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Neanderthals may have been infected by diseases carried out of Africa by humans

Neanderthals may have been infected with diseases carried out of Africa by waves of Homo sapiens

A new study suggests that Neanderthals across Europe may well have been infected with diseases carried out of Africa by waves of anatomically modern humans, or Homo sapiens. As both were species of hominin, it would have been easier for pathogens to jump populations, say researchers. This might have contributed to the demise of Neanderthals.

Researchers from the universities of Cambridge and Oxford Brookes have reviewed the latest evidence gleaned from pathogen genomes and DNA from ancient bones, and concluded that some infectious diseases are likely to be many thousands of years older than previously believed.

There is evidence that our ancestors interbred with Neanderthals and exchanged genes associated with disease. There is also evidence that viruses moved into humans from other hominins while still in Africa. So, the researchers argue, it makes sense to assume that humans could, in turn, pass disease to Neanderthals, and that - if we were mating with them - we probably did.

Dr Charlotte Houldcroft, from Cambridge's Division of Biological Anthropology, says that many of the infections likely to have passed from humans to Neanderthals - such as tapeworm, tuberculosis, stomach ulcers and types of herpes - are chronic diseases that would have weakened the hunter-gathering Neanderthals, making them less fit and able to find food, which could have catalysed extinction of the species.

"Humans migrating out of Africa would have been a significant reservoir of tropical diseases," says Houldcroft. "For the Neanderthal population of Eurasia, adapted to that geographical infectious disease environment, exposure to new pathogens carried out of Africa may have been catastrophic."

"However, it is unlikely to have been similar to Columbus bringing disease into America and decimating native populations. It's more likely that small bands of Neanderthals each had their own infection disasters, weakening the group and tipping the balance against survival," says Houldcroft. New techniques developed in the last few years mean researchers can now peer into the distant past of modern disease by unravelling its genetic code, as well as extracting DNA from fossils of some of our earliest ancestors to detect traces of disease.

In a paper published today in the American Journal of Physical Anthropology, Houldcroft, who also studies modern infections at Great Ormond Street Hospital, and Dr Simon Underdown, a researcher in human evolution from Oxford Brookes University, write that genetic data shows many infectious diseases have been "co-evolving with humans and our ancestors for tens of thousands to millions of years".

The longstanding view of infectious disease is that it exploded with the dawning of agriculture some 8,000 years ago, as increasingly dense and sedentary human populations coexisted with livestock, creating a perfect storm for disease to spread.

The researchers say the latest evidence suggests disease had a much longer "burn in period" that pre-dates agriculture. In fact, they say that many diseases traditionally thought to be 'zoonoses', transferred from herd animals into humans, such as tuberculosis, were actually transmitted into the livestock by humans in the first place.

"We are beginning to see evidence that environmental bacteria were the likely ancestors of many pathogens that caused disease during the advent of agriculture, and that they initially passed from humans into their animals," says Houldcroft.

"Hunter-gatherers lived in small foraging groups. Neanderthals lived in groups of between 15-30 members, for example. So disease would have broken out sporadically, but have been unable to spread very far. Once agriculture came along, these diseases had the perfect conditions to explode, but they were already around."

There is as yet no hard evidence of infectious disease transmission between humans and Neanderthals; however, considering the overlap in time and geography, and not least the evidence of interbreeding, Houldcroft and Underdown say that it must have occurred.

Neanderthals would have adapted to the diseases of their European environment. There is evidence that humans benefited from receiving genetic components through interbreeding that protected them from some of these: types of bacterial sepsis - blood poisoning occurring from infected wounds - and encephalitis caught from ticks that inhabit Siberian forests.

In turn, the humans, unlike Neanderthals, would have been adapted to African diseases, which they would have brought with them during waves of expansion into Europe and Asia.

The researchers describe Helicobacter pylori, a bacterium that causes stomach ulcers, as a prime candidate for a disease that humans may have passed to Neanderthals. It is estimated to have first infected humans in Africa 88 to 116 thousand years ago, and arrived in Europe after 52,000 years ago. The most recent evidence suggests Neanderthals died out around 40,000 years ago.

Another candidate is herpes simplex 2, the virus which causes genital herpes. There is evidence preserved in the genome of this disease that suggests it was

transmitted to humans in Africa 1.6 million years ago from another, currently unknown hominin species that in turn acquired it from chimpanzees.

"The 'intermediate' hominin that bridged the virus between chimps and humans shows that diseases could leap between hominin species. The herpesvirus is transmitted sexually and through saliva. As we now know that humans bred with Neanderthals, and we all carry 2-5% of Neanderthal DNA as a result, it makes sense to assume that, along with bodily fluids, humans and Neanderthals transferred diseases," says Houldcroft.

Recent theories for the cause of Neanderthal extinction range from climate change to an early human alliance with wolves resulting in domination of the food chain. "It is probable that a combination of factors caused the demise of Neanderthals," says Houldcroft, "and the evidence is building that spread of disease was an important one."

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Breakthrough may stop multiple sclerosis in its tracks

An international research team has demonstrated that a new plant-derived drug can block the progression of multiple sclerosis (MS).

University of Queensland researcher Dr Christian Gruber said the breakthrough could be a step forward in preventing and treating MS and other autoimmune diseases. "This is a really exciting discovery because it may offer a whole new quality of life for people with this debilitating disease," he said.

The new drug is expected to be taken by mouth, in contrast to some current MS treatments where patients need to have frequent injections.

MS is a chronic incurable condition marked by attacks that bring gradual deterioration in the patient's health. About 23,000 people are affected in Australia and 2.5 million worldwide.

Dr Gruber said the new drug -- named T20K -- was extracted from a traditional medicinal plant, the Oldenlandia affinis(*アカネ科*). The drug treatment had been successful in an animal model, and patent applications filed in several countries.

"Phase one clinical trials could begin as early as 2018," Dr Gruber said.

"Licences have been assigned to Cyxone, a company established last year to develop this new class of drugs for the treatment of autoimmune diseases. "Cyxone's immediate focus is on bringing T20K through the pre-clinical program required for delivering a safe, orally active drug." Dr Gruber said the new treatment arose from a synthesised plant peptide, a class of drugs known as cyclotides. "Cyclotides are present in a range of common plants, and they show significant potential for the treatment of auto immune diseases," he said.

"The T20K peptides exhibit extraordinary stability and chemical features that are ideally what you want in an oral drug candidate."

The international research team demonstrated in an animal model that T20K stopped progression in the normal clinical symptoms of MS.

Dr Gruber, from UQ's School of Biomedical Sciences, is also an international research fellow at the Center for Physiology and Pharmacology at the Medical University of Vienna. He and his colleagues published their breakthrough research in PNAS.

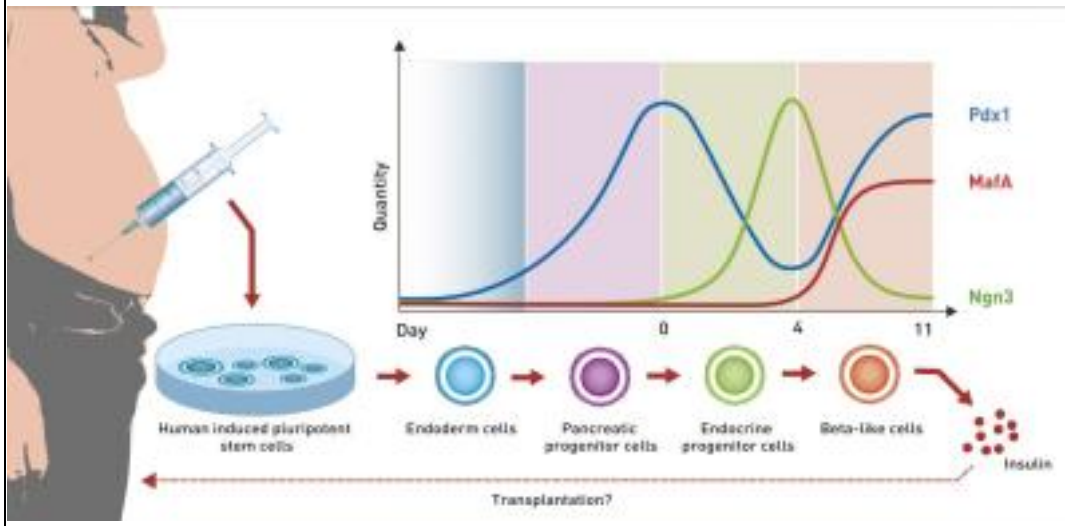
http://www.eurekalert.org/pub_releases/2016-04/ez-bcf040816.php

Beta cells from love handles

Beta cells generated using "genetic software" produce the hormone insulin

Researchers led by Martin Fussenegger, Professor of Biotechnology and Bioengineering at ETH Zurich's Department of Biosystems Science and Engineering in Basel, have performed a feat that many specialists had until now held to be impossible: they have extracted stem cells from a 50-year-old test subject's fatty tissue and applied genetic reprogramming to make them mature into functional beta cells.

