

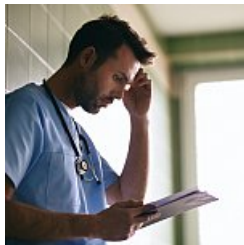
NIH RESEARCH MATTERS

2018 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 2018, these honors included two [NIH-supported scientists who earned Nobel Prizes](#) and three [NIH-funded researchers who earned prestigious Lasker Awards](#). Here's just a small sample of the NIH-supported research accomplishments in 2018. For more health and medical research findings from NIH, visit [NIH Research Matters](#).

Clinical Advances

Prevention, Diagnosis, and Treatment of Human Disease



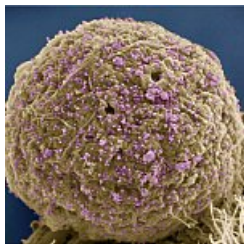
Preventing opioid overdoses

Every day, more than 100 people nationwide die from an overdose of opioids, including prescription opioids such as oxycodone and fentanyl. Two recent studies highlighted very different strategies to help prevent overdose. One showed that [certain medications reduced the risk of death by about half for people who'd previously had a non-fatal opioid overdose](#). But less than a third who'd had a non-fatal opioid overdose received them. A separate study showed that [notifying a clinician that one of their patients had died of an opioid overdose reduced the number and doses of opioid medications later prescribed](#).



[Physical clot removal can help more people after stroke](#)

An ischemic stroke occurs when blood vessels that supply the brain become blocked. Doctors can try to protect the brain from permanent damage by physically removing the blockage with a procedure called a thrombectomy. This approach was previously approved for use up to six hours after a stroke. A multi-site clinical trial showed that brain imaging was able to identify certain people who could benefit from a thrombectomy for up to 16 hours after a stroke. Based in part on this finding, experts issued new treatment guidelines so that more lives could be saved.



[Antibody combination suppresses HIV](#)

Since the 1990s, people with HIV, the virus that causes AIDS, have taken combinations of drugs called antiretroviral therapy (ART) to prevent the virus from multiplying. However, researchers have been looking for treatments that can last longer and cause fewer side effects. In an early phase clinical trial, a combination of two antibodies suppressed blood levels of HIV for months after treatment in some people. With further improvement and testing, long-acting antibody combinations may become an alternative to daily drugs.



[Bystanders save lives using defibrillator for cardiac arrest](#)

Experts estimate that each year more than 18,000 Americans have a cardiac arrest in public near witnesses who could potentially administer immediate treatment. A study found that people are more likely to survive a cardiac arrest if a bystander uses an automated external defibrillator while waiting for emergency medical services. The analysis suggests that each year bystanders saved about 1,700 additional lives by using these devices.



[Fecal transplants restore gut microbes after antibiotics](#)

Antibiotics can kill both harmful and helpful bacteria in the digestive tract. That can make people more vulnerable to infections after treatment. Researchers found that they could use a fecal transplant to return beneficial bacteria to people with cancer who received antibiotics for stem cell transplant procedures. The study showed that a person's own gut bacteria can be used to quickly restore a healthy microbiome following intensive antibiotic treatment.



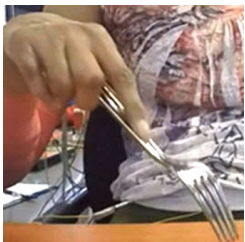
[Factors contributing to higher incidence of diabetes for black Americans](#)

Black adults in the United States are nearly twice as likely as white adults to develop type 2 diabetes. A study found that biological risk factors—including excess weight and too much belly fat—are primarily responsible for higher rates of diabetes for black Americans. The results suggest that making positive changes in known risk factors, like losing excess weight, can help reduce this racial health disparity.



[Daily aspirin shows no benefit for healthy older adults](#)

Studies have found that aspirin can help some people prevent a second heart attack or stroke. Aspirin may also help prevent a first heart attack or stroke in people who are at high risk for these conditions. For healthy older adults, however, a large clinical trial found that a daily low-dose aspirin doesn't prolong life or help prevent heart disease, physical disability, dementia, or stroke.

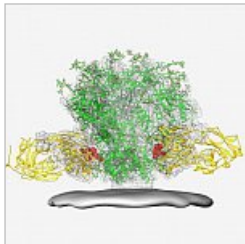


[Spinal cord stimulation improves hand grip after spinal injury](#)

Spinal cord damage can lead to serious disabilities, including paralysis. More than a quarter of a million Americans are now living with spinal cord injuries. A noninvasive treatment helped six people with spinal cord injuries in the neck to improve their hand strength and dexterity. The approach could help expand treatment options for people with these serious injuries.

