of serious disease. They improved protection regardless of a person's age or whether they had already received different boosters.

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### [Hearing aids slow cognitive decline in people at high risk](#)

As the world population ages, there's a need for safe and affordable ways to prevent or slow cognitive decline. Among older adults with hearing loss who were at increased risk for dementia, researchers found that those who received hearing aids had nearly half the rate of cognitive decline over a three-year period. Treating hearing loss could be a safe way to lower the risk of dementia in vulnerable people.



### [App aids early screening for autism](#)

Autism spectrum disorder is a complex condition marked by challenges with social communication and repetitive behaviors. Early diagnosis can lead to early treatment and improved outcomes. But autism can be hard to diagnose. Scientists developed an interactive app that displays videos and collects data on a child's eye gaze, facial expressions and other factors linked to autism. The app detected early signs of autism with a high level of accuracy.

## Promising Medical Findings Results with Potential for Enhancing Human Health



### [Immune and hormonal features of Long COVID](#)

About one in eight people who survive an acute SARS-CoV-2 infection go on to have persistent symptoms. The processes that give rise to this syndrome, known as Long COVID, remain unclear. Researchers found several immune and hormonal differences between people with Long COVID and those without. Another study found that infection with a common cold virus [may predispose some people to develop Long COVID](#). This year, researchers also discovered how COVID-19 [may damage cells' energy production](#) and potentially cause some symptoms of Long COVID.

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**Protein may be linked to exercise intolerance in ME/CFS**

People with myalgic encephalomyelitis/chronic fatigue syndrome (ME/CFS) live with debilitating symptoms. These including exhaustion, exercise intolerance, cognitive problems and worsening of symptoms after even mild exertion. A study suggested that high levels of a protein called WASF3 may reduce energy production in the muscle cells of people with ME/CFS. Blocking this protein in cells in the laboratory restored energy production, suggesting a potential new strategy for treating the condition.



**Engineering skin grafts for complex body parts**

Advances in bioengineering have allowed researchers to grow new patches of skin in the lab. But these skin patches have been small and limited in shape. Using new techniques, scientists grew strong skin in the shape of a full human hand. This technology has the potential to help heal burns and other damage to complex body parts with less trauma and scarring.



**Blood test for early Alzheimer's detection**

One of the first stages of Alzheimer's disease involves the formation of toxic aggregates of a protein called amyloid beta ( $A\beta$ ). The ability to detect these early would let scientists test new treatments before irreparable brain damage occurs. Researchers developed a blood test that could detect the toxic  $A\beta$  aggregates before Alzheimer's symptoms appeared. This is one of several promising approaches to early diagnosis of Alzheimer's and other dementias.



**Erythritol and cardiovascular events**

Artificial sweeteners can help people reduce their sugar and calorie intake. But little is known about the long-term health consequences. Researchers found that elevated blood levels of the artificial sweetener erythritol were associated with increased risk of heart attack and stroke. When used as a sweetener, erythritol is typically added at levels more than 1,000-fold higher than those found naturally in foods. The results highlight the need to further study erythritol's long-term effects on cardiovascular health.

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## Basic Research Insights

### Noteworthy Advances in Fundamental Research



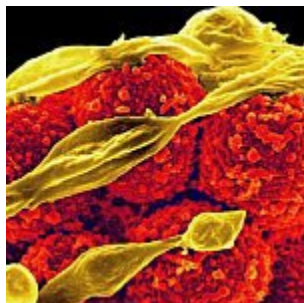
#### [Scientists build largest maps to date of cells in human brain](#)

An international network of researchers created detailed cellular maps of human and nonhuman animal brains. The scientists created the most detailed cell atlas yet of the adult human brain. They also compared human and nonhuman primate brains and found gene activity patterns that were unique to humans. These and other findings could lead to future advances for a host of mental conditions and brain disorders.



#### [Male contraceptive disables sperm](#)

Researchers developed a compound that temporarily disabled mouse and human sperm. It worked by inhibiting an enzyme that sperm need in order to move. Treating male mice with the compound prevented pregnancies without affecting mating behavior. Male fertility returned to normal by 24 hours after treatment. The findings could potentially lead to a non-hormonal, on-demand contraceptive pill for men.

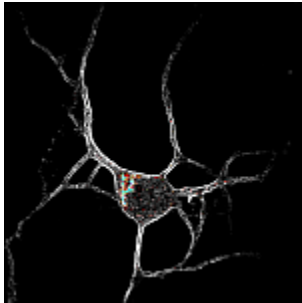


#### [Immune boost may protect against multiple hospital-acquired infections](#)

Traditional vaccines train the body to recognize a specific microbe. Researchers designed a novel type of vaccine that stimulated the innate immune system, the body's first line of defense against infection. The vaccine provided protection for mice against a wide range of bacteria and fungi. If effective in people, the approach could help prevent deaths from hospital-acquired infections.



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**[How psychedelic drugs may help with depression](#)**

Some psychedelic drugs are being tested as therapies for certain mental illnesses. These drugs work by binding receptors that promote plasticity—the brain's ability to form new connections. Researchers found that these compounds needed to cross nerve cell membranes to activate receptors inside cells. Activating the same receptors on the cell surface did not promote plasticity. The findings could lead to drugs that encourage brain plasticity without hallucinogenic effects.



**[Gut microbes may affect motivation to exercise](#)**

Researchers found that gut microbes can affect levels of exercise in mice. Depleting the gut microbiome stopped dopamine increases in mice brains after exercise. It also caused the mice to exercise less and get exhausted more easily. Further experiments revealed how the gut microbes raise dopamine levels in the brain. The findings, if confirmed in humans, suggest strategies that might help encourage people to exercise.