In the presence of glucose, the beta cells generated using this "genetic software" produce the hormone insulin - just like natural beta cells, which are found in the pancreas. The researchers reported this in the journal Nature Communications.



The diagram shows the dynamics of the most important growth factors during differentiation of human induced pluripotent stem cell to beta-like cells. **ETH Zurich**

Maturation dynamic reproduced

The Basel-based researchers took the stem cells and added a highly complex synthetic network of genes - the genetic software. They designed this network to precisely recreate the key growth factors involved in this maturation process.

Central to the process are the growth factors Ngn3, Pdx1 and MafA. Concentrations of these factors change during the differentiation process. For instance, MafA is not present at the start of maturation. Only on day four, in the final maturation step, does it appear, its concentration rising steeply and then remaining at a high level. The changes in concentration of Ngn3 and Pdx1, however, are very complex: while the concentration of Ngn3 rises and then falls again, the level of Pdx1 rises at the beginning and towards the end of maturation.

Fussenegger stresses that it is essential to reproduce these natural processes as closely as possible in order to produce functioning beta cells: "The timing and the quantities of these growth factors are extremely important."

New beta cells respond to glucose

In Fussenegger's opinion, it is a real breakthrough that a synthetic gene network has been successfully used to achieve genetic reprogramming that delivers beta cells. Until now, scientists have controlled such stem cell differentiation processes by adding various chemicals and proteins using pipettes.

"It's not only really hard to add just the right quantities of these components at just the right time, it's also inefficient and impossible to scale up," Fussenegger says. In contrast, the new process can successfully transform three out of four adipose stem cells into beta cells.

These beta cells not only look very similar to their natural counterparts - both kinds contain dark spots known as granules, which store insulin. The artificial beta cells also function in a very similar way. "At the present time, the quantities of insulin they secrete are not as great as with natural beta cells," he admits.

But the key point is that the researchers have for the first time succeeded in reproducing the entire natural process chain, from stem cell to differentiated beta cell.

Implants of endogenous cells

In future, the Basel-based ETH researchers' new technique might make it possible to implant new functional beta cells in diabetes sufferers that are made from their own adipose tissue.

While beta cells have been transplanted in the past, this has always required subsequent suppression of the recipient's immune system - as with any transplant of donor organs or tissue. "With our beta cells, there would likely be no need for this action, since we can make them using endogenous cell material taken from the patient's own body," Fussenegger says, adding: "This is why our work is of such interest in the treatment of diabetes."

Complete maturation in the petri dish

To date, the ETH researchers have merely cultured their beta cells; they have yet to implant them in a diabetes sufferer. This is because they first wanted to test whether stem cells could be fully differentiated from start to finish using genetic programming.

Fussenegger is convinced that this new method could also be used to produce other cells. Stem cells taken from adipose tissue could be differentiated into various cell types, he says - "And most people have an overabundance of fat from which these stem cells can be harvested."

Saxena P, Heng BC, Bai P, Folcher M, Zulewski H, Fussenegger, M. A programmable synthetic lineage-control network that differentiates human IPSCs into glucose-sensitive insulin-secreting beta-like cells. Nature Communications, published online April 11th 2016. DOI: 10.1038/NCOMMS11247

http://www.eurekalert.org/pub_releases/2016-04/sumc-sts040616.php

Stanford trial shows paper tape can help prevent foot blisters

Paper tape proves best blister deterrent

Ten years ago, Grant Lipman, MD, an emergency medicine physician, was working as a doctor for endurance athletes who were running 25 to 50 miles a day in various parts of the world, from China to Antarctica to Chile.

Despite the harsh conditions and extreme exercise, the most common complaint that Lipman heard from the athletes was about the pain and debilitation caused by foot blisters, the same kind that plagues lots of people, from hikers to women in heels. "What I kept hearing was, 'Doctor, I'd be doing so well, if only for my feet,'" said Lipman, clinical associate professor of emergency medicine. "Their feet were getting decimated."

Multiple methods of blister prevention have been tried, Lipman said, including powders, antiperspirants, lubricants, tapes and adhesive pads. But despite the numerous scientific studies on blister prevention over the years, there is little evidence to show that any of these methods work well, he said, until now.

Paper tape: Who knew?

In a new study, Lipman and colleagues report that inexpensive paper tape, the kind available at most drugstores, when applied to blister-prone areas prior to exercise, successfully prevented both the incidence and frequency of foot blisters. The tape, commonly referred to as surgical tape, is used for wound treatment. It is only mildly adhesive -- an advantage because it doesn't tear the blisters if they do occur. The results will be published online April 11 in the Clinical Journal of Sport Medicine.

"People have been doing studies on blister prevention for 30 or 40 years and never found anything easy that works," said Lipman, who is the lead author of the study. "I wanted to look at this critically." The senior author of the study is Brian Krabak, MD, a sports medicine physician affiliated with the University of Washington.

Over the years, in addition to the complaints from the extreme runners, Lipman has heard from military doctors, bemoaning the state of their military recruits' feet. Blisters were keeping recruits from participating in basic training. From his experience treating athletes and listening to his patients, Lipman drew anecdotal evidence that the paper tape method could provide the best answer. Then he set out to test the theory.

155-mile experiment

In 2014, Lipman and his colleagues recruited 128 runners participating in the 155-mile, six-stage RacingThePlanet ultramarathon event that crosses deserts around the globe, including the Gobi Desert and deserts in Jordan and Madagascar.

Paper tape was applied to just one of each of the runners' feet. The untaped areas of the same foot served as a control. (Which foot got the tape and which didn't was chosen at random). The tape was applied by trained medical assistants to either the participants' blister-prone areas or, if they had no blister history, to randomly selected locations on the foot.

The paper tape was applied in a smooth, single layer before the race and at subsequent stages of the race, Lipman said. The medical assistants followed the runners for 155 miles over seven days. For 98 of the 128 runners, no blisters formed where the tape had been applied, whereas 81 of the 128 got blisters in untaped areas.

"It's kind of a ridiculously cheap, easy method of blister prevention," Lipman said. "You can get it anywhere. A little roll coasts about 69 cents, and that should last a year or two." He added, "The best way to make it to the finish line is by taking care of your feet."

Other Stanford co-authors are former wilderness medicine fellows Louis Sharp, MD, Katherine Shea, MD, and Mark Christensen, MD; and Alexandra DiTullio, MD, emergency medicine resident.

The study was supported by a 2014 RacingThePlanet research grant. The preventive taping technique described in the study is discussed in Lipman's book The Wilderness First Aid Handbook and a related app, a link to which is available at http://wildernessaid.com.

Stanford's Department of Emergency Medicine also supported the work.

http://bit.ly/1quwxzq

Unexplained 'Genetic Superheroes' Overcome Disease Mutations

A tiny number of people in the world carry genetic mutations that were thought to guarantee the development of severe childhood diseases, but these people do not actually have these diseases, according to a new study.

by Agata Blaszczak-Boxe, Contributing Writer

In the study, researchers looked at the genetic data from more than half a million people from around the world. The scientists found 13 adults who carried the exact genetic mutations that cause diseases such as cystic fibrosis, which severely affects the lungs and digestive system, or a condition called Pfeiffer syndrome, which affects the bones of the skull. But despite the mutations, these adults had not developed these diseases.

The results may be the first step toward identifying ways to prevent other people who also have these mutations from developing such diseases, the researchers said. "If you want to develop therapies for prevention, if you want to come up with ways of not just finding the cause, but [also] ways of preventing the manifestations of disease," then these individuals may help find a way, Stephen Friend, a co-author of the study and a researcher at Sage Bionetworks in Seattle, said in a press briefing about the new study.

