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Scientists identify foods that fight disease

New research demonstrates benefits of foods, from eggs to coffee, for lowering risk of diabetes, cancer and other diseases

Boston - The foods we eat play a significant role in our health. Scientists are discovering how eggs, nuts, dairy products, vegetables and even coffee can help protect against health problems. Nutrition 2018 will feature the latest research into how adding certain foods to our diet might help lower risk for diabetes, cancer, neurodegenerative diseases and other health issues.

Nutrition 2018 is the inaugural flagship meeting of the American Society for Nutrition held June 9-12, 2018 at the Hynes Convention Center in Boston. Contact the media team for abstracts, images and interviews, or to obtain a free press pass to attend the meeting.

Improving diabetes risk factors

Eggs may reduce diabetes risk factors

Findings from a 12-week randomized study of overweight or obese individuals with pre- or type 2 diabetes suggests that eggs may help reduce risk factors associated with diabetes. Participants who ate an egg each day showed greater improvements in fasting blood sugar levels and insulin resistance than those who ate an egg substitute. Furthermore, eating eggs did not significantly change cholesterol levels. Shirin Pourafshar, University of Virginia, will present this research on Sunday, June 10, from 1-3 p.m. in the Hynes Convention Center, Auditorium (poster 102) (abstract).

Daily pecans might lower cardiometabolic risk factors

After four weeks of eating a small handful (about 1.5 ounces) of whole pecans daily, overweight adults age 45 or older who were otherwise healthy showed favorable changes in cardiometabolic risk factors including blood sugar levels, insulin resistance and insulin-producing cell function, compared to when study participants consumed a diet similar in total fat and fiber but without daily pecans. Additional research is required to determine if a small daily portion of pecans would help lower the risk of cardiovascular disease and type 2 diabetes for middle-aged and older adults who are overweight or obese. Diane L. McKay, Friedman School of Nutrition Science and Policy at Tufts University, will present this research on Monday, June 11 from 3-5 p.m. in the Hynes Convention Center, Room 309 (abstract).

Combating cancer and loss of motor function

Homing in on dairy products that lower colorectal cancer risk

Researchers studying 101,677 people, ages 54 to 83 years, found that not all dairy products are equal when it comes to reducing colorectal cancer risk. Study participants who consumed low-fat or fermented dairy products such as yogurt showed the lowest risk for developing colorectal cancer. Yumie Takata, Oregon State University, will present this research on Monday, June 11, from 1-3 p.m. in the Hynes Convention Center, Hall D (poster 831) (abstract).

Vegetables and berries help reduce Parkinsonism risk

As a follow-up to a study that linked a healthy diet with a reduced risk of Parkinsonism (a group of neurological disorders that cause movement problems similar to those seen in Parkinson's disease), researchers followed 706 people for an average of 4.6 years to find out if consuming fruits and vegetables may be specifically associated with lowered risk. Their analysis revealed that eating more vegetables (especially green leafy vegetables) and berries, but not other fruits, may reduce the risk of Parkinsonism and slow its progression in older adults. Puja Agarwal, Rush University Medical Center will present this research on Sunday, June 10, from 8 a.m.-6 p.m. in the Hynes Convention Center, Auditorium (poster 22) (abstract).

Components of edible mushrooms fight inflammation

An analysis of PPEP-1 and PPEP-2 polysaccharides from the edible mushroom Pleurotus eryngii reveals that these complex

carbohydrates can inhibit induced inflammatory responses. The new results are the first to demonstrate these anti-inflammatory properties and highlight the potential of PPEP-1 and PPEP-2 as dietary supplements to reduce inflammatory responses. Gaoxing Ma, Nanjing Agricultural University; University of Massachusetts, Amherst; will present this research on Tuesday, June 12, from 11:15-11:30 a.m. in the Hynes Convention Center, Room 309 (abstract).

Coffee could be good for the liver

A study of more than 14,000 people, ages 45 to 64, finds that people who drink three or more cups of coffee a day have a lower risk of liver-related hospitalizations than those who never drink coffee. The new findings provide evidence that coffee drinkers may have a lower risk for liver disease. Emily Hu, Johns Hopkins Bloomberg School of Public Health, will present this research on Sunday, June 10, from 1-3 p.m. in the Hynes Convention Center, Auditorium (poster 55) (abstract).

Please note that abstracts presented at Nutrition 2018 were selected by a committee of experts but have not generally undergone a rigorous peer review process such as that required for publication in a scientific journal. As such, the findings presented should be considered preliminary until a peer-reviewed publication is available.

About Nutrition 2018

Nutrition 2018 is the inaugural flagship meeting of the American Society for Nutrition held June 9-12, 2018 at the Hynes Convention Center in Boston. It is the national venue for more than 3,000 top researchers, practitioners and other professionals to announce exciting research findings and explore their implications for practice and policy. Scientific symposia address the latest advances in cellular and physiological nutrition and metabolism, clinical and translational nutrition, global and public health, population science, and food science and systems. http://www.nutrition.org/N18 #Nutrition2018

http://bit.ly/2LU3osB

Bacteriophages offer promising alternative to antibiotics

Positive results from one of the first clinical studies of viruses that kill harmful gut bacteria

Boston (June 10, 2018) - Results from a new clinical study have confirmed the safety and tolerability of using bacteria-specific viruses known as bacteriophages to eliminate disease-causing bacteria in the gut. The new treatment could be used in place of antibiotics to rid the gut of harmful bacteria and promote the growth of beneficial bacteria that are known to enhance gastrointestinal health, immune function and anti-inflammatory processes.

"People taking antibiotics can develop resistance and experience gastrointestinal distress since antibiotics kill both bad and good bacteria in the gut," said study co-investigator, Taylor C. Wallace, Ph.D., principal and CEO of the Think Healthy Group Inc. and an adjunct professor in the Department of Nutrition and Food Studies at George Mason University. "Using viruses that infect only specific types of bacteria spares the many good bacteria in the gut, which are linked to numerous long-term beneficial health outcomes. We have shown for the first time that bacteriophage treatment has no apparent side effects, at least with short-term use."

Wallace will present the results from the Bacteriophage for Gastrointestinal Health (PHAGE) Study -- the first clinical study in the Western hemisphere to provide patients with bacteriophages -- at the American Society for Nutrition annual meeting, Nutrition 2018, held June 9-12, 2018 in Boston.

Bacteriophages can be used to selectively combat specific microorganisms in people without causing any type of infection or disrupting the body's microbiome as a whole. In addition to treating bacteria-related gastrointestinal illnesses, Wallace and study co-investigator Tiffany Weir, Ph.D., of Colorado State University are interested in using bacteriophages as dietary supplements to help restore balance to the bacteria that live in the gut of people with metabolic syndrome, which is known to shift gut bacteria to a more pathogenic and inflammatory state.

The PHAGE study included 31 people who reported significant gastrointestinal distress at the beginning of the study, but who were not diagnosed with any specific gastrointestinal disorder. Study participants were assigned to either a placebo or treatment group for the first four weeks of the study, followed by a two-week washout period and an additional four weeks on the opposite treatment. The treatment group received four bacteriophage strains that specifically eliminate E. coli, a pathogen that can contribute to gastrointestinal irregularities and stomach upset.

The researchers report that study participants tolerated the bacteriophage treatment extremely well, with no adverse events reported during the four weeks of treatment. During the bacteriophage treatment, they observed significant decreases in interleukin 4, an inflammatory marker often associated with allergic response. There were also changes in differential abundance of several other gut bacterial species, including reductions in Clostridium perfringens and increases in several health-promoting bacterial species. Within a small subset of individuals with two or more risk factors for metabolic syndrome, there was also an increase in beneficial Bifidobacterium spp.

The researchers say that bacteriophages might also be useful for eliminating nutritional deficiencies due to chronic diarrhea in developing countries and are seeking larger-scale support to test which strains might be best for this application. Chronic diarrhea and associated malnutrition are the second most common causes of childhood death worldwide.

Taylor C. Wallace will present this research on Sunday, June 10, during the Medical Nutrition: Interventions for the Treatment and Prevention of Nutrition-Related Diseases Session from 3- 5 p.m. in the Hynes Convention Center, Room 206 (abstract). Contact the media team for more information or to obtain a free press pass to attend the meeting.

Please note that abstracts presented at Nutrition 2018 were evaluated and selected by a committee of experts but have not generally undergone the same peer review process required for publication in a scientific journal. As such, the findings presented should be considered preliminary until a peer-reviewed publication is available.

http://bit.ly/2yqflHa

Bacteriophages: Are they an overlooked driver of Parkinson's disease?

Researchers have discovered the role certain bacteriophages may play in the onset of Parkinson's disease

Atlanta, GA - In the first study of its kind, researchers from the New York-based Human Microbiology Institute have discovered the role certain bacteriophages may play in the onset of Parkinson's disease (PD). The research is presented at ASM Microbe, the annual meeting of the American Society for Microbiology, held from June 7th to June 11th in Atlanta, Georgia.

The researchers, led by George, Tetz, M.D., Ph.D., Human Microbiology Institute, showed that the abundance of lytic *Lactococcus* phages was higher in PD patients when compared to healthy individuals. This abundance led to a 10-fold reduction in neurotransmitter-producing *Lactococcus*, suggesting the possible role of phages in neurodegeneration. Comparative analysis of the bacterial component also revealed significant decreases in *Streptococcus* spp. and *Lactobacillus* spp. in PD.

Lactococcus are regulators of gut permeability and are enteric dopamine producers, which plays a primary role in PD. "The depletion of lactococcus due to high numbers of strictly lytic phages in PD patients might be associated with PD development and directly linked to dopamine decrease as well as the development of gastrointestinal symptoms of PD," said Dr. Tetz.

To explore bacterial and bacteriophage community compositions associated with PD, the researchers used shotgun metagenomics sequencing data of fecal microbiome from 32 patients with PD and 28 controls.