Promising Medical Advances

Findings with Potential for Enhancing Human Health



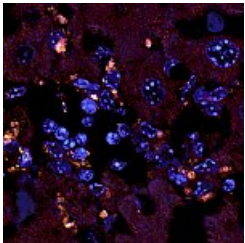
[Test vaccine active against many HIV strains](#)

Researchers haven't been able to create an effective HIV vaccine, in part because there are many different strains of the virus. NIH scientists have been developing a vaccine to target a part of the virus that's thought to be similar across most HIV strains. When tested in animals, this vaccine prompted the immune system to form antibodies that could neutralize dozens of HIV strains. A small study of the test vaccine in people is expected to begin in late 2019.



[Blood test detects several cancer types](#)

Cancer treatment is more likely to be successful when the disease is detected early. Researchers have been working to develop tests that detect bits of tumor material in blood, urine, or saliva. One team developed a blood test that can detect signs of eight common solid tumors. With further development, this type of test could allow for earlier detection and treatment of several types of cancer.



[Gut microbe drives autoimmunity](#)

Scientists found evidence that a certain gut microbe can trigger autoimmune disease in mice that are prone to such disease. The bacteria crossed the gut barrier and moved into the lymph nodes and liver to provoke an autoimmune response. The researchers found the same microbe in liver biopsies from people with autoimmune diseases, but not from healthy liver transplant donors. The results suggest new avenues for treating debilitating and potentially lethal autoimmune diseases.



[Wearable ultrasound patch tracks blood pressure](#)

High blood pressure, or hypertension—a condition that can lead to heart attack, stroke, kidney disease, and other health problems—usually doesn't cause warning symptoms, so many people don't know they have it. A blood pressure test is the only way to detect it. Researchers are engineering a blood pressure sensor that uses ultrasound technology within a flexible skin patch. After further development and testing, the technology may eventually replace other methods of monitoring blood pressure.



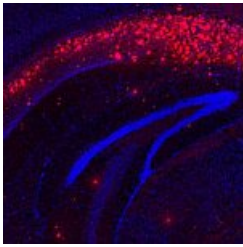
[Appendix linked to toxic Parkinson's protein](#)

In Parkinson's disease, many brain cells contain unusual clumps of the protein alpha-synuclein. These clumps are thought to be toxic to the cells and lead to their death. This protein has also been shown to accumulate in the gut of Parkinson's patients. Researchers discovered that people who'd had their appendix removed had a lower chance of developing Parkinson's disease. The study suggests that the toxic protein buildup that's linked to Parkinson's may begin in the appendix.



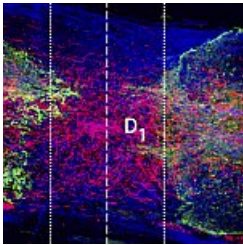
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Turning Discovery Into Health



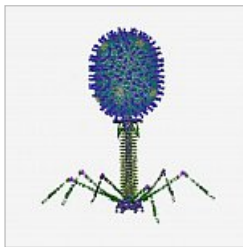
[Impaired brain drainage in aging and Alzheimer's](#)

Vessels that allow waste products to drain out of the brain were only recently discovered. A new study found that these waste-clearing vessels don't work as well in older mice, which leads to waste buildup. When the scientists enhanced vessel drainage in older mice, the animals' cognitive abilities improved. In contrast, disrupting these vessels increased buildup of Alzheimer's disease-related proteins. These results suggest a possible way to combat the cognitive decline seen in aging and age-related diseases.



[Regrowing neurons across scarred spinal tissue](#)

Spinal cord damage can lead to a loss of sensation and paralysis below the injury site. Scientists have long thought that the scar that forms after a spinal cord injury actively prevents the regrowth of damaged neurons, the cells that carry messages to and from the brain. Researchers were able to devise a three-pronged approach to stimulate the growth of neurons across scarred spinal tissue in rodents. The findings could help scientists develop treatments for spinal cord injury.

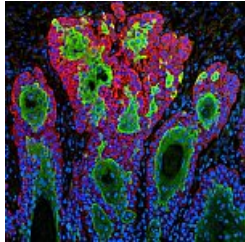


[Vaccine protects animals against anthrax and plague](#)

Certain microbes pose a risk to national security because a terrorist could release them to infect and sicken the public. Researchers developed a way to engineer a vaccine that protected animals from both anthrax and plague, two major bioterrorism agents. After more development and testing, the approach could be used to protect people from these and other diseases that pose a public health threat.