"We now have tools that allow us to search for people who should have gotten sick" but didn't, he said.

The idea of the new research was, "study the healthy, don't just study the sick," Friend said.

In the study, the researchers looked at the genetic data of about 589,000 people. The information came from 12 previously collected data sets. The researchers said they wanted to see if, among these people, there were any individuals who remained healthy despite carrying certain genetic mutations linked to severe childhood disorders.

The researchers focused on diseases that are caused by mutations in a single gene, and have severe symptoms that generally show up early in childhood.

In their search, the investigators found three adults who did not have cystic fibrosis, despite having mutations on both copies of the CFTR gene, which normally causes the condition, according to the study, published today (April 11) in the journal Nature Biotechnology.

Three other adults identified in the study lacked a certain form of a skeletal condition called atelosteogenesis, despite carrying mutations on both copies of the gene called the SLC26A2 gene that is linked with the disorder. Atelosteogenesisis is usually lethal at birth, or shortly afterward, according to the National Institutes of Health.

Other people in the study lacked conditions such as familial dysautonomia (which affects nerve cells, and can result in sudden death during childhood), Smith-Lemli-Opitz syndrome (which causes widespread developmental problems throughout the body), and epidermolysis bullosa simplex (a severe skin condition), despite having mutations in the genes for these conditions.

The researchers said they don't know for sure exactly why these people failed to develop the diseases that they seemed genetically destined for.

However, one possibility is that these individuals also have other genes that somehow suppress these disease-causing mutations, preventing these people from

getting sick, said study co-author Rong Chen, director of clinical genome informatics at the Icahn Institute of Genetics and Multiscale Biology in New York. "It is the first [study] to try to systematically identify these unique individuals that are walking amongst us, that have genetic mutations that should result in a disease that they don't have," said Scott J. Hebbring, an associate research scientist at the Marshfield Clinic Research Foundation, who was not involved in the study.

"These could have important implications when it comes to finding ways to treat these diseases," he told Live Science.

However, the researchers noted the study had limitations. For example, the investigators said they were not able to contact the 13 people identified in the study, because the researchers did not have the means to obtain consent from the people to do so. This means the scientists were not able to interview the individuals, physically examine them or verify the accuracy of the genetic information that the researchers got from the previously collected data sets.

It is therefore not possible to determine with certainty that these people are truly resistant to these diseases without further information, the researchers said.

But the scientists said they are now planning to conduct another study, in which people would first sign up to have their genes analyzed, and then the researchers would follow up with those individuals over a certain period of time.

http://www.eurekalert.org/pub_releases/2016-04/naos-nrh041116.php

New report: Hepatitis B and C could be eliminated as public health problems in US

Considerable resources, and attention to various barriers will be required to prevent further sickness and deaths from the transmission of hepatitis B and C

WASHINGTON - It is possible to end the transmission of hepatitis B and C and prevent further sickness and deaths from the diseases, but time, considerable resources, and attention to various barriers will be required, says a new report from the National Academies of Sciences, Engineering, and Medicine. However, controlling the diseases by reducing the number of new and overall cases in the U.S. is more feasible in the short term. This is the first report of a two-phase study; the second report, to be released in early 2017, will outline a strategy for meeting the goals discussed in this report.

At least 700,000 to 1.4 million Americans have chronic hepatitis B, and between 2.5 million and 4.7 million have chronic hepatitis C. Together, the diseases kill approximately 20,000 people every year in the U.S. In the past, the term "disease elimination" often referred to complete termination of any new infections in a population, but eliminating a disease as a public health problem is a less absolute goal. The report describes a public health problem as a disease that commands attention as a major threat to the health of the community. In the case of hepatitis B and C, elimination of the diseases as public health problems would mean ending their transmission in the U.S., and for the infections that remain, preventing their undesirable signs and symptoms entirely.

Hepatitis B is transmitted three ways: from an infected mother to her child, from direct contact with infected blood, or from unprotected sex with an infected partner. The committee that carried out the study and wrote the report said the first step in eliminating hepatitis B is ending its transmission, which could be prevented with universal immunization. Administered in three doses, the hepatitis B vaccine confers long-lasting, 95 percent immunity. Although mother-to-child transmission of hepatitis B is rare in the U.S., 800 to 1,000 such infections occur every year.

These infections could be avoided by better identifying infected pregnant women to allow for early treatment of their newborns; a dose of hepatitis B vaccine at birth and completion of the full vaccine series helps prevent these transmissions. There is also room for improvement in hepatitis B vaccination in children and adults in the U.S. Only about 64 percent of infants receive the hepatitis B vaccine within one day of birth, and approximately 72 percent receive it within the first three days. Vaccination of adults is more complicated, because a comprehensive system for immunization after school age does not exist. Targeting people at elevated risk of contracting hepatitis B virus might be an efficient way to reach susceptible adults. For example, routine vaccinations could be given at prisons or in sexually transmitted disease clinics.

People with chronic hepatitis B require medical monitoring for their entire lives, the committee said. Although current therapies do not cure the infection, treatment prevents disease progression and deaths from cirrhosis and liver cancer.

Hepatitis C is transmitted through contact with infected blood and less commonly through sexual contact or from mother to child. No vaccine for hepatitis C exists, so prevention requires both reducing the likelihood that someone with the disease will transmit the virus and reducing the risk that someone uninfected will contract it, the committee said.

Individuals born between 1945 and 1965 account for the majority of the chronic hepatitis C in the U.S., but most new infections are associated with unsafe drug injection. While hepatitis C can be cured and curing infected injection drug users could reduce transmission and elicit a drop in disease prevalence of 20 percent to 80 percent, reaching this population is difficult. Some evidence suggests that programs such as needle exchange could help reduce vulnerability to hepatitis C. Preventing substance use disorders in the first place also could lower transmission by reducing the number of people at risk for contracting the virus.

Ending illness and deaths from hepatitis C depends on both stopping the disease's progression in its early stages, and reversing the course of advanced disease, the committee said. Hepatitis C can be cured in eight to 12 weeks with new, direct-acting antiviral drugs -- which can elicit sustained response in 94 percent to 99 percent of patients, likely reducing the risk of cirrhosis of the liver and liver cancer. However, these treatment drugs are expensive. Curing a patient with chronic hepatitis C costs between $54,000 to $168,000 for just the drugs; actual treatment costs will vary. Both Medicaid and private insurers have responded to the cost by restricting access to only the sickest patients. Given the current prices, it is not possible to treat all Americans infected with chronic hepatitis C, the committee stated.

The high price of treatment also creates a tension in determining which patients should be a priority in receiving treatment, because those at most immediate risk of death are not necessarily those transmitting the virus. Hepatitis C infection substantially raises risk of death, especially when the infection has progressed to cirrhosis, the committee said. Those at risk for cirrhosis tend to be older people, who are less likely to pass on the virus through drug use or sexual contact and are usually beyond childbearing age.

Various barriers exist to eliminating the public health problem of hepatitis B and C in the U.S., and some of them affect both ending transmission and reducing the complications of chronic infection. One such barrier is that most state and local health offices are not able to identify infections, causing an incomplete understanding of the epidemics. For example, only five states and two large cities are funded for comprehensive viral hepatitis surveillance. Without a clear understanding of who is most affected by the diseases, it is difficult to form a strategy to combat them. Furthermore, viral hepatitis often carries a stigma for infected patients. Shame and fear of a positive test result can keep people away from testing and care, undermining any public health elimination effort.

Another barrier is that approximately two-thirds of those with chronic hepatitis B and half of people with chronic hepatitis C do not know they are infected. Both diseases are asymptomatic until the later stages. Most new cases of chronic hepatitis B in the U.S. are in foreign-born people who may face language or social barriers to accessing care. Foreigners need to live in the U.S. for five years before qualifying for many states' Medicaid programs; the Affordable Care Act also restricts access to care for temporary residents and undocumented arrivals.

People newly infected with hepatitis C tend to be poorer and less educated than average; many use injection drugs. Such patients can be hard to screen and have less contact with the health system. Prisons are a promising venue in which to treat hepatitis C, but treatment is an expensive obstacle for the prison system. The cost of the direct-acting antivirals is high, and the staff time required to manage an inmate in treatment often far exceeds the available resources.