The results indicate that the decrease in Lactococci in the PD patients was due to the appearance of strictly lytic, virulent lactococcal phages belonging to the c2-like and 936 groups that are frequently

isolated from dairy products. These results open a discussion on the role of environmental phages and phagobiota composition in health and disease.

"Bacteriophages have previously been overlooked as pathogenic factors, and the study points out their pivotal role in pathogenesis," said Dr. Tetz. Future research is needed to explore bacterial viruses as a diagnostic and treatment target for therapeutic intervention.

http://bit.ly/2LTbMZu

Making mistakes while studying actually helps you learn better

When learning something new, there are instances where trial and error helps rather than hinders, according to recent findings by Baycrest researchers

When learning something new, there are instances where trial and error helps rather than hinders, according to recent findings by Baycrest researchers.

Contrary to popular belief, when a person makes a mistake while learning, it improves their memory for the right information, but only if the error is close to the correct answer, according to a study published in the journal, Memory.

"Our research found evidence that mistakes that are a 'near miss' can help a person learn the information better than if no errors were made at all," says Dr. Nicole Anderson, senior author on the paper and senior scientist at Baycrest's Rotman Research Institute.

"These types of errors can serve as stepping stones to remembering the right answer. But if the error made is a wild guess and out in left field, then a person does not learn the correct information as easily."

These findings could help with improving education for not only younger adults, but also late-life learners.

In one of the studies reported in the paper, researchers recruited 32 young adults with no Spanish background to guess the English definition of certain Spanish words.

The Spanish words selected either resembled an English word with a similar meaning (such as careera, which means degree) or the word looked like an English word, but meant something different (such as carpeta, which resembles carpet, but means folder).

Participants were shown the Spanish words and asked to guess its meaning. Then, they were briefly shown the correct translation, before being shown another Spanish word. After repeating this process with 16 Spanish words, participants had a short break before their memory for the translations was tested.

Researchers found that people were better able to remember the correct translations for Spanish words that were similar to the English word. They had greater difficulty recalling the meaning for words that looked misleading.

"Based on these findings, someone studying for an exam should only take practice quizzes after reviewing the material," says Dr. Anderson, who is also an associate professor of psychology and psychiatry at the University of Toronto.

"If a person takes a practice test and is unfamiliar with the content, they risk making guesses that are nowhere near the right answer. This could make it harder for them to learn the correct information later."

Even if a person makes a mistake while testing themselves, as long as their error is close to the right answer, they're more likely to remember the right information, adds Dr. Anderson.

As next steps, the team is studying the brain activity of people when they make "near miss" and "out in left field" types of errors during learning. Their work strives to uncover how these different mistakes impact a person's brain function when they try to remember the correct information.

This research was supported by the Canadian Institutes of Health Research and York University.

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Ingesting honey after swallowing button battery reduces injury and improves outcomes

CHOP and NCH researchers found household and clinical options for rapidly protecting against caustic effects

Philadelphia, - A team of ear, nose, and throat (ENT) specialists has demonstrated that eating honey after swallowing a button battery has the potential to reduce serious injuries in small children. Based on findings in laboratory animals, the research suggests that this common household product may significantly reduce morbidity and mortality from highly caustic batteries.

"Button batteries are ingested by children more 2,500 times a year in the United States, with more than a 12-fold increase in fatal outcomes in the last decade compared to the prior decade," said Co-Principal Investigator, Ian N. Jacobs, MD, Director of the Center for Pediatric Airway Disorders and a pediatric otolaryngologist at Children's Hospital of Philadelphia (CHOP). "Since serious damage can occur within two hours of ingesting a battery, the interval between ingestion and removal is a critical time to act in order to reduce esophageal injury."

Jacobs collaborated with researchers at CHOP and Co-Principal Investigator, Kris R. Jatana, MD, a pediatric otolaryngologist and Director of Pediatric Otolaryngology Quality Improvement at Nationwide Children's Hospital, in a study published online in The Laryngoscope.

Because of their size, candy-like shape and shiny metallic surface, button batteries have posed a risk for toddlers for decades. When the battery reacts with saliva and tissue of the esophagus, it creates a hydroxide-rich, alkaline solution that essentially dissolves tissue. Children with an esophageal button battery may present with symptoms of sore throat, cough, fever, difficulty swallowing, poor oral intake or noisy breathing. This can cause severe complications like esophageal perforation, vocal cord paralysis and erosion into the airway or major blood vessels. The longer it takes for the battery to be removed, the higher the risk for these children, particularly those without access to hospitals with specialized anesthesiologists and endoscopists experienced in removing foreign objects.

The research team wanted to determine successful interventions for mitigating these injuries in both a home and clinical setting and test their effectiveness in a live animal model, in this case, laboratory pigs. Specifically, the researchers sought palatable, more viscous liquids that could create a protective barrier between the tissue and the battery, as well as neutralize harsh alkaline levels. The team screened various options, including common household beverages such as juices, sodas, and sports drinks, in laboratory experiments.

"We explored a variety of common household and medicinal liquid options, and our study showed that honey and sucralfate demonstrated the most protective effects against button battery injury, making the injuries more localized and superficial," said Jatana. "The findings of our study are going to be put immediately into clinical practice, incorporated into the latest National Capital Poison Center Guidelines for management of button battery ingestions."

Prior published studies by this team had tested weakly acidic liquids like lemon juice as a proof of concept. However, many children do not enjoy drinking lemon juice. By contrast, the sweet taste of honey is much more palatable to young children.

"Our recommendation would be for parents and caregivers to give honey at regular intervals before a child is able to reach a hospital, while clinicians in a hospital setting can use sucralfate before removing the battery," Jacobs said. However, the authors caution against using these substances in children who have a clinical suspicion of existing sepsis or perforation of the esophagus, known severe allergy to honey or sucralfate, or in children less than one-year-old due to a small risk of botulism.

"While future studies could help establish the ideal volume and frequency for each treatment, we believe that these findings serve as a reasonable benchmark for clinical recommendations," Jacobs said. "Safely ingesting any amount of these liquids prior to battery removal is better than doing nothing."

"Button batteries are commonly found in households, and they should always be stored in a secured container, out of reach of children," said Jatana. "Parents and caregivers should check all electronic products in the home and make certain that the battery is enclosed in a compartment that requires a tool to open and periodically check to ensure it stays secure over time."

In addition to his CHOP position, Jacobs is also on the faculty of the Perelman School of Medicine at the University of Pennsylvania. Jatana serves as an Associate Professor of Otolaryngology-Head and Neck Surgery at The Ohio State University College of Medicine. Both Jacobs and Jatana serve in leadership positions within the National Button Battery Task Force, affiliated with the American Academy of Pediatrics and American Broncho-Esophagological Association.

Funding support for this research came from the Children's Hospital of Philadelphia's Frontier Program Grant.

Anfang et al, "pH-neutralizing esophageal irrigations as a novel mitigation strategy for button battery injury," The Laryngoscope, *online June 11, 2018.*

http://bit.ly/2JS9JV2

Volcanic activity, declining ocean oxygen triggered mass extinction of ancient organisms

Millions of years ago volcanoes filled the atmosphere with CO_2, draining the oceans of oxygen and driving a mass extinction of marine organisms

TALLAHASSEE, Fla. -- Global climate change, fueled by skyrocketing levels of atmospheric carbon dioxide, is siphoning oxygen from today's oceans at an alarming pace -- so fast that scientists aren't entirely sure how the planet will respond.

Their only hint? Look to the past.

In a study to be published this week in the journal Proceedings of the National Academy of Sciences, researchers from Florida State University did just that -- and what they found brings into stark relief the disastrous effects a deoxygenated ocean could have on marine life.

Millions of years ago, scientists discovered, powerful volcanoes pumped Earth's atmosphere full of carbon dioxide, draining the oceans of oxygen and driving a mass extinction of marine organisms.

"We want to understand how volcanism, which can be related to modern anthropogenic carbon dioxide release, manifests itself in ocean chemistry and extinction events," said study co-author Jeremy Owens, an assistant professor in FSU's Department of Earth, Ocean and Atmospheric Science. "Could this be a precursor to what we're seeing today with oxygen loss in our oceans? Will we experience something as catastrophic as this mass extinction event?"

For this study, an international team of scientists set out to better understand today's oxygen-deprived oceans by investigating the Toarcian Oceanic Anoxic Event (T-OAE), an interval of global oceanic deoxygenation characterized by a mass extinction of marine organisms that occurred in the Early Jurassic Period.

"We wanted to reconstruct Early Jurassic ocean oxygen levels to better understand the mass extinction and the T-OAE," said Theodore Them, a postdoctoral researcher at FSU who led the study. "We used to think of ocean temperature and acidification as a one-two punch, but more recently we've learned this third variable, oxygen change, is equally important."

By analyzing the thallium isotope composition of ancient rocks from North America and Europe, the team found that ocean oxygen began to deplete well before the defined time interval traditionally ascribed to the T-OAE.

That initial deoxygenation, researchers say, was precipitated by massive episodes of volcanic activity -- a process not altogether unlike the industrial emission of carbon dioxide we're familiar with today.

"Over the past 50 years, we've seen that a significant amount of oxygen has been lost from our modern oceans," Them said. "While the timescales are different, past volcanism and carbon dioxide increases could very well be an analog for present events."

When the atmosphere is suffused with carbon dioxide, global temperatures climb, triggering a cascade of hydrological, biological and chemical events that conspire to sap the oceans of oxygen.

Scientists have found evidence that several hundred thousand years before the T-OAE, volcanoes flooded Earth's atmosphere with carbon dioxide, helping to set in motion the sequence of events that would ultimately result in oceanic deoxygenation and widespread marine life extinction.

While researchers have long surmised a link between volcanism, loss of oxygen and mass extinction, this study provides the first conclusive data.

"As a community, we've suggested that sediments deposited during the T-OAE were indicative of widespread oxygen loss in the oceans, but we've never had the data until now," Them said.