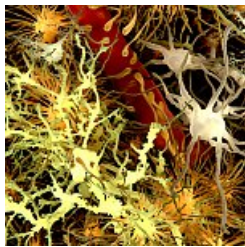
Insights From the Lab

Noteworthy Advances in Basic Research



Understanding Cancer

Using molecular and clinical information from more than 10,000 tumors, researchers finished a [detailed genomic analysis of 33 types of cancer](#). This better understanding of how, where, and why cancer develops could inform the development of novel and more personalized treatment approaches. In another analysis, scientists found that [primary and metastatic tumors within an individual likely rely on the same genetic mutations to grow and spread](#). While this finding needs to be confirmed, it suggests that precision treatments for metastatic cancers could be chosen based on a single tumor sample.



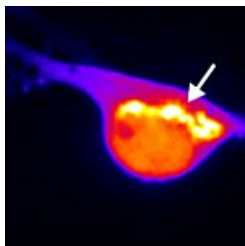
[Senescent cells linked to brain disease in mice](#)

In brain diseases like Alzheimer's and Parkinson's, deposits of certain abnormal proteins accumulate in the brain. These are thought to damage healthy nerve cells, causing them to stop working and die. Previous studies suggest that senescent cells—old or damaged cells that have stopped dividing to produce new cells—may play a role in the protein accumulation. Scientists found that eliminating senescent cells reduced signs of brain disease in mice. The findings may be an important clue for developing treatments.



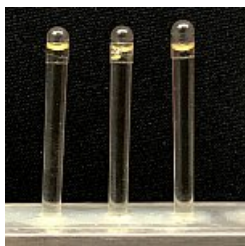
[Human skeletal stem cell identified](#)

Stem cells have the potential to develop into some or many different cell types in the body. Researchers have long been looking for the specific stem cells for bone and cartilage. By labeling and carefully tracking cells, scientists identified a self-renewing human skeletal stem cell. The finding may one day lead to ways to restore bone, cartilage, and supportive tissues for organs.



[How opioid drugs activate receptors](#)

Opioids work by activating specific receptors on nerve cells. Scientists have always assumed that all opioids—whether produced by the body or taken as a drug—interact in the same way with these receptors. But a study found that opioid drugs and the brain's natural opioids differ in how they activate receptors in nerve cells. This difference may help researchers develop better treatments that are less addictive than currently available opioid drugs.



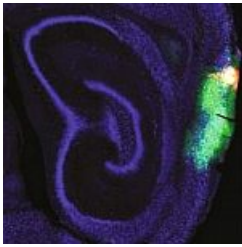
[Protective liquid enables oral insulin delivery in rats](#)

Many people with diabetes need insulin injections several times a day to control their blood sugar levels. Insulin can't be swallowed because the stomach would destroy it. Researchers developed a way to package insulin into capsules that protect it from the stomach. In rats, the capsules lowered blood sugar safely and for an extended time. The approach could lead to development of an oral insulin option for people, which would ease the pain and difficulty of maintaining healthy blood sugar levels.



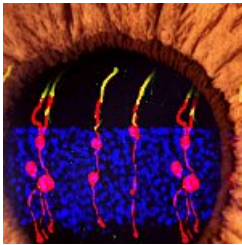
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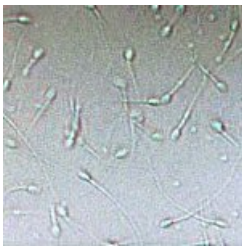
[How the brain keeps track of time](#)

When you remember an event, your brain records information about the time and place where it happened. Such memories can be lost with damage or disease to specific brain regions, as with Alzheimer's disease. Researchers discovered a set of brain cells in a region called the medial entorhinal cortex that keeps track of time in mice. The study suggests that separate circuits in this brain region record information about time and place when forming memories.



[Regenerating light-sensing eye cells in mice](#)

Damage to photoreceptors, the light-sensing cells at the back of the eye, can cause vision loss. These cells don't regenerate on their own in mammals. Researchers were able to restore some vision in mice that were born blind by genetically reprogramming supportive cells in the retina, called Müller glia, into becoming photoreceptors. The findings could help advance the development of regenerative therapies for blinding eye diseases.



[Experimental male contraceptive blocks sperm movement](#)

No safe, reversible, and reliable drug yet exists for a man to take in order to prevent pregnancy. One team is working on a compound that interferes with sperm movement, or motility. The compound successfully inhibited human sperm motility in the laboratory and lowered sperm motility when given to monkeys. With further testing and improvement, the compound could potentially be developed into a reversible male contraceptive.