The study was sponsored by the Centers for Disease Control and Prevention Office of Viral Hepatitis and the U.S. Department of Health and Human Services Office of Minority Health. The National Academies of Sciences, Engineering, and Medicine are private, nonprofit institutions that provide independent, objective analysis and advice to the nation to solve complex problems and inform public policy decisions related to science, technology, and medicine. The Academies operate under an 1863 congressional charter to the National Academy of Sciences, signed by President Lincoln. For more information, visit http://national-academies.org. A roster follows.

http://nas.edu/HepatitisElimination

Copies of A National Strategy on the Elimination of Hepatitis B and C - Phase 1 are available from the National Academies Press on the Internet at http://www.nap.edu or by calling 202-334-3313 or 1-800-624-6242. Reporters may obtain a copy from the Office of News and Public Information (contacts listed above).

http://www.eurekalert.org/pub_releases/2016-04/icl-tbo041116.php

The brain on LSD revealed: First scans show how the drug affects the brain

Researchers from Imperial College London, working with the Beckley Foundation, have for the first time visualised the effects of LSD on the human brain.

Researchers from Imperial College London, working with the Beckley Foundation, have for the first time visualised the effects of LSD on the human brain.

In a series of experiments, scientists have gained a glimpse into how the psychedelic compound affects brain activity. The team administered LSD (Lysergic acid diethylamide) to 20 healthy volunteers in a specialist research centre and used various leading-edge and complementary brain scanning techniques to visualise how LSD alters the way the brain works.

The findings, published in Proceedings of the National Academy of Sciences (PNAS), reveal what happens in the brain when people experience the complex visual hallucinations that are often associated with LSD state. They also shed light on the brain changes that underlie the profound altered state of consciousness the drug can produce.

A major finding of the research is the discovery of what happens in the brain when people experience complex dreamlike hallucinations under LSD. Under normal conditions, information from our eyes is processed in a part of the brain at the back of the head called the visual cortex. However, when the volunteers took LSD, many additional brain areas - not just the visual cortex - contributed to visual processing.

Dr Robin Carhart-Harris, from the Department of Medicine at Imperial, who led the research, explained: "We observed brain changes under LSD that suggested our volunteers were 'seeing with their eyes shut' - albeit they were seeing things from their imagination rather than from the outside world. We saw that many more areas of the brain than normal were contributing to visual processing under LSD - even though the volunteers' eyes were closed. Furthermore, the size of this effect correlated with volunteers' ratings of complex, dreamlike visions. "

The study also revealed what happens in the brain when people report a fundamental change in the quality of their consciousness under LSD.

Dr Carhart-Harris explained: "Normally our brain consists of independent networks that perform separate specialised functions, such as vision, movement and hearing - as well as more complex things like attention. However, under LSD the separateness of these networks breaks down and instead you see a more integrated or unified brain.

"Our results suggest that this effect underlies the profound altered state of consciousness that people often describe during an LSD experience. It is also related to what people sometimes call 'ego-dissolution', which means the normal sense of self is broken down and replaced by a sense of reconnection with themselves, others and the natural world. This experience is sometimes framed in a religious or spiritual way - and seems to be associated with improvements in well-being after the drug's effects have subsided."

Dr Carhart-Harris added: "Our brains become more constrained and compartmentalised as we develop from infancy into adulthood, and we may become more focused and rigid in our thinking as we mature. In many ways, the brain in the LSD state resembles the state our brains were in when we were infants: free and unconstrained. This also makes sense when we consider the hyper-emotional and imaginative nature of an infant's mind."

In addition to these findings, research from the same group, part of the Beckley/Imperial Research Programme, revealed that listening to music while taking LSD triggered interesting changes in brain signalling that were associated with eyes-closed visions.

In a study published in the journal European Neuropsychopharmacology, the researchers found altered visual cortex activity under the drug, and that the combination of LSD and music caused this region to receive more information from an area of the brain called the parahippocampus. The parahippocampus is involved in mental imagery and personal memory, and the more it communicated with the visual cortex, the more people reported experiencing complex visions, such as seeing scenes from their lives.

PhD student Mendel Kaelen from the Department of Medicine at Imperial, who was lead author of the music paper, said: "This is the first time we have witnessed the interaction of a psychedelic compound and music with the brain's biology.

The Beckley/Imperial Research Programme hope these collective findings may pave the way for these compounds being one day used to treat psychiatric disorders. They could be particularly useful in conditions where negative thought patterns have become entrenched, say the scientists, such as in depression or addiction.

Mendel Kaelen added: "A major focus for future research is how we can use the knowledge gained from our current research to develop more effective therapeutic approaches for treatments such as depression; for example, music-listening and LSD may be a powerful therapeutic combination if provided in the right way."

Professor David Nutt, the senior researcher on the study and Edmond J Safra Chair in Neuropsychopharmacology at Imperial, said: "Scientists have waited 50 years for this moment - the revealing of how LSD alters our brain biology.

For the first time we can really see what's happening in the brain during the psychedelic state, and can better understand why LSD had such a profound impact on self-awareness in users and on music and art. This could have great implications for psychiatry, and helping patients overcome conditions such as depression." Amanda Feilding, Director of the Beckley Foundation, said: "We are finally unveiling the brain mechanisms underlying the potential of LSD, not only to heal, but also to deepen our understanding of consciousness itself."

The research involved 20 healthy volunteers - each of whom received both LSD and placebo - and all of whom were deemed psychologically and physically healthy. All the volunteers had previously taken some type of psychedelic drug. During carefully controlled and supervised experiments in a specialist research centre, each volunteer received an injection of either 75 micrograms of LSD, or placebo. Their brains were then scanned using various techniques including fMRI and magnetoencephalography (MEG). These enabled the researchers to study activity within the whole of the brain by monitoring blood flow and electrical activity.

http://nyti.ms/1SQOjUD

Zika virus 'scarier than thought' says US

The Zika virus is "scarier" than first thought and its impact on the US could be greater than predicted, public health officials have admitted.

A wider range of birth defects has been linked to the virus, said Dr Anne Schuchat of the US Centers for Disease Control and Prevention (CDC). And the mosquitoes that carry the virus could travel to more US states than previously thought, she said.

The current Zika outbreak began almost a year ago in Brazil. It has been linked to thousands of birth defects there and has spread widely through the Americas.

"Most of what we've learned is not reassuring," said Dr Schuchat at a White House briefing on Monday. "Everything we know about this virus seems to be scarier than we initially thought."

There have been 346 confirmed cases of Zika in the continental United States, according to the CDC, all associated with travel. Earlier this year, US President Barack Obama asked the US Congress for $1.9bn (£1.25bn) in emergency funding to combat the virus. In the meantime it has been using money totalling $589m left over from the Ebola virus fund.

That was a temporary stopgap and inadequate to get the job done, said Dr Anthony Fauci of the National Institute of Allergy and Infectious Diseases.

The US now needs more money to fight the mosquitoes and to fund better research into vaccines and treatments, he said.

"When the president asked for $1.9 billion, we needed $1.9 billion."

Dr Fauci said initial trials of a Zika vaccine would likely start in September this year. Depending on the results, larger trials could begin at the start of 2017.

"The very, very best scenario" would be a vaccine ready for the general public by the beginning of 2018, he told the BBC World Service. He said there had been recent discoveries about how destructive Zika appeared to be to foetal brains. There were also reports of rare neurologic problems in adults, he said.

The CDC announced that Puerto Rico is to receive $3.9m in emergency Zika funding as the number of cases there doubles every week.

In February, the first US case of locally transmitted Zika was reported in Dallas, Texas - spread through sexual contact, not a mosquito bite.

http://bit.ly/1NdWVYX

Zika Virus Linked with Another Brain Disease: What's ADEM?

Some people infected with the Zika virus may develop a rare neurological disorder that is similar to multiple sclerosis, a new study from Brazil suggests.

by Rachael Rettner, Senior Writer

The study reports two cases of people who were infected with the Zika virus and who later developed a condition called acute disseminated encephalomyelitis (ADEM). In people with this condition, the body's own immune system causes swelling in the brain and spinal cord, and damages the protective coating of nerve fibers called myelin.