Prehistorical examples of carbon dioxide deluges and suffocating oceanic deoxygenation provide a lesson in how Earth systems respond to a variable climate.

This analysis of the T-OAE, and the onset of deoxygenation that preceded it, is another in a lineage of reports that presage a bleak future for oceans with diminishing levels of oxygen.

"It's extremely important to study these past events," Them said. "It seems that no matter what event we observe in Earth's history, when we see carbon dioxide concentrations increasing rapidly, the result tends to be very similar: a major or mass extinction event. This is another situation where we can unequivocally link widespread oceanic deoxygenation to a mass extinction."

Steps can still be taken to curb oxygen loss in the modern oceans. For example, conserving important wetlands and estuaries -- along with other environments that absorb and store large amounts of carbon dioxide -- could help to blunt the effects of harmful industrial emissions.

But should our oceans' oxygen contents continue to decline at their current rates, future marine organisms could be doomed to the same fate that befell their Jurassic ancestors.

"If you're an oxygen-consuming organism, you don't want to see major changes in marine oxygen levels," Them said. "You either adapt or go extinct."

Measurements for this study were conducted at the FSU-based National High Magnetic Field Laboratory. The research was funded by the National Science Foundation and the National Aeronautic and Space Administration.

http://bit.ly/2MqU68q

Prostate cancer DNA test identifies men with six-fold increased risk

A major new study of more than 140,000 men has identified 63 new genetic variations in the DNA code that increase the risk of prostate cancer.

Researchers devised a new test combining these single letter genetic variants with more than 100 others previously linked to prostate cancer, to predict which men were most at risk of developing the disease during their lifetime.

The test identifies 1 per cent of men who are at highest risk because they have inherited many of these risky variants - and they are nearly six times more likely to develop prostate cancer than the population average.

An international team of researchers led by scientists at The Institute of Cancer Research, London, developed a brand new DNA test to unearth new genetic variants that were particularly hard to find.

Their study is published today (Monday) in the journal Nature Genetics, and was largely funded by the National Cancer Institute in

the US, with additional support from the European Research Council, Cancer Research UK and Prostate Cancer UK.

Scientists at The Institute of Cancer Research (ICR) now believe enough is known about prostate cancer genetics to begin assessing whether testing can benefit patients.

They are planning a trial of a DNA test on saliva samples taken in GP practices, to evaluate whether advice or preventative treatment could reduce cases of prostate cancer among those men found to have the highest inherited risk.

The new study used a new DNA analysis - the 'Oncoarray', to compare more than half a million single-letter changes in the DNA code of nearly 80,000 men with prostate cancer and more than 61,000 men without the disease.

The researchers identified 63 new variants in DNA which when inherited increased a man's risk of prostate cancer. Each individually had only a small effect on risk, but the combined effect of inheriting multiple variants could be dramatic.

The 1 per cent of men at highest risk were 5.7 times more likely than the general population to develop prostate cancer - taking the absolute risk from around one in 11 to one in two.

And the top 10 per cent in the population risk distribution were 2.7 times more likely to develop the disease than the general population - corresponding to a risk of almost one in four.

Interestingly, the researchers found that many of the new genetic variants were found in the region of genes involved in communication between cells of the immune system and other cells in the body.

This implies that genetic errors in immune pathways may be affecting prostate cancer risk, which could have important implications for potential future treatment of prostate cancers with immunotherapies.

Researchers believe that following the new study, they can now account for almost 30 per cent of a man's inherited risk of prostate cancer - which may now be enough to start using the information in practical testing strategies.

Professor Ros Eeles, Professor of Oncogenetics at The Institute of Cancer Research, London, said:

"By looking at the DNA code of tens of thousands of men in more depth than ever before, we have uncovered vital new information about the genetic factors that can predispose someone to prostate cancer, and, crucially, we have shown that information from more than 150 genetic variants can now be combined to provide a readout of a man's inherited risk of prostate cancer.

"If we can tell from testing DNA how likely it is that a man will develop prostate cancer, the next step is to see if we can use that information to help prevent the disease. We now hope to begin a small study in GP practices to establish whether genetic testing using a simple spit test could select high-risk men who might benefit from interventions to identify the disease earlier or even reduce their risk."

Professor Paul Workman, Chief Executive of The Institute of Cancer Research, London, said:

"We have seen dramatic progress in recent years in our understanding of the genetics of prostate cancer, and this new research is another big step forward that tells us more about why some men develop the disease and others don't.

"We are on the cusp of moving from theory to practice - from explaining how genetics affects prostate cancer risk, to testing for genetic risk and attempting to prevent the disease. This study also gives us important information about the causes of prostate cancer and the potential role of the immune system, which could ultimately be employed in the design of new treatments."

http://bit.ly/2tcqlzt

Researchers identify new type of depression

Protein linked with depression shows promise as new drug target

Depression is a mental disorder that affects over 300 million people around the world. While treatments exist, many of them are based on one hypothesis of how depression arises. Patients that do not fit this mold may not be getting benefits. A study led by Hiroshima University (HU), which was published online this May in Neuroscience, shed light on how one protein called RGS8 plays a role in depression behaviors.

Scientists think depression occurs because of the monoamine hypothesis, so named for the type of two chemicals that depressed people lack: serotonin and norepinephrine (NE). Ninety percent of antidepressant drugs are made based on this idea. They aim to recalibrate these two monoamines. For some of these patients, however, it may not be enough.

"Thirty percent of people on these drugs do not experience an effect," Yumiko Saito and Yuki Kobayashi said. Both are neuroscientists in HU's Graduate School of Integrated Arts and Sciences. "Obviously, we need a new drug! We need another explanation for what could cause depression."

This study builds upon previous work in which her team found that RGS8 controls a hormone receptor called MCHR1. Parts of the brain involved with movement and mood regulation show signs of RGS8 expression. MCHR1, when active, helps regulate sleep, feeding, and mood responses. The researchers found that RGS8 inactivates MCHR1 in cultured cells.

Thus, the idea is that less RGS8 means increased depressed behavior. However, this effect had never been examined in a living being. Here Saito's group studied depression in mice in two scopes: at the behavioral level, and at the immunohistological level.

First, the mice did a swim test, which is a common behavioral analysis method to assess depressive behaviors in animals. Researchers measure the time each mouse was active, then subtract it from the total test time, leaving researchers with an immobility time period.

Mice with more RGS8 in their nervous system recorded shorter immobility times than those with a normal amount of RGS8. When given an antidepressant drug that acts on monoamines, though, the RGS8 mice had even shorter immobility times. However, when the mice were given a drug that stops MCHR1 from working, immobility time did not change.

"These mice showed a new type of depression," Saito remarked. "Monoamines appeared to not be involved in this depressive behavior. Instead, MCHR1 was."

With that conclusion, the team looked at the mice's brains under the microscope to determine the relationship between MCHR1 and RGS8. More specifically, they examined the size of cilia sprouting from cells in a region of the hippocampus called the CA1, where RGS8 concentration was highest. Cilia are TV antennae-like organelles involved in cellular communication.

The team found that RGS8 mice not only had less depressed behavior than those without extra RGS8, but they also had longer cilia. That is, mice that took the drug that stopped MCHR1 from working had longer cilia.

In the past ten years, scientists have been seeing that dysfunctional cilia are associated with disorders like obesity, kidney disease and retina disease. Not much is known about their relationship with mood disorders. These findings led Saito's group to think that RGS8 is a promising candidate toward the development of new antidepressant drugs, which is a focus for future experiments.

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How Did a Tick Temporarily Paralyze a Little Girl?

By Rachael Rettner, Senior Writer | June 12, 2018 06:45am ET

A five-year-old girl in Mississippi temporarily lost the ability to walk after she developed "tick paralysis," a rare condition caused by tick bites.

The girl's mother, Jessica Griffin, first noticed something was wrong last Wednesday morning (June 6), when her daughter Kailyn had trouble getting up to go to daycare.

"As soon as her feet hit the floor, she fell," Griffin told local news outlet Mississippi News Now. "She would try to stand and walk but would continue to fall."

At first, Griffin thought her daughter's legs were just asleep. But while brushing Kailyn's hair, Griffin found a tick in her daughter's scalp. Griffin removed the tick and took her daughter to the emergency room, where she was diagnosed with tick paralysis.

Tick paralysis is a rare disease that's thought to be caused by a toxin in tick saliva, according to a 2006 report on the condition from the Centers for Disease Control and Prevention (CDC). Symptoms usually appear about four to seven days after a tick bites a person, and typically go away within 24 hours of tick removal, the CDC said. These symptoms can include an unsteady gait, muscle weakness and eventually, breathing difficulties, according to the National Institutes of Health (NIH). The condition can also lead to flu-like symptoms such as muscles aches and tiredness.

The paralysis is "ascending," which means it starts in the lower body and moves up, the NIH says.

Most previous cases of tick paralysis have been reported in children; typically girls, according to a 2012 report on the condition. Girls often have longer hair than boys, which ticks can attach to and hide in, increasing the risk of tick paralysis, the report said.

Griffin urged parents to check their kids for ticks. Kailyn has now fully recovered and "hasn't slowed down since her feet hit that floor this morning," Griffin posted to Facebook on June 7.

https://theatln.tc/2sY7Uz9

Gossiping Is Good

The surprising virtues of talking behind people's backs

Ben Healy

Christopher DeLorenzo

Word on the street is that gossip is the worst. An Ann Landers advice column once characterized it as "the faceless demon that breaks hearts and ruins careers."

The Talmud describes it as a "three-pronged tongue" that kills three people: the teller, the listener, and the person being gossiped about. And Blaise Pascal observed, not unreasonably, that "if people really knew what others said about them, there would not be four friends left in the world." Convincing as these indictments seem, however, a significant body of research suggests that gossip may in fact be healthy.

It's a good thing, too, since gossip is pretty pervasive. Children tend to be seasoned gossips by the age of 5, [1] and gossip as most researchers understand it—talk between at least two people about absent others—accounts for about two-thirds of conversation. [2] In the 1980s, the journalist Blythe Holbrooke took a stab at bringing rigor to the subject, tongue firmly in cheek, by positing the Law of Inverse Accuracy: $C = (TI)^{\wedge}v - t$, in which the likelihood of gossip being circulated (C) equals its timeliness (T) times its interest (I) to the power of its unverifiability (v) minus the reluctance someone might feel about repeating it out of taste (t). [3]

Despite gossip's dodgy reputation, a surprisingly small share of it—as little as 3 to 4 percent—is actually malicious. [4] And even that portion can bring people together. Researchers at the University of Texas and the University of Oklahoma found that if two people share negative feelings about a third person, they are likely to feel closer to each other than they would if they both felt positively about him or her. [5]

Gossip may even make us better people. A team of Dutch researchers reported that hearing gossip about others made research subjects more reflective; positive gossip inspired self-improvement efforts, and negative gossip made people prouder of themselves. [6] In another study, the worse participants felt upon hearing a piece of negative gossip, the more likely they were to say they had learned a lesson from it. [7] Negative gossip can also have a prosocial effect on those who are gossiped about. Researchers at Stanford and UC Berkeley found that once people were ostracized from a group due to reputed selfishness, they reformed their ways in an attempt to regain the approval of the people they had alienated. [8]

By far the most positive assessment of gossip, though, comes courtesy of the anthropologist and evolutionary psychologist Robin Dunbar. Once upon a time, in Dunbar's account, our primate ancestors bonded through grooming, their mutual back-scratching ensuring mutual self-defense in the event of attack by predators. But as hominids grew more intelligent and more social, their groups became too large to unite by grooming alone. That's where language—and gossip, broadly defined—stepped in. [9] Dunbar argues that idle chatter with and about others gave early humans a sense of shared identity and helped them grow more aware of their environment, thus incubating the complex higher functioning that would ultimately yield such glories of civilization as the Talmud, Pascal, and Ann Landers.

So the next time you're tempted to dish the dirt, fear not—you may actually be promoting cooperation, boosting others' self-esteem, and performing the essential task of the human family. That's what I heard, anyway.

The Studies:

[1] Engelmann et al., "Pre-schoolers Affect Others' Reputations Through Prosocial Gossip" (British Journal of Developmental Psychology, Sept. 2016)

[2] Nicholas Emler, "Gossip, Reputation, and Social Adaptation," in Good Gossip (University Press of Kansas, 1994)

[3] Blythe Holbrooke, Gossip (St. Martin's, 1983)

[4] Dunbar et al., "Human Conversational Behavior" (Human Nature, Sept. 1997)

[5] Bosson et al., "Interpersonal Chemistry Through Negativity" (Personal Relationships, June 2006)

[6] Martinescu et al., "Tell Me the Gossip" (Personality and Social Psychology Bulletin, Dec. 2014)

[7] Baumeister et al., "Gossip as Cultural Learning" (Review of General Psychology, June 2004)

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[9] Robin Dunbar, Grooming, Gossip, and the Evolution of Language (Harvard University Press, 1998)

http://bit.ly/2JRBaOw

One-third of US adults may unknowingly use medications that can cause depression

Polypharmacy on the rise

A new study from University of Illinois at Chicago researchers suggests that more than one-third of U.S. adults may be using prescription medications that have the potential to cause depression or increase the risk of suicide, and that because these medications are common and often have nothing to do with depression, patients and health care providers may be unaware of the risk.

The researchers retrospectively analyzed medication use patterns of more than 26,000 adults from 2005 to 2014, which were collected as part of the National Health and Nutrition Examination Survey.

They found that more than 200 commonly used prescription drugs -- including hormonal birth control medications, blood pressure and

heart medications, proton pump inhibitors, antacids and painkillers -- have depression or suicide listed as potential side effects.

Published in the Journal of the American Medical Association, the study is the first to demonstrate that these drugs were often used concurrently and that concurrent use, called polypharmacy, was associated with a greater likelihood of experiencing depression. Approximately 15 percent of adults who simultaneously used three or more of these medications experienced depression while taking the drugs, compared with just 5 percent for those not using any of the drugs, 7 percent for those using one medication and 9 percent for those taking two drugs simultaneously.

The researchers observed similar results for drugs that listed suicide as a potential side effect. These findings persisted when the researchers excluded anyone using psychotropic medications, considered an indicator of underlying depression unrelated to medication use.

"The take away message of this study is that polypharmacy can lead to depressive symptoms and that patients and health care providers need to be aware of the risk of depression that comes with all kinds of common prescription drugs -- many of which are also available over the counter," said lead author Dima Qato, assistant professor of pharmacy systems, outcomes and policy in the UIC College of Pharmacy.

"Many may be surprised to learn that their medications, despite having nothing to do with mood or anxiety or any other condition normally associated with depression, can increase their risk of experiencing depressive symptoms, and may lead to a depression diagnosis."

Qato notes that the study also shows an important trend of increasing polypharmacy for medications with depression, particularly suicidal symptoms, as a potential adverse effect. This makes the need for awareness of depression as a potential side effect even more pressing.

The researchers found use of any prescription medication with a potential depression adverse effect increased from 35 percent in the 2005 to 2006 period to 38 percent in the 2013 to 2014 period. Approximate use of antacids with potential depression adverse effects, like proton pump inhibitors and H2 antagonists, increased from 5 percent to 10 percent in the same period. Use of three or more drugs concurrently increased from 7 percent to 10 percent, approximately.

For prescription drugs with suicide listed as a potential side effect, usage increased from 17 percent to 24 percent, and use of three or more drugs concurrently increased from 2 percent to 3 percent.

"People are not only increasingly using these medicines alone, but are increasingly using them simultaneously, yet very few of these drugs have warning labels, so until we have public or system-level solutions, it is left up to patients and health care professionals to be aware of the risks," Qato said.

Qato says that solutions worth further study may include updating drug safety software to recognize depression as a potential drug-drug interaction, so that health care professionals, including pharmacists, are more likely to notice if a patient is using multiple medications that may increase risk.

Or, including evaluation of medication use in the depression screening and diagnostic tools used by doctors and nurses and recommended by the U.S. Preventive Services Task Force, especially when it comes to persistent or treatment-resistant depression.

"With depression as one of the leading causes of disability and increasing national suicide rates, we need to think innovatively about depression as a public health issue, and this study provides evidence that patterns of medication use should be considered in strategies that seek to eliminate, reduce or minimize the impact of depression in our daily lives," Qato said.

Co-authors on the study are Katharine Ozenberger of UIC and Columbia University's Mark Olfson. Qato and Olfson both noted financial disclosures potentially relevant to the study.

http://bit.ly/2teIqqd

Researchers map brain of blind patient who can see motion

Neuroscientists at Western University's Brain and Mind Institute, have confirmed and detailed a rare case of a blind woman able to see objects - but only if in motion.

A team led by neuropsychologist Jody Culham has conducted the most extensive analysis and brain mapping to date of a blind patient, to help understand the remarkable vision of a 48-year-old Scottish woman, Milena Canning.

Canning lost her sight 18 years ago after a respiratory infection and series of strokes. Months after emerging blind from an eight-week coma, she was surprised to see the glint of a sparkly gift bag, like a flash of green lightning.

Then she began to perceive, sporadically, other moving things: her daughter's ponytail bobbing when she walked, but not her daughter's face; rain dripping down a window, but nothing beyond the glass; and water swirling down a drain, but not a tub already full with water.

Glaswegian ophthalmologist Gordon Dutton referred Canning to the Brain and Mind Institute in London, Canada, where tests by Culham's team included functional Magnetic Resonance Imaging (fMRI) to examine the real-time structure and workings of her brain.

They determined Canning has a rare phenomenon called Riddoch syndrome - in which a blind person can consciously see an object if moving but not if stationary.

"She is missing a piece of brain tissue about the size of an apple at the back of her brain - almost her entire occipital lobes, which process vision," says Culham, a professor in the Department of Psychology and Graduate Program in Neuroscience.

"In Milena's case, we think the 'super-highway' for the visual system reached a dead end. But rather than shutting down her whole visual system, she developed some 'back roads' that could bypass the superhighway to bring some vision - especially motion - to other parts of the brain."

In essence, Canning's brain is taking unexpected, unconventional detours around damaged pathways.

During the study, Canning was able to recognize the motion, direction, size and speed of balls rolled towards her; and to command her hand to open, intercept and grab them at exactly the right time. She could navigate around chairs.

Yet she inconsistently identified an object's colour, and was able only half the time to detect whether someone's hand in front of her showed thumb-up or thumb-down.

"This work may be the richest characterization ever conducted of a single patient's visual system," says Culham. "She has shown this very profound recovery of vision, based on her perception of motion."

The research shows the remarkable plasticity of the human brain in finding work-arounds after catastrophic injuries. And it suggests conventional definitions of 'sight' and 'blindness' are fuzzier than previously believed.

"Patients like Milena give us a sense of what is possible and, even more importantly, they give us a sense of what visual and cognitive functions go together," Culham says.

For Canning, the research at BMI helps explain more about what she perceives and how her brain is continuing to change. She is able to navigate around chairs, can see a bright-shirted soccer goalie and can see steam rising from her morning cup of coffee, for example.

"I can't see like normal people see or like I used to see. The things I'm seeing are really strange. There is something happening and my brain is trying to rewire itself or trying different pathways," Canning says.

The research is newly published in the journal Neuropsychologia.

http://bit.ly/2MzjMQu

Call to factor gender into Alzheimer's research

Women and men are affected differently by the disease, a reality often overlooked in the research. Paul Biegler reports.

In 2005, the *New York Times* ran a story that caused an extra frisson of fear in roughly 48% of its readers. It reported a study that found regular aspirin did not prevent a first heart attack in women under 65, as it did in men.