The condition is similar to multiple sclerosis (MS), which also causes damage to myelin. But whereas people with MS often have multiple attacks, people with ADEM usually have just a single attack of symptoms and recover after about six months.

The study adds to a growing list of conditions already linked with the Zika virus, including another neurological disorder called Guillain-Barré syndrome, as well as microcephaly, a birth defect in which an infant's head is abnormally small and is thought to occur when the virus is passed from a woman to her infant during pregnancy.

Still, the new study found only an association between the Zika virus and ADEM, and thus cannot prove that Zika virus infection causes ADEM. It's also important to note that neither Guillain-Barré syndrome nor ADEM is common in people with Zika virus infections, the researchers said. [Zika Virus FAQs: Top Questions Answered]

"This doesn't mean that all people infected with Zika will experience these brain problems," Dr. Maria Lucia Brito Ferreira, a co-author of the new study and a physician at Restoration Hospital in Recife, Brazil, said in a statement. "However, our study may shed light on possible lingering effects the virus may be associated with in the brain."

The study included 151 people who visited a hospital in Recife between December 2014 and June 2015, and who had symptoms of Zika virus or another similar virus. Of these, six people developed symptoms of autoimmune disorders, in which the patient's own immune system mistakenly attacks the body. It turned out that four of these patients had Guillain-Barré syndrome, and two had ADEM, the researchers found. (All six of these patients tested positive for Zika virus.)

For some of these people, neurological symptoms started as soon as the Zika virus symptoms appeared, but for others, the neurological symptoms took up to 15 days to appear.

The study will be presented at the American Academy of Neurology meeting in Vancouver, which runs from April 15 to 21.

http://www.eurekalert.org/pub_releases/2016-04/osu-t6e041116.php

The 6 elements of an effective apology, according to science

'Acknowledgment of responsibility' is most important

COLUMBUS, Ohio - There are six components to an apology - and the more of them you include when you say you're sorry, the more effective your apology will be, according to new research.

But if you're pressed for time or space, there are two elements that are the most critical to having your apology accepted.

"Apologies really do work, but you should make sure you hit as many of the six key components as possible," said Roy Lewicki, lead author of the study and professor emeritus of management and human resources at The Ohio State University's Fisher College of Business.

In two separate experiments, Lewicki and his co-authors tested how 755 people reacted to apologies containing anywhere from one to all six of these elements:

1. ***Expression of regret***
2. ***Explanation of what went wrong***
3. ***Acknowledgment of responsibility***
4. ***Declaration of repentance***
5. ***Offer of repair***
6. ***Request for forgiveness***

The research is published in the May 2016 issue of the journal Negotiation and Conflict Management Research. Lewicki's co-authors were Robert Lount, associate professor of management and human resources at Ohio State, and Beth Polin of Eastern Kentucky University. While the best apologies contained all six elements, not all of these components are equal, the study found.

"Our findings showed that the most important component is an acknowledgement of responsibility. Say it is your fault, that you made a mistake," Lewicki said.

The second most important element was an offer of repair.

"One concern about apologies is that talk is cheap. But by saying, 'I'll fix what is wrong,' you're committing to take action to undo the damage," he said.

The next three elements were essentially tied for third in effectiveness: expression of regret, explanation of what went wrong and declaration of repentance.

The least effective element of an apology is a request for forgiveness. "That's the one you can leave out if you have to," Lewicki said.

The first study involved 333 adults recruited online through Amazon's MTURK program. All the participants read a scenario in which they were the manager of an accounting department that was hiring a new employee. At a previous job, the potential employee had filed an incorrect tax return that understated a client's capital gains income. When confronted about the issue, the job candidate apologized.

The participants were told that the apology contained one, three or all six of the apology components. They were then asked to rate on a scale of 1 (not at all) to 5 (very) how effective, credible and adequate the apology statement would be.

The second study included 422 undergraduate students. The students read the same scenario as in the first study, but instead of being told which components the apology contained, they read an actual apology that included anywhere from one to six statements based on the six elements. For example, for acknowledgment of responsibility, the apology statement read "I was wrong in what I did, and I accepted responsibility for my actions."

They again rated how effective, credible and adequate the apology statement would be. The results of the two studies were not identical, but they were very similar, Lewicki said. For both studies, the more elements that the apology contained, the more effective it was rated.

When the elements were evaluated one at a time, there was general consistency in the importance of the components across the two studies, with slight variations. But in both studies, the request for forgiveness was seen as least important.

In both studies, half the respondents were told the job applicant's incorrect tax return was related to competence: He was not knowledgeable in all relevant tax codes. The other half were told it was related to integrity: He knowingly filed the tax return incorrectly.

The value of each of the six components was the same whether the apology was related to failures of competence or integrity. But overall, participants were less likely to accept apologies when the job applicant showed a lack of integrity versus a lack of competence.

Lewicki noted that, in this work, participants simply read apology statements. But the emotion and voice inflection of a spoken apology may have powerful effects, as well. "Clearly, things like eye contact and appropriate expression of sincerity are important when you give a face-to-face apology," he said.

http://www.eurekalert.org/pub_releases/2016-04/tmsh-lum041116.php

Lung ultrasound may be a safe substitute for chest X-ray when diagnosing pneumonia in children

Shown to be highly effective and safe for diagnosing pneumonia in children

Lung ultrasound has been shown to be highly effective and safe for diagnosing pneumonia in children and a potential substitute for chest X-ray, according to a study conducted at the Icahn School of Medicine at Mount Sinai. Results are currently published in the medical journal Chest.

Pneumonia is the leading cause of death in children worldwide, according to the World Health Organization (WHO). Symptoms include fever, cough, and rapid breathing. Chest X-ray is considered the test of choice for diagnosing pneumonia in children, but the WHO estimates three-quarters of the world's population does not have access to radiography.

Investigators conducted a randomized controlled trial in the pediatric Emergency Department at The Mount Sinai Hospital comparing lung ultrasound to chest X-ray in 191 children from birth to 21 years of age. The patients were randomly assigned into an investigational arm (received a lung ultrasound and if the physician needed additional verification, a chest X-ray) and a control arm (received a chest X-ray followed by a lung ultrasound). Researchers found a 38.8 percent reduction in chest X-rays in the investigational arm compared to no

reduction in the control arm, with no missed pneumonia cases and no increase in any other adverse events.

The research team was led by James Tsung, MD, MPH, Associate Professor in the Department of Emergency Medicine and Department of Pediatrics at the Icahn School of Medicine at Mount Sinai, and former clinical fellow Brittany Pardue Jones, MD, who's currently Assistant Professor in the Department of Pediatrics at Vanderbilt University School of Medicine.

"Ultrasound is portable, cost-saving and safer for children than an X-ray because it does not expose them to radiation," says Dr. Tsung. "Our study could have a profound impact in the developing world where access to radiography is limited."

Furthermore, the reduction in chest X-rays in the investigational arm resulted in an overall cost savings of $9,200, and length of stay in the Emergency Department was decreased by 26 minutes.

"In the era of precision medicine, lung ultrasound may also be an ideal imaging option in children who are at higher risk for radiation-induced cancers or have received multiple radiographic or CT imaging studies," says Dr. Tsung.

As more and more handheld ultrasound machines come to market, these results suggest that lung ultrasound has the potential to become the preferred choice for the diagnosis of pneumonia in children. Further research is needed to investigate the impact of lung ultrasound on antibiotic use and stewardship.

http://bit.ly/1QcUK2v

Daily Aspirin Is Most Beneficial in Your 50s, Panel Says

Those who start taking daily aspirin during their 50s get the most benefit from its use in preventing a heart attack, stroke and colon cancer

by Cari Nierenberg, Live Science Contributor | April 11, 2016 06:36pm ET

People in their 50s or 60s may benefit from taking aspirin daily, but those who start during their 50s get the most benefit from its use in preventing a heart attack, stroke and colon cancer, according to new recommendations from a government-appointed panel of independent experts.

Daily aspirin is also beneficial for men and women who start taking it in their 60s, but its overall benefits are smaller than those for people who start taking it in their 50s, according to the new advice from the U.S. Preventive Services Task Force (USPSTF).

Taking one daily low-dose (81 milligrams) aspirin tablet may be an inexpensive and effective way to help reduce the rates of heart disease, cancer and stroke, which are major causes of deaths for adults in the U.S., the USPSTF said.