The finding, since confirmed in a number of studies, was something of a touchstone in the increasing push to include sex as a variable in research design, now mandated by the US National Institutes of Health and the European Commission.

A new paper from the Society for Women's Health Research in Washington DC in the US, however, suggests that when it comes to Alzheimer's research, we have a bit of catching up to do.

"A growing body of research shows us that Alzheimer's disease differs between women and men," says Pauline Maki from the University of Illinois at Chicago, a co-author on the paper, which is published in the journal *Alzheimer's & Dementia*.

Some of those differences place women at a striking disadvantage from the disease, which blights more than 5.5 million Americans over 65 with memory loss, muddled thinking and social withdrawal. Scan a city sidewalk and around 10 to 15% of folk will be carrying a version of the Apolipoprotein E (APOE) gene known as E4. That genetic tweak puts people at higher risk of depositing a protein in the brain called amyloid beta, the main component of the plaques found in Alzheimer's. If you're a woman aged between 65 and 75 with the E4 variant, your risk of Alzheimer's is four times higher than the menfolk. The reason isn't known.

The APOE4 gene also rears its head in the conflicting literature on hormone replacement therapy (HRT). Some studies suggest that starting HRT soon after menopause protects against cognitive decline, while others find no such effect. Critically, the authors note, one recent study found women with the E4 variant who got oestrogen replacement had fewer amyloid deposits on brain scans.

That's probably good because, in another confounding result, for any given degree of pathological brain change, a woman's risk of getting the symptoms of Alzheimer's is more than six-fold that of men. As with the preceding findings, the reasons remain maddeningly unclear.

The gender disparity doesn't end there. Once women get Alzheimer's they decline more quickly than men.

On this there is at least a theory. Women rate better than blokes on verbal memory across their lifespan. That means women can start slipping yet still perform adequately on memory screening tests. This masks the disease, which gets diagnosed later, hampering prevention efforts and leading to faster deterioration.

The upshot, say the authors, is that sex-specific screening tests should be well and truly on the agenda.

Nearly two-thirds of Alzheimer's sufferers are women, a fact partially explained by age being a risk factor for the disease, and women living longer. But longevity does not fully explain the gender difference and it is time, say the authors, for researchers to step up to the plate and fill the knowledge gap.

Among a raft of recommendations, they call for gender to be included in the massive data-crunching exercises of precision medicine, to re-examine past dementia studies for differential effects between men and women.

“To improve the diagnosis of the disease and to speed the development of new treatments and interventions, we must better understand how the biological and sociocultural differences between women and men are influencing the development, progression, and treatment of Alzheimer’s,” said Maki. The article comes as the Australian Government releases its own progress report on the $200 million Boosting Dementia Research Initiative. Among a range of innovative Alzheimer’s treatments being researched are ultrasound, music therapy and the effects of reducing iron levels in the blood. The mainstay of treatment for Alzheimer’s continues, however, to be drug therapy. There is no known cure.

http://bit.ly/2JMcKtO

Inequality: My unfair disadvantage, not your unearned privilege

Professor Ashleigh Shelby Rosette studies framing of inequity

DURHAM, N.C. -- Efforts to address social inequalities in income, education and employment opportunity can be boosted simply by the manner in which that inequity is presented, according to new research from Duke University's Fuqua School of Business.

If you benefit from an inequity, how you handle the situation could depend upon how it is described to you, Professor Ashleigh Shelby Rosette found.

Her study tested people's willingness to surrender part of a bonus at work as a way of studying the presentation of an unjust imbalance or inequity. "The manner in which you frame inequity or privilege, whether it's focused on the self - my unearned privilege -- or focused on the other - his or her unfair disadvantage - can influence the extent to which you want to rectify it," Rosette said.

"When attempting to influence individuals who are in a position to help rectify financial and social inequity, the way in which you phrase it makes a difference," Rosette said.

Previous research had found framing inequity as a group advantage made members of the group more likely to support efforts to address the inequity. But Rosette found the opposite is true for individuals.

"We show that at the individual level, when you tell a person that what they have received is unearned," Rosette said, "it triggers self-serving biases and they become less likely to rectify the inequity."

The study, Framing advantageous inequity with a focus on others: A catalyst for equity restoration, is newly published in the Journal of Experimental Social Psychology. Rosette worked with Christy Zhou Koval of Hong Kong University, who received her Ph.D at Fuqua.

The researchers asked 199 white participants to imagine they were sales associates who were to receive a performance bonus. They were told an audit had found company policy had assigned sales opportunities unfairly based on race. Then they were given the opportunity to share some or all of their bonus.

Participants who were told a specific black colleague had been unfairly disadvantaged by the policy were willing to give up more of the bonus than those told they had been given an unfair advantage because they were white. They also gave up more than the participants who were told that all white personnel were undeservedly advantaged, or that all black employees were unfairly disadvantaged. A second study replicated the results.

"When we frame inequity as a person's undeserved privilege, that person tends to justify their status by talking down the other party, describing the colleague as lazy or incompetent. This disparagement then justifies their decision not to share their rewards even though they were unfairly distributed in the first place." Rosette said. "Simply by changing the framing and presenting inequity as another person's undeserved disadvantage, we find people are more interested in addressing it and are less likely to blame the other person."

The findings suggest that understanding how people think about the disadvantages of others may be just as important as understanding how people think about their own advantages - especially when the goal is to encourage behaviors and policies to redress the imbalance. "It's two sides of the same coin," Rosette said. "How you look at it determines whether you are willing to address inequity. Our findings suggest the focus should be on the disadvantages bestowed upon the other person, rather than the unearned privileges that accumulate to the self."

CITATION: "Framing advantageous inequity with a focus on others: A catalyst for equity restoration," Ashleigh Shelby Rosette and Christy Zhou Koval. Journal of Experimental Social Psychology, *May 2018. DOI: https://doi.org/10.1016/j.jesp.2018.03.002*

http://bit.ly/2LYMPvM

Seawater yields first grams of yellowcake

Yarn-like material collects largest amount of uranium to date

SEQUIM, Wash. -- For the first time, researchers at Pacific Northwest National Laboratory and LCW Supercritical Technologies have created five grams of yellowcake -- a powdered form of uranium used to produce fuel for nuclear power production -- using acrylic fibers to extract it from seawater.

This first gram of yellowcake was produced from uranium captured from seawater with modified yarn. Chien Wai and colleagues at LCW Supercritical Technologies produced the yellowcake, a powdered form of uranium used to produce fuel for nuclear power production. **LCW Supercritical Technologies**

"This is a significant milestone," said Gary Gill, a researcher at PNNL, a Department of Energy national laboratory, and the only one with a marine research facility, located in Sequim, Wash. "It indicates that this approach can eventually provide commercially attractive nuclear fuel derived from the oceans -- the largest source of uranium on earth."

That's where LCW, a Moscow, Idaho clean energy company comes in. LCW with early support from PNNL through DOE's Office of Nuclear Energy, developed an acrylic fiber which attracts and holds on to dissolved uranium naturally present in ocean water.

"We have chemically modified regular, inexpensive yarn, to convert it into an adsorbent which is selective for uranium, efficient and reusable," said Chien Wai, president of LCW Supercritical Technologies. "PNNL's capabilities in evaluating and testing the material, have been invaluable in moving this technology forward."

Wai is a former University of Idaho professor who, along with colleague Horng-Bin Pan, was involved in earlier DOE-funded research to develop materials in order to increase domestic availability of uranium, which is mostly imported into the U.S. currently.

Wai founded LCW and, with funding from the Small Business Innovation Research program, worked out a new approach to adsorb the uranium onto a molecule or ligand that is chemically bound to the acrylic fiber. The result is a wavy looking polymer adsorbent that can be deployed in a marine environment, is durable and reusable.

The adsorbent material is inexpensive, according to Wai. In fact, he said, even waste yarn can be used to create the polymer fiber. The adsorbent properties of the material are reversible, and the captured uranium is easily released to be processed into yellowcake. An analysis of the technology suggests that it could be competitive with the cost of uranium produced through land-based mining.

PNNL researchers have conducted three separate tests of the adsorbent's performance to date by exposing it to large volumes of seawater from Sequim Bay next to its Marine Sciences Laboratory. The water was pumped into a tank about the size of a large hot tub.

"For each test, we put about two pounds of the fiber into the tank for about one month and pumped the seawater through quickly, to mimic conditions in the open ocean" said Gill. "LCW then extracted the uranium from the adsorbent and, from these first three tests, we got about five grams -- about what a nickel weighs. It might not sound like much, but it can really add up."

Gill notes that seawater contains about three parts per billion of uranium. It's estimated that there is at least four billion tons of uranium in seawater, which is about 500 times the amount of uranium known to exist in land-based ores, which must be mined.

Mining of underground uranium has environmental challenges not encountered with extracting it from the oceans. And Wai says the fibers, which have affinity for more heavy metals than just uranium, can likely be used one day to clean up toxic waterways themselves. He says the fibers have potential to extract vanadium, an expensive metal used in large scale batteries, from the oceans instead of mining it from the ground.

For now, based on the successful scaled-up testing in Sequim and significant production of yellowcake, LCW is applying for further SBIR funding for a uranium extraction field demonstration, to be led by PNNL, in the Gulf of Mexico, where the water is much warmer. The material performs much better in warmer water and extraction rates in the Gulf are expected to be three to five times higher, therefore making it more economical to obtain uranium from seawater.

The adsorbent technology is in the process of being licensed to LCW.

http://bit.ly/2JTZdQa

'Gut instinct' may have been the GPS of human ancestors

Researchers say the findings point to a need to further examine whether bariatric treatments and surgeries for obesity may adversely affect memory

Ask anyone if they remember where they ate the juiciest burger, the sweetest cupcake or the smoothest bisque, and they probably can describe the location in great detail, down to the cross streets, the décor, and the table where they sat. A new USC study in *Nature Communications* gives a possible explanation for food's prominence in memory.