But when people are in their 60s, the balance between the potential benefits and possible harms of using aspirin changes, said Dr. Kirsten Bibbins-Domingo, chairwoman of the USPSTF and a professor of medicine at the University of California, San Francisco. As people get older, they face an increased risk that aspirin use will result in bleeding in the gut, she said. Moreover, people may not live long enough to realize the benefits of aspirin as a preventive for colorectal cancer, Bibbins-Domingo added.

The advice issued today (April 11) marks the first time that the task force has made a recommendation for using aspirin to prevent both cardiovascular disease and colorectal cancer. (Previously, the task force released separate recommendations for aspirin use in curbing colon cancer risk in 2007, and one for staving off cardiovascular disease in 2009.)

The new recommendations apply to adults ages 50 to 69 who have a 10 percent or greater risk of developing cardiovascular disease in the next 10 years and who are not at increased risk for bleeding from aspirin therapy, according to the USPSTF, a medical advisory panel that makes recommendations on the effectiveness of preventive health services for Americans. The recommendations were published online today in the journal Annals of Internal Medicine. [5 Interesting Facts About Aspirin]

When determining a person's cardiovascular risk, doctors consider factors such as age, sex, blood pressure, cholesterol and lipid levels, as well as a history of diabetes and smoking.

Heart and cancer protection

To form the recommendations, members of the task force reviewed the latest research on the role of aspirin therapy in preventing heart disease, stroke and colorectal cancer, and they developed computer models to estimate aspirin therapy's benefits and harms in adults ages 40 and older.

The data showed that the health benefit is definitely larger the earlier a person starts taking aspirin, Bibbins-Domingo told Live Science.

But this does not mean that adults in their 40s should begin taking daily low-dose aspirin to prevent heart disease and cancer. The USPSTF did not find enough scientific evidence to make a decision about the pros and cons of initiating aspirin use in people younger than 50, or in those ages 70 and older.

About 40 percent of U.S. adults older than 50 take aspirin to prevent heart disease and stroke, according to a recent review study.

Studies have found that people need to take regular low-dose aspirin for at least five to 10 years before they see the benefits of protection from colorectal cancer, Bibbins-Domingo said. The preventive benefits for cardiovascular disease are more immediate, and seem to begin within the first five years of daily aspirin use, she said.

Aspirin may work to protect against heart attack and stroke by helping to prevent blood from clotting in the arteries that lead to the heart and brain that may be

narrowed by atherosclerotic plaques. Aspirin's role in preventing colon cancer is not well understood, but it may help reduce inflammation that can promote cancer development, the researchers said.

For adults who begin low-dose aspirin use in their 50s, the benefits outweigh the increased risk of gastrointestinal (GI) bleeding by a moderate amount, Bibbins-Domingo said. The benefits of daily aspirin use are smaller in people in their 60s because of a higher risk of GI bleeding and hemorrhagic stroke (which occurs when a blood vessel bursts) in this age group, she said.

Before starting to take aspirin daily for preventive reasons, people should have a conversation with their doctor to understand the benefits and risks, and this discussion should recur as people age if they remain on low-dose aspirin over time, Bibbins-Domingo said.

http://www.eurekalert.org/pub_releases/2016-04/cmu-sdh041216.php

Scientists discover how the brain repurposes itself to learn scientific concepts

New research shows how learning physics concepts is accomplished by repurposing neural structures originally used for general everyday purposes.

The human brain was initially used for basic survival tasks, such as staying safe and hunting and gathering. Yet, 200,000 years later, the same human brain is able to learn abstract concepts, like momentum, energy and gravity, which have only been formally defined in the last few centuries.

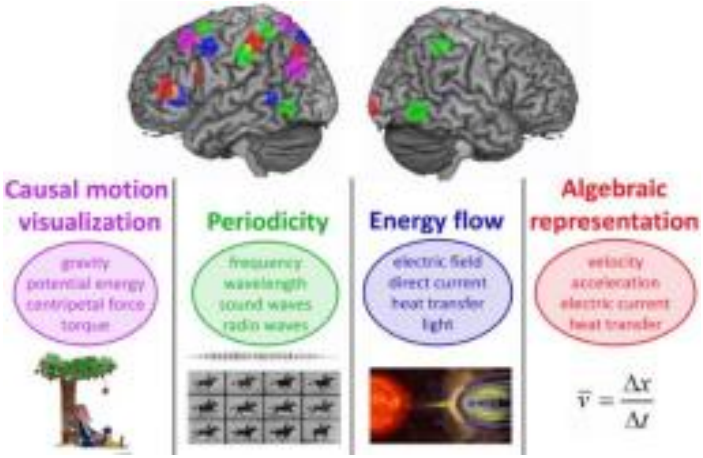
New research from Carnegie Mellon University has now uncovered how the brain is able to acquire brand new types of ideas. Published in Psychological Science, scientists Robert Mason and Marcel Just used neural-decoding techniques developed at CMU to identify specific physics concepts that advanced students recalled when prompted. The brain activation patterns while thinking about the physics concepts indicated that all of the students' brains used the ancient brain systems the same way, and the patterns revealed how the new knowledge was formed -- by repurposing existing neural systems.

The findings could be used to improve science instruction.

"If science teachers know how the brain is going to encode a new science concept, then they can define and elaborate that concept in ways that match the encoding. They can teach to the brain by using the brain's language," said Mason, a senior research associate in the Dietrich College of Humanities and Social Sciences' Department of Psychology.

Mason and Just, the D. O. Hebb University Professor of Psychology, recruited nine advanced physics and engineering students to participate in the study. Each student's brain was scanned at CMU's Scientific Imaging and Brain Research (SIBR) Center while they were shown a set of 30 familiar concepts, such as gravity, entropy, inertia, refraction and velocity.

Using a machine learning program, Mason and Just were able to identify which of the 30 concepts a student was thinking about because the thought of each concept created its own brain activation pattern. They also could break down the patterns into the different neural pieces used to build the full concepts.



New research from Carnegie Mellon University shows for the first time how learning physics concepts is accomplished by repurposing neural structures that were originally used for general everyday purposes. More specifically, the brain is able to learn physics concepts because of its ability to understand the four fundamental concepts of causal motion, periodicity, energy flow and algebraic (sentence-like) representations. **Carnegie Mellon University**

The research showed for the first time how learning physics concepts is accomplished by repurposing neural structures that were originally used for general everyday purposes. More specifically, the brain is able to learn physics concepts because of its ability to understand the four fundamental concepts of causal motion, periodicity, energy flow and algebraic (sentence-like) representations.

Brain systems that process rhythmic periodicity when hearing a horse gallop also support the understanding of wave concepts in physics. Similarly, understanding gravity involves visualizing causal motion, like an apple falling from a tree; energy flow uses the same system as sensing warmth from a fire or the sun; and understanding how one concept relates to others in an equation uses the same brain systems that are used to comprehend sentences describing quantities.

"This is why humans have been able to move ahead and innovate -- because we can use our brain for new purposes," Just said. "Human brains haven't changed much over a few thousand years, but new fields like aeronautics, genetics, medicine and computer science have been developed and continuously change. Our findings explain how the brain is able to learn and discover new types of concepts."

These findings are examples of the many brain research breakthroughs at Carnegie Mellon. CMU has created some of the first cognitive tutors, helped to develop the Jeopardy-winning Watson, founded a groundbreaking doctoral program in neural computation, and is the birthplace of artificial intelligence and cognitive psychology. Building on its strengths in biology, computer science, psychology, statistics and engineering, CMU launched BrainHub, an initiative that focuses on how the structure and activity of the brain give rise to complex behaviors.

The Office of Naval Research funded this study. Read the full study:
http://www.ccbi.cmu.edu/reprints/Mason_Psychological-Science-2016_CCBI-preprint.pdf.

http://www.eurekalert.org/pub_releases/2016-04/s-poh041216.php

Prevalence of homosexuality in men is stable throughout time since many carry the genes

Computer model sheds light on how male homosexuality remains present in populations throughout the ages

Around half of all heterosexual men and women potentially carry so-called homosexuality genes that are passed on from one generation to the next. This has helped homosexuality to be present among humans throughout history and in all cultures, even though homosexual men normally do not have many descendants who can directly inherit their genes. This idea is reported by Giorgi Chaladze of the Ilia State University in Georgia, and published in Springer's journal Archives of Sexual Behavior. Chaladze used a computational model that, among others, includes aspects of heredity and the tendency of homosexual men to come from larger families.