The body's longest nerve, the vagus nerve, is the autobahn between what scientists have referred to as the "two brains" -- the one in your head and the other in your gastrointestinal tract. The nerve is key for telling you the tank is full and to put the fork down because it helps transmit biochemical signals from the stomach to the most primitive part of the brain, the brainstem.

But in this animal study, researchers may have found a greater purpose behind this complex circuitry involving the vagus nerve. This "gut-brain axis" may help you remember where you ate by directing signals to another part of the brain, the hippocampus, the memory center.

Following our stomach

The scientists believe that this gut instinct, this connection between spatial awareness and food, is likely a neurobiological mechanism that dates back ages to when the definition of fast food was a herd of deer running away from the nomadic hunters who tracked them.

Back then especially, it would be critical for the gut to work with the brain like a Waze or Google Maps navigation app, said Scott Kanoski, an assistant professor of biological sciences at USC Dornsife and corresponding author of the paper. Those wandering early humans could remember a site where they had found and collected food and return repeatedly for more.

"When animals find and eat a meal, for instance, the vagus nerve is activated and this global positioning system is engaged," Kanoski said. "It would be advantageous for an animal to remember their external environment so that they could have food again."

The study was published on June 5.

Disruption disorients the internal compass

To examine this gut-brain connection, the research team conducted the study on rats. They saw that rats with their gut-brain vagus nerve pathway disconnected could not remember information about their environment. "We saw impairments in hippocampal-dependent memory when we cut off the communication between the gut and the brain," said lead author Andrea Suarez, a PhD candidate in biological sciences. "These memory deficits were coupled with harmful neurobiological outcomes in the hippocampus."

Specifically, the disconnected pathway affected markers in the brain that are key for the growth of new neural connections and new brain cells. However, it did not appear to affect the rats' anxiety levels or their weight, the scientists noted.

The scientists wrote that their findings may raise an important and timely medical question that merits further exploration: Could bariatric surgeries or other therapies that block gut-to-brain signaling affect memory?

The study was supported by a National Institutes of Health grant to Kanoski (DK104897) and to study co-author Guillame de Lartigue at Yale University (DK094871).

Other co-authors were Ted M. Hsu, Clarissa M. Liu, Emily Noble, Alyssa Cortella, Emily Nakamoto, and Joel Hahn, all in biological sciences at USC Dornsife.

http://bit.ly/2JOI4Ee

Why we make blood cells in our bones

Zebrafish help solve an evolutionary puzzle, and may help make blood stem cell transplants safer

In humans and other mammals, the stem cells that give rise to all blood cells are located in the bone. But in fish, blood stem cells are found in the kidney. Since the late 1970s, when biologists first realized that blood develops in a specific location in the body -- the 'blood stem cell niche' -- they have wondered why different creatures have evolved to carry out this function in different locations.

Forty years later, scientists have found a valuable clue: the niche evolved to protect blood stem cells from the harmful ultraviolet (UV) rays in sunlight.

The findings are published in Nature by researchers at the Harvard Department of Stem Cell and Regenerative Biology, Boston Children's Hospital's Stem Cell Program, and the Harvard Stem Cell Institute. This new piece of the 'blood stem cell niche' puzzle will help the team improve the safety of blood stem cell transplants.

A parasol above the kidney

The inspiration for this study came from an incidental observation in the zebrafish, an animal model used in many laboratories.

"I was trying to look at blood stem cells under the microscope, but a layer of melanocytes above the kidney blocked my view," said Friedrich Kapp, M.D., now at the Center for Pediatrics, University of Freiburg Medical Center in Germany. Melanocytes are cells that produce melanin, the pigment responsible for the color of human skin.

"The shape of the melanocytes above the kidney reminded me of a parasol, so I thought, do they provide UV protection to blood stem cells?" said Kapp.

So Kapp exposed normal zebrafish and mutant zebrafish lacking melanocytes to UV radiation. Sure enough, the number of blood stem cells decreased in the mutants.

Moreover, the normal zebrafish lost blood stem cells when they were turned upside down and irradiated. This confirmed that the melanocyte umbrella was physically shielding the kidney from the rays above.

From water to land

After showing that melanocytes protect blood stem cells from UV radiation, the researchers searched the evolutionary 'tree of life' to find similarities. They found that melanocytes have been surrounding the blood stem cell niche for a long time -- even in a fish

species that separated from the rest of the vertebrate family trees around 500 million years ago.

Looking at more recent evolution, toward land animals, the researchers zoomed in on a type of poison dart frog. When the tadpoles grew legs, the blood stem cells moved from the melanocyte-covered kidney to the bone marrow. The researchers noticed that during all its developmental stages, the frog's blood stem cell niche was protected from UV light.

Understanding the blood stem cell niche

"We now have evidence that sunlight is an evolutionary driver of the blood stem cell niche," said Leonard Zon, M.D., senior author of the study. Zon is a Harvard professor of stem cell and regenerative biology, the Grousbeck Professor of Pediatrics at Boston Children's Hospital, and a Howard Hughes Medical Institute Investigator.

Zon will continue to study the blood stem cell niche by defining the biological signaling pathways that govern the interactions between melanocytes and blood stem cells.

A better understanding of the niche is important for blood stem cell transplants, where it is critical for transplanted cells to find a new, safe home in the body.

"As a hematologist and oncologist, I treat patients with blood diseases and cancers," said Zon. "Once we understand the niche better, we can make blood stem cell transplants much safer."

http://bit.ly/2HVCKNF

Science Says: What happens when researchers make mistakes

Everyone makes mistakes, but when scientists do, the remedy goes far beyond saying you're sorry.

June 13, 2018 by Marilynn Marchione

Two fresh examples show how some journals and universities react when the need arises to set the record straight.

On Wednesday, the *New England Journal of Medicine* retracted and republished a landmark study on the Mediterranean diet, and issued an unprecedented five other corrections after an obscure report last year scrutinized thousands of articles in eight journals over more than a decade and questioned some methods.

Separately, Cornell University said it was investigating "a wide range of allegations of research misconduct" raised against a prominent food marketing faculty member. The New England Journal's review did not alter any conclusions and should raise public trust in science, not erode it, said its top editor, Dr. Jeffrey Drazen.

"When we discover a problem we work very hard to get to the bottom of it," he said. "There's no fraud here as far as we can tell. But we needed to correct the record."

How common are errors?

"Retractions are definitely on the rise" and there are 10 times as many corrections as retractions, said Dr. Ivan Oransky, a health journalism professor at New York University and co-founder of Retraction Watch, a website that tracks errors in science journals.

But they're still pretty rare. About 1,350 papers were retracted in 2016 out of 2 million published—less than a tenth of a percent, but up from 36 out of 1 million in 2000, he said.

"The main reason they're up is that people are looking," and the internet makes it easier with tools to detect plagiarism and manipulated images, Oransky said.

Studies are often the main source of evidence that guides doctors' decision-making and patient care, and that's why journals are so meticulous when that evidence is called into question.

Anatomy Of A Mistake

Here's what happened at the New England Journal.

Many experiments randomly assign people to different groups to compare one treatment to another. The groups should be similar on height, weight, age and other factors, and statistical tests can suggest

whether the distribution of these traits is implausible, compromising any results.

Dr. John Carlisle of Torbay Hospital in England used one such test to scrutinize thousands of studies from 2000 through 2015 including 934 in the New England Journal and flagged 11 as suspicious.

The journal contacted each author and "within a week we resolved 10 of the 11 cases," Drazen said. In five, Carlisle was wrong. Five others were terminology errors by the authors—Wednesday's corrections.

The last was the diet study on 7,500 people in Spain, which established that eating lots of fish, vegetables, olive oil and nuts could slash heart risks by 30 percent—front-page news everywhere. Researchers dug through records and discovered that one study site had not followed procedures—if one person in a household joined the study, others such as a spouse also were allowed in. That makes the group assignments not truly random. When results were re-analyzed without those folks, the bottom line remained the same, and the journal is now publishing both versions.

"I've been impressed" with the response, Carlisle said.

His analysis also covered 518 studies in the *Journal of the American Medical Association*, but *JAMA* has not done a systematic review, said its top editor, Dr. Howard Bauchner. Instead, the journal asks authors to respond if concerns are raised about specific articles and publishes those as they arise.

Food Articles Under A Cloud

Last week, *JAMA* published an "expression of concern " about six articles by Brian Wansink, head of the Cornell Food and Brand Lab, "to alert the scientific community to the ongoing concerns about the validity of these publications" and ask Cornell to do an independent evaluation.

Wansink has had seven papers retracted (one twice), 15 corrections and now this expression of concern, Oransky said.

Wansink said in an email that he has been working with co-authors in France, Israel and the Netherlands "to locate the original data sets and reanalyze and the data in the papers," and that materials will be independently analyzed by Cornell and reported back to the journal.

Cornell's statement says a committee of faculty members has been investigating allegations against Wansink since last fall and working with federal agencies that sponsor research.

"The assertions being made by outside researchers and the retraction of multiple papers from academic journals by the Food and Brand Lab are concerning. Our silence on this matter to date should in no way be construed as a disregard for the seriousness of the claims being raised nor as an abdication of our obligation to explore them."

http://bit.ly/2JUI09p

Parents see cancer prevention potential as best reason for HPV vaccination

Study evaluated physicians' messages on why vaccination is important

Bottom Line: Parents of adolescents believed that the potential to prevent certain types of cancer is the best reason for their children to receive the human papillomavirus (HPV) vaccine, whereas other reasons health care providers often give were far less persuasive.

Journal in Which the Study was Published: *Cancer Epidemiology, Biomarkers & Prevention*, a journal of the American Association for Cancer Research.

Author: Melissa B. Gilkey, PhD, assistant professor of Health Behavior at the University of North Carolina Gillings School of Global Public Health in Chapel Hill.

Background: "HPV causes over 40,000 cancers in the U.S. each year, including cancers of the cervix, vagina, vulva, penis, anus, and back of the throat. Most of these cases are potentially preventable through HPV vaccination," Gilkey said.