According to previous research, sexual orientation is influenced to a degree by genetic factors and is therefore heritable. Chaladze says this poses a problem from an evolutionary perspective, because homosexual men tend not to have many offspring to whom they can provide their genetic material. In fact, they have on average five times fewer children than their heterosexual counterparts.

Chaladze used an individual-based genetic model to explain the stable, yet persistent, occurrence of homosexuality within larger populations. He took into account findings from recent studies that show that homosexual men tend to come from larger families. These suggest that the genes responsible for homosexuality in men increase fecundity (the actual number of children someone has) among their female family members, who also carry the genes. Other reports also suggest that many heterosexual men are carriers of the genes that could predispose someone to homosexuality.

Based on Chaladze's calculations, male homosexuality is maintained in a population at low and stable frequencies if half of the men and roughly more than half of the women carry genes that predispose men to homosexuality.

"The trend of female family members of homosexual men to have more offspring can help explain the persistence of homosexuality, if we also consider that those males who have such genes are not always homosexuals," says Chaladze.

The possibility that many heterosexual men are carriers can also explain why estimates of the number of men who have reported any same-sex sexual behavior and same-sex sexual attraction are much higher than estimates of those who self-identify as homosexual or bisexual. According to Chaladze, non-homosexual male carriers might sometimes manifest interest in homosexual behavior without having a homosexual identity.

The possibility that a large percentage of heterosexual people are carriers of genetic material predisposing to homosexuality has implications for genomic studies. Researchers should therefore consider including participants who do not have homosexual relatives in such studies.

Reference: Chaladze, G. (2016). Heterosexual Male Carriers Could Explain Persistence of Homosexuality in Men: Individual-Based Simulations of an X-Linked Inheritance Model, Archives of Sexual Behavior. DOI 10.1007/s10508-016-0742-2

http://www.eurekalert.org/pub_releases/2016-04/cifs-1ap041216.php

1917 astronomical plate has first-ever evidence of exoplanetary system

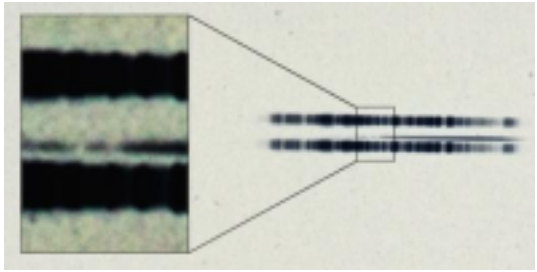
You can never predict what treasure might be hiding in your own basement.

Pasadena, CA-- We didn't know it a year ago, but it turns out that a 1917 image on an astronomical glass plate from our Carnegie Observatories' collection shows the first-ever evidence of a planetary system beyond our own Sun. This unexpected find was recognized in the process of researching an article about planetary systems surrounding white dwarf stars in New Astronomy Reviews.

Here's what happened: about a year ago, the review's author, Jay Farihi of University College London, contacted our Observatories' Director, John Mulchaey. He was looking for a plate in the Carnegie archive that contained a spectrum of van Maanen's star, a white dwarf discovered by Dutch-American astronomer Adriaan van Maanen in the very year our own plate was made.

Stellar spectra are recordings of the light emitted by distant stars. Spectra spread out all of the component colors of light, like a rainbow from a prism, and they can teach astronomers about a star's chemical composition. They can also tell them how the light emitted by a star is affected by the chemistry of the things it passes through before reaching us on Earth.

Stellar spectra images allowed 19th century astronomers to develop a system for classifying stars that is still used today. Modern astronomers use digital tools to image stars, but for decades, they would use glass photographic plates both to take images of the sky, and to record stellar spectra.



The 1917 photographic plate spectrum of van Maanen's star from the Carnegie Observatories' archive. The pull-out box shows the strong lines of the element calcium, which are surprisingly easy to see in the century old spectrum. The spectrum is the thin, (mostly) dark line in the center of the image. The broad dark lanes above and below are from lamps used to calibrate wavelength, and are contrast-enhanced in the box to highlight the two "missing" absorption bands in the star. **The Carnegie Institution for Science**

As requested, the Observatories located the 1917 plate, made by former Observatories Director Walter Adams at Mount Wilson Observatory, which was then part of Carnegie. Other than a notation on the plate's sleeve indicating that the star looked a bit warmer than our own Sun, everything seemed very ordinary.

However, when Farihi examined the spectrum, he found something quite extraordinary.

The clue was in what's called an "absorption line" on the spectrum. Absorption lines indicate "missing pieces," areas where the light coming from a star passed through something and had a particular color of light absorbed by that substance. These lines indicate the chemical makeup of the interfering object.

Carnegie's 1917 spectrum of van Maanen's star revealed the presence of heavier elements, such as calcium, magnesium, and iron, which should have long since disappeared into the star's interior due to their weight.

Only within the last 12 years has it become clear to astronomers that van Maanen's star and other white dwarfs with heavy elements in their spectra represent a type of planetary system featuring vast rings of rocky planetary remnants that deposit debris into the stellar atmosphere. These recently discovered systems are called "polluted white dwarfs." They were a surprise to astronomers, because white dwarfs are stars like our own Sun at the end of their lifetimes, so it was not at all expected that they would have leftover planetary material around them at that stage.

"The unexpected realization that this 1917 plate from our archive contains the earliest recorded evidence of a polluted white dwarf system is just incredible," Mulchaey said. "And the fact that it was made by such a prominent astronomer in our history as Walter Adams enhances the excitement."

Planets themselves have not yet been detected orbiting van Maanen's star, nor around similar systems, but Farihi is confident it is only a matter of time.

"The mechanism that creates the rings of planetary debris, and the deposition onto the stellar atmosphere, requires the gravitational influence of full-fledged planets," he explained. "The process couldn't occur unless there were planets there."

"Carnegie has one of the world's largest collections of astronomical plates with an archive that includes about 250,000 plates from three different observatories--Mount Wilson, Palomar, and Las Campanas," concluded Mulchaey. "We have a ton of history sitting in our basement and who knows what other finds we might unearth in the future?"

http://www.eurekalert.org/pub_releases/2016-04/m-coo041216.php

Children of older mothers do better

The benefits associated with being born in a later year outweigh the biological risks associated with being born to an older mother

Children of older mothers are healthier, taller and obtain more education than the children of younger mothers. The reason is that in industrialized countries educational opportunities are increasing, and people are getting healthier by the year. In other words, it pays off to be born later.

Most previous research suggests that the older women are when they give birth, the greater the health risks are for their children. Childbearing at older ages is understood to increase the risk of negative pregnancy outcomes such as Down syndrome, as well as increase the risk that the children will develop Alzheimer's disease, hypertension, and diabetes later in life.

However, despite the risks associated with delaying childbearing, children may also benefit from mothers delaying childbearing to older ages. These are the findings from a new study conducted by Mikko Myrskylä, the director of the Max Planck Institute for Demographic Research (MPIDR),) and his colleague Kieron Barclay at the London School of Economics, that has been published today in Population and Development Review.

Both public health and social conditions have been improving over time in many countries. Previous research on the relationship between maternal age and child outcomes has ignored the importance of these macro-level environmental changes over time. From the perspective of any individual parent, delaying childbearing means having a child with a later birth year. For example, a ten-year difference in maternal age is accompanied by a decade of changes to social and environmental conditions.

Taking this perspective, this new MPIDR-study shows that when women delay childbearing to older ages their children are healthier, taller, and more highly educated. It shows that despite the risks associated with childbearing at older ages, which are attributable to aging of the reproductive system, these risks are either counterbalanced, or outweighed, by the positive changes to the environment in the period during which the mother delayed her childbearing.

For example, a woman born in 1950 who had a child at the age of 20 would have given birth in 1970. If that same woman had a child at 40, she would have given birth in 1990. "Those twenty years make a huge difference," explains Mikko Myrskylä. A child born in 1990, for example, had a much higher probability of going to a college or university than somebody born 20 years earlier.