The Centers for Disease Control and Prevention (CDC) currently recommends that boys and girls receive two doses of the HPV vaccine, beginning at age 11 or 12. As of 2016, about 60 percent of teenagers had received the first dose, but only about 43 percent were up to date on all recommended doses, according to the CDC.

"We still have work to do on improving the timeliness of those doses and on reaching the remaining 40 percent of young people who have not started HPV vaccination," Gilkey said. "To increase uptake, we need to more effectively communicate the value of HPV vaccination to parents."

How the Study Was Conducted: In this study, Gilkey and colleagues developed a best-worst scaling experiment to evaluate 11 reasons health care providers typically give for HPV vaccination. The experiment was administered in 2016 via a national, online survey of 1,177 parents of adolescents ages 11-17. Fifty-seven percent of the parents had initiated HPV vaccination.

Results: Parents said "it can prevent some types of cancer" was the best reason to get the HPV vaccination. Parents also felt that "it can prevent a common infection;" "it has lasting benefits;" and "it is a safe vaccine" were persuasive reasons.

Parents said the worst reasons providers could give included "it is a scientific breakthrough;" "I got it for my own child;" and "your child is due for it."

Messages ranked in the middle were "it works best at this age;" "it should be given before sexual contact;" "getting it on time may mean fewer shots;" and "I think it is important."

The researchers used stratified analyses to evaluate whether the parents' opinions would vary depending on their overall confidence in vaccines. Gilkey said she was surprised to discover that vaccine confidence did not appear to significantly affect parents' perceptions of physicians' messages, and cancer prevention was the most effective message for both groups.

Author's Comments: The study augments previous research that suggested the way in which physicians discuss the HPV vaccine may affect parents' decisions on whether to have their children get the vaccine.

"Our prior research indicates that providers give many different reasons for HPV vaccination, and the findings of this study suggest that they may do better to streamline their communication," Gilkey said. "Cancer prevention is likely to be your best bet no matter who you're talking to."

"Cancer prevention was clearly the most convincing reason for HPV vaccination. Reasons that have to do with sexual activity, scientific novelty, or providers' decisions for their own children may ultimately be distractions that are best avoided," she continued.

Study Limitations: Gilkey pointed out that the study evaluated parents' perceptions about what would motivate them to vaccinate their children, and may not fully reflect real-life conversations during an office visit. Also, because the reasons were ranked, those that were ranked lower may have been less persuasive than the top-ranked messages, but are not objectively "bad" messages to use in discussing HPV vaccination, she said.

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http://bit.ly/2MxGf0f

New discovery about the brain's water system may prove beneficial in stroke

Revealing how water is transported to the brain

The brain rests in a fluid, which among other things protects it from concussions. Scientists have known this for centuries.

Every day around half a litre of water is transported from the blood to the brain through a thin tissue called plexus choroideus. But exactly how this is done has so far been quite a mystery.

In a new study published in Nature Communications researchers at the University of Copenhagen have proven for the first time on mice models that the transport is not controlled by osmosis, as many used to believe.

Instead water is primarily transported to the brain via a so-called co-transporter, which moves a certain amount of water when ions are transported across the tissue plexus choroideus.

'It is brand new knowledge on a very important physiological process involving the by far most complex organ in the human body, namely the brain. If we are able to target this ion and water transporter with medicine, it would affect a number of disorders involving increased intracranial pressure, including brain haemorrhage, blood clots in the brain and hydrocephalus', says Associate Professor at the Department of Neuroscience Nanna MacAulay.

Severe Consequences of Increased Pressure

The researchers have examined the tissue plexus choroideus in mice and tested whether water can be moved through the tissue even though the conditions required for osmotic water transport are missing. This turned out to be the case; a different process thus had to be responsible for the water transport.

They then did tests on live mice to see how fast brain fluid is produced when possible water transporters are inhibited. This revealed that the co-transporter in question is responsible for half of all fluid production for the brain cavity and is thus the main water transporter in this tissue.

'Of course, it would be ground-breaking if we were able to use this mechanism as a target for medical treatment and turn down the inflow of water to the brain to reduce intracranial pressure.

There are no effective medical treatments for a lot of disorders involving increased intracranial pressure. And at worst, the patient may suffer permanent damage and even die as a result of increased pressure. Therefore, this basic mechanism is an important find to us', says Nanna MacAulay.

The researchers stress that the structure of the responsible proteins is the same in mice as in the human cell membrane in plexus chorideus. Therefore, they expect to find the same mechanisms in humans.

As a next step they will try to determine how the inflow of water to the brain can be affected and controlled using the newly discovered mechanism.

The study is based on tests in animals. Thus it has less statistical weight than case/control studies in humans and larger randomized trials in humans.

http://bit.ly/2MAjYij

Non-coding DNA changes the genitals you're born with

Male mice grow ovaries instead of testes if they are missing a small region of DNA that doesn't contain any genes

Male mice grow ovaries instead of testes if they are missing a small region of DNA that doesn't contain any genes, finds a new paper published in *Science*. The study, led by researchers at the Francis Crick Institute, could help explain disorders of sex development in humans, at least half of which have an unknown genetic cause.

Mammals will develop ovaries and become females unless the early sex organs have enough of a protein called *SOX9* at a key stage in their development. *SOX9* causes these organs to become testes, which then direct the rest of the embryo to become male.

The amount of *SOX9* produced is controlled initially by the *SRY* protein encoded by the *Sry* gene, which is located on the Y chromosome. This is why males, who have an X chromosome and a Y chromosome, usually develop testes while females, who have two X chromosomes, do not.

Only 2% of human DNA contains the 'code' to produce proteins, key building blocks of life. The remaining 98% is 'non-coding' and was once thought to be unnecessary 'junk' DNA, but there is increasing evidence that it can play important roles.

The latest study adds to this evidence, showing that a small piece of DNA called enhancer 13 (Enh13), located over half a million bases away from the *Sox9* gene, boosts *SOX9* protein production at the right moment to trigger testes development. When the team genetically removed Enh13 from male (XY) mice, they developed ovaries and female genitalia.

Enh13 is located in part of the mouse genome that maps directly onto a region of the human genome. People with XY chromosomes who are missing a larger DNA fragment in this region of the genome develop female sex organs, and this study could finally explain why this happens.

Experiments leading to sex reversal in mice are not new. In 1991, a team of scientists including Crick Group Leader Robin Lovell-Badge unveiled 'Randy' a chromosomally female (XX) mouse who developed as a male after the team introduced the *Sry* gene into the developing embryo.

"We've come a long way since Randy, and now for the first time we've demonstrated sex reversal after changing a non-coding region of DNA rather than a protein-coding gene," explains Professor Robin-Lovell Badge, senior author of the paper. "We think Enh13 is probably relevant to human disorders of sex development and could potentially be used to help diagnose some of these cases."

Dr Nitzan Gonen, first author of the paper and postdoc at the Crick, says: "Typically, lots of enhancer regions work together to boost gene expression, with no one enhancer having a massive effect. We identified four enhancers in our study but were really surprised to find that a single enhancer by itself was capable of controlling something as significant as sex."

"Our study also highlights the important role of what some still refer to as 'junk' DNA, which makes up 98% of our genome. If a single enhancer can have this impact on sex determination, other non-coding regions might have similarly drastic effects. For decades, researchers have looked for genes that cause disorders of sex development but we haven't been able to find the genetic cause for over half of them. Our latest study suggests that many answers could lie in the non-coding regions, which we will now investigate further."

"We know that *SRY* has to act within a narrow time window and we think that Enh13 is far more critical than other enhancers because it is the one that acts early to boost *Sox9* expression. There are others that can help drive *Sox9* expression in the testis, but these are likely to be more important to maintain high levels rather to initiate them."

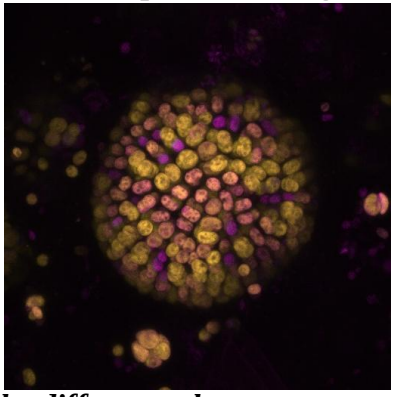
http://bit.ly/2t4MaSs

New type of photosynthesis discovered

The discovery changes our understanding of the basic mechanism of photosynthesis and should rewrite the textbooks.

It will also tailor the way we hunt for alien life and provide insights into how we could engineer more efficient crops that take advantage of longer wavelengths of light.

The discovery, published today in Science, was led by Imperial College London, supported by the BBSRC, and involved groups from the ANU in Canberra, the CNRS in Paris and Saclay and the CNR in Milan.



Colony of Chroococcidiopsis-like cells where the different colours represent photosynthesis driven by chlorophyll-a (magenta) and chlorophyll-f (yellow).
Dennis Nuernberg

The vast majority of life on Earth uses visible red light in the process of photosynthesis, but the new type uses near-infrared light instead.

It was detected in a wide range of cyanobacteria (blue-green algae) when they grow in near-infrared light, found in shaded conditions like bacterial mats in Yellowstone and in beach rock in Australia.

As scientists have now discovered, it also occurs in a cupboard fitted with infrared LEDs in Imperial College London.

Photosynthesis beyond the red limit

The standard, near-universal type of photosynthesis uses the green pigment, chlorophyll-a, both to collect light and use its energy to make useful biochemicals and oxygen. The way chlorophyll-a absorbs light means only the energy from red light can be used for photosynthesis.

Since chlorophyll-a is present in all plants, algae and cyanobacteria that we know of, it was considered that the energy of red light set the 'red limit' for photosynthesis; that is, the minimum amount of energy needed to do the demanding chemistry that produces oxygen. The red limit is used in astrobiology to judge whether complex life could have evolved on planets in other solar systems.

However, when some cyanobacteria are grown under near-infrared light, the standard chlorophyll-a-containing systems shut down and different systems containing a different kind of chlorophyll, chlorophyll-f, takes over.

Until now, it was thought that chlorophyll-f just harvested the light. The new research shows that instead chlorophyll-f plays the key role in photosynthesis under shaded conditions, using lower-energy infrared light to do the complex chemistry. This is photosynthesis 'beyond the red limit'.

Lead researcher Professor Bill Rutherford, from the Department of Life Sciences at Imperial, said: "The new form of photosynthesis made us rethink what we thought was possible. It also changes how we understand the key events at the heart of standard photosynthesis. This is textbook changing stuff."

Preventing damage by light

Another cyanobacterium, *Acaryochloris*, is already known to do photosynthesis beyond the red limit. However, because it occurs in just this one species, with a very specific habitat, it had been considered a 'one-off'. *Acaryochloris* lives underneath a green sea-squirt that shades out most of the visible light leaving just the near-infrared.

The chlorophyll-f based photosynthesis reported today represents a third type of photosynthesis that is widespread. However, it is only used in special infrared-rich shaded conditions; in normal light conditions, the standard red form of photosynthesis is used.

It was thought that light damage would be more severe beyond the red limit, but the new study shows that it is not a problem in stable, shaded environments.

Co-author Dr Andrea Fantuzzi, from the Department of Life Sciences at Imperial, said: "Finding a type of photosynthesis that works beyond the red limit changes our understanding of the energy requirements of photosynthesis. This provides insights into light energy use and into mechanisms that protect the systems against damage by light."

These insights could be useful for researchers trying to engineer crops to perform more efficient photosynthesis by using a wider range of light. How these cyanobacteria protect themselves from damage caused by variations in the brightness of light could help researchers discover what is feasible to engineer into crop plants.

Textbook-changing insights

More detail could be seen in the new systems than has ever been seen before in the standard chlorophyll-a systems. The chlorophylls often termed 'accessory' chlorophylls were actually performing the crucial chemical step, rather than the textbook 'special pair' of chlorophylls in the centre of the complex.

This indicates that this pattern holds for the other types of photosynthesis, which would change the textbook view of how the dominant form of photosynthesis works.

Dr Dennis Nürnberg, the first author and initiator of the study, said: "I did not expect that my interest in cyanobacteria and their diverse lifestyles would snowball into a major change in how we understand photosynthesis. It is amazing what is still out there in nature waiting to be discovered."

Peter Burlinson, lead for frontier bioscience at BBSRC - UKRI says, "This is an important discovery in photosynthesis, a process that plays a crucial role in the biology of the crops that feed the world. Discoveries like this push the boundaries of our understanding of life and Professor Bill Rutherford and the team at Imperial should be congratulated for revealing a new perspective on such a fundamental process."

http://bit.ly/2t59war

Long suspected theory about the moon holds water

Discovery of moganite in a lunar meteorite reinforces belief that water exists on the Moon

A team of Japanese scientists led by Masahiro Kayama of Tohoku University's Frontier Research Institute for Interdisciplinary Sciences, has discovered a mineral known as moganite in a lunar meteorite found in a hot desert in northwest Africa.

Photograph of lunar meteorite NWA 2727. **Masahiro Kayama, Tohoku University**

This is significant because moganite is a mineral that requires water to form, reinforcing the belief that water exists on the Moon.

"Moganite is a crystal of silicon dioxide and is similar to quartz. It forms on Earth as a precipitate when alkaline water including SiO_2 is evaporated under high pressure conditions," says Kayama. "The existence of moganite strongly implies that there is water activity on the Moon."

Kayama and his team analyzed 13 of the lunar meteorites using sophisticated methods to determine chemical compositions and structures of their minerals. These included electron microscopy for high-magnification, and micro-Raman spectroscopy to determine the structure of the minerals based on their atomic vibration.

Moganite was found in only one of those 13 samples, confirming the team's theory that it could not have formed in the African desert. "If terrestrial weathering had produced moganite in the lunar meteorite, there should be moganite present in all the samples that fell to Earth around the same time. But this was not the case," says Kayama.

He adds that part of the moganite had changed into the high-pressure SiO2 minerals stishovite and coesite, which he believes was most likely formed through heavy impact collisions on the Moon

This is the first time that moganite has been detected in lunar rocks. The researchers say the meteorites probably came from an area of the Moon called Procellarum Terrane, and that the moganite was formed through the process of water evaporation in strong sunlight. Kayama's working theory is that deeper under the lunar surface, protected from the sun, crystals of water ice could be abundant.

In recent years, space missions have found evidence of lunar water or ice concentrated at the poles where sunlight appears at a very narrow angle, leading to pockets of cold traps. This is the first time, however, that the scientists have found evidence of abundant water ice in the lunar subsurface at mid and lower latitudes.

Kayama's team estimates that the accumulation of water in the lunar soil is about 0.6 weight percent. If they are right, future lunar explorers would have easier access to the resource, which would greatly enhance the chances of the Moon hosting human settlement

and infrastructure, and supporting a variety of industries within the next few decades.

JAXA, the Japan Aerospace Exploration Agency, is said to be considering two future missions - a lunar pole landing mission in five years to look for water resources and a sample return mission from the far-side of the Moon in ten years.

In addition to testing for water in other silica minerals found, Kayama and his team also plan to study water from solar wind to the regolith soils and volcanic eruptions from the lunar mantle.

"Solar wind-induced water can give us new insight into the history of sun activity, and volcanic water provides us with information of lunar evolution together with water," says Kayama, about his lab's next project. "It's all very exciting."

https://go.nature.com/2HXB5an

Controversial alcohol study cancelled by US health agency

An investigation by the US National Institutes of Health finds missteps that put the industry-funded project's credibility in doubt.

Sara Reardon

The US National Institutes of Health (NIH) has terminated a controversial US$100 million study examining whether drinking small amounts of alcohol every day can improve health.

The agency's decision, announced on 15 June, came shortly after an NIH advisory council voted unanimously to end the trial. An agency investigation had found that NIH staff and outside researchers acted inappropriately by soliciting industry funding and biasing the grant review process to favor specific scientists.

Those findings have undermined the study's credibility if it had been allowed to proceed, said NIH director Francis Collins at the advisory-council meeting. "Is it even possible at this point that the results of this trial would have the credibility to influence anyone's decision-making," he asked. "That does in fact seem quite doubtful."

The study, which began enrolling participants in January 2018 under the auspices of the National Institute on Alcohol Abuse and Alcoholism (NIAAA), included $67 million from five alcohol companies over 10 years. It came under fire in March after the *New York Times* reported that the study's lead investigator — cardiovascular researcher Kenneth Mukamal of Beth Israel Deaconess Medical Center in Boston, Massachusetts — and his collaborators had directly courted funding from the liquor industry in 2013 and 2014, prior to the study's launch.

Collins put the study on hold in May and announced two investigations of the matter. He directed a working group within the NIH Advisory Council to the Director to assess the scientific merits and integrity of the study, and the NIH's Office of Management Assessment (OMA) to determine whether NIH employees had improper interactions with industry. The findings of the first probe were revealed on 15 June; the second probe will be completed later this month.

Industry money

The advisory council report, which included initial findings from the OMA, found significant problems with the study, beyond those detailed in the media. According to the report, the study's lead scientists and agency employees solicited funds from alcohol industry representatives in violation of NIH conflict-of-interest rules.

The outside researchers also spoke with at least three members of NIAAA leadership for advice on how best to submit a grant proposal for the study.

These interactions could have conferred an unfair advantage to Mukamal and his colleagues in a competitive grant process, according to the report. Reviews by two NIH staff members had concluded that the study, which aimed to enrol 7,800 people at 16

sites around the world, was too small to draw significant conclusions and that its findings could be biased. Peer reviewers also mentioned that industry input could bias the study's findings, but a senior NIAAA staff member advised Mukamal and his colleagues to ignore those comments.

E-mails included in the working group's report suggested that NIAAA staff and the outside researchers worked together to circumvent normal processes in order to court industry funding. A 2015 e-mail between NIAAA senior staff and the study scientists suggested editing an email to alcohol-industry representatives to include "a bullet that states 'one of the important findings will be showing that moderate drinking is safe', etc." And e-mails between several NIAAA employees in 2014 discussed not mentioning to NIH administrators that a paper published that year showed that moderate drinking was harmful to a person's health unless specifically asked.

Mukamal did not immediately respond to a request for comment.

Public-private partnerships involving the NIH are supposed to be coordinated by a nonprofit known as the Foundation for the NIH (FNIH) in Bethesda, Maryland. The FNIH solicits and distributes industry money to avoid conflicts of interest or the potential for industry influence on a study's design or results. According to the report, when the scientists involved in the alcohol study submitted the proposal to FNIH in 2015, they included no mention of their prior meetings with liquor-industry representatives or NIAAA staff members.

Next steps

NIAAA director George Koob said he was "disappointed in what transpired" and said he would work with other NIH offices to shut down the trial in an orderly way.

The NIAAA has already spent $4 million on the study, but NIH principal deputy director Larry Tabak says that the study seems so compromised that any results would not be credible. "By terminating the study now, we minimize the loss of resources," he says.

Adriane Fugh-Berman, a pharmacologist at Georgetown University in Washington DC, praises Collins and the NIH for acting so quickly after questions about the study were raised in the media. "These e-mails are a good example of how when you partner with industry, it starts to change the research agenda itself," she says. "I really hope that this causes NIH to question the benefit of public-private partnership with industry."

At its meeting, the advisory group also voted to accept the report's other recommendations, including additional measures to prevent NIH employees from soliciting external funding or engaging with applicants inappropriately. Collins said that the NIH will also investigate whether any of its other public-private partnerships have involved inappropriate interactions between staff, applicants and industry, and to ensure that all of the agency's institutes are adhering to the same principles.

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