Barclay and Myrskylä used data from over 1.5 million Swedish men and women born between 1960 and 1991 to examine the relationship between maternal age at the time of birth, and height, physical fitness, grades in high school, and educational attainment of the children. Physical fitness and height are good proxies for overall health, and educational attainment is a key determinant of occupational achievement and lifetime opportunities.

They found that when mothers delayed childbearing to older ages, even as old as 40 or older, they had children who were taller, had better grades in high school, and were more likely to go to university.

For example, comparing two siblings born to the same mother decades apart, on average the child born when the mother was in her early 40s spends more than a year longer in the educational system than his or her sibling born when the mother was in her early 20s.

In their statistical analyses, Barclay and Myrskylä compared siblings who share the same biological mother and father. Siblings share 50% of their genes, and also grow up in the same household environment with the same parents.

"By comparing siblings who grew up in the same family it was possible for us to pinpoint the importance of maternal age at the time of birth independent of the influence of other factors that might bias the results" said Kieron Barclay.

"The benefits associated with being born in a later year outweigh the individual risk factors arising from being born to an older mother. We need to develop a different perspective on advanced maternal age. Expectant parents are typically well aware of the risks associated with late pregnancy, but they are less aware of the positive effects" said Myrskylä.

Kieron Barclay and Mikko Myrskylä, Advanced Maternal Age and Offspring Outcomes: Causal Effects and Countervailing Period Trends
Population and Development Review Article first published online: 8 APR 2016
DOI: 10.1111/j.1728-4457.2016.00105.x

http://www.eurekalert.org/pub_releases/2016-04/epfd-htb041216.php

How the brain produces consciousness in 'time slices'

EPFL scientists propose a new way of understanding of how the brain processes unconscious information into our consciousness.

According to the model, consciousness arises only in time intervals of up to 400 milliseconds, with gaps of unconsciousness in between.

The driver ahead suddenly stops, and you find yourself stomping on your breaks before you even realize what is going on. We would call this a reflex, but the underlying reality is much more complex, forming a debate that goes back centuries: Is consciousness a constant, uninterrupted stream or a series of discrete bits - like the 24 frames-per-second of a movie reel?

Scientists from EPFL and the universities of Ulm and Zurich, now put forward a new model of how the brain processes unconscious information, suggesting that consciousness arises only in intervals up to 400 milliseconds, with no consciousness in between. The work is published in PLOS Biology.

Continuous or discrete?

Consciousness seems to work as continuous stream: one image or sound or smell or touch smoothly follows the other, providing us with a continuous image of the world around us.

As far as we are concerned, it seems that sensory information is continuously translated into conscious perception: we see objects move smoothly, we hear sounds continuously, and we smell and feel without interruption. However, another school of thought argues that our brain collects sensory information only at discrete time-points, like a camera taking snapshots.

Even though there is a growing body of evidence against "continuous" consciousness, it also looks like that the "discrete" theory of snapshots is too simple to be true.

A two-stage model

Michael Herzog at EPFL, working with Frank Scharnowski at the University of Zurich, have now developed a new paradigm, or "conceptual framework", of how consciousness might actually work. They did this by reviewing data from previously published psychological and behavioral experiments that aim to determine if consciousness is continuous or discrete. Such experiments can involve showing a person two images in rapid succession and asking them to distinguish between them while monitoring their brain activity.

The new model proposes a two-stage processing of information. First comes the unconscious stage: The brain processes specific features of objects, e.g. color or shape, and analyzes them quasi-continuously and unconsciously with a very high time-resolution.

However, the model suggests that there is no perception of time during this unconscious processing. Even time features, such as duration or color change, are not perceived during this period. Instead, the brain represents its duration as a kind of "number", just as it does for color and shape.

Then comes the conscious stage: Unconscious processing is completed, and the brain simultaneously renders all the features conscious. This produces the final "picture", which the brain finally presents to our consciousness, making us aware of the stimulus.

The whole process, from stimulus to conscious perception, can last up to 400 milliseconds, which is a considerable delay from a physiological point of view. "The reason is that the brain wants to give you the best, clearest information it can, and this demands a substantial amount of time," explains Michael Herzog.

"There is no advantage in making you aware of its unconscious processing, because that would be immensely confusing." This model focuses on visual perception, but the time delay might be different for other sensory information, e.g. auditory or olfactory.

This is the first two-stage model of how consciousness arises, and it provides a more complete picture of how the brain manages consciousness than the "continuous versus discrete" debate envisages. But it especially provides useful insights about the way the brain processes time and relates it to our perception of the world.

This work involved a collaboration between EPFL's Brain Mind Institute with the University of Zurich and the University of Ulm. It was funded by the Swiss National Science Foundation.

Herzog MH, Kammer T, Scharnowski F. Time Slices: What Is the Duration of a Percept? PLOS Biology 14(4): e1002433. 12 April 2016. DOI: 10.1371/journal.pbio.1002433

http://www.eurekalert.org/pub_releases/2016-04/eaft-iic040816.php

Increase in coffee consumption could provide protective effect in non-alcoholic fatty liver disease

A daily dose of coffee could improve several key markers of non-alcoholic fatty liver disease by reducing permeability of the gut

Barcelona, Spain: Adding coffee to the diet of people with non-alcoholic fatty liver disease (NAFLD) could help reverse the condition, according to a new study conducted in mice presented at The International Liver CongressTM 2016 in Barcelona, Spain.

The study found that a daily dose of coffee (equivalent to six cups of espresso coffee for a 70kg person) improved several key markers of NAFLD in mice that were fed a high fat diet. These mice also gained less weight than others fed the same diet without the dose of caffeine.

The scientists also showed how coffee protects against NAFLD by raising levels of a protein called Zonulin (ZO)-1, which lessens the permeability of the gut.[1] Experts believe that increased gut permeability contributes to liver injury and worsens NAFLD.[2] People suffering from NAFLD can develop scaring of the liver, also known as fibrosis, which can progress to a potentially life-threatening condition known as cirrhosis.[3]

"Previous studies have confirmed how coffee can reverse the damage of NAFLD but this is the first to demonstrate that it can influence the permeability of the intestine," said Vincenzo Lembo, at the University of Napoli, Italy and study author. "The results also show that coffee can reverse NAFLD-related problems such as ballooning degeneration, a form of liver cell degeneration."

Researchers analysed three different groups of mice over a 12 week period. Group one received a standard diet, group two had a high fat diet and group three was given a high fat diet plus a decaffeinated coffee solution.

Coffee supplementation to a high fat diet significantly reversed levels of cholesterol ($p<0.001$), alanine aminotransferase (an enzyme which levels increase in the blood when the liver is damaged) ($p<0.05$), amount of fat in the liver cells (steatosis) ($p<0.001$) and ballooning degeneration ($p<0.05$). The combination of coffee and a high fat diet also reduced weight gain over time ($p=0.028$) in the mice.

The study results suggest that coffee supplementation could cause variations in the intestinal tight junctions, which regulate the permeability of the intestine.[4]

"Italy is famous for its coffee and this Italian study has reinforced our knowledge on the link between it and non-alcoholic fatty liver disease," said Professor Laurent Castera, EASL Secretary General.

"Although not suggesting that we should consume greater levels of coffee, the study offers insights that can help future research into and understanding of the therapeutic role coffee can play in combating NAFLD."

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[2] *Spengler and Loomba. The Gut Microbiota, Intestinal Permeability, Bacterial Translocation, and Nonalcoholic Fatty Liver Disease: What Comes First? American Gastroenterological Association. 2015; 1(2: 129-130).*

[3] *British Liver Trust. Non-Alcohol Related Fatty Liver Disease. Available from: http://www.britishlivertrust.org.uk/liver-information/liver-conditions/non-alcohol-related-fatty-liver-disease/. Last accessed: March 2016.*

[4] *Ulluwishewa et al. Regulation of Tight Junction Permeability by Intestinal Bacteria and Dietary Components. The Journal of Nutrition. 2011; (1415): 769-776.*

http://bit.ly/1TZ7OiI

Is Alpha Centauri the right place to search for life elsewhere?

It sounds like science fiction. From the people who brought you the project Breakthrough Listen to search for extraterrestrial life, comes a new research program that's looking at sending a tiny spacecraft to the nearest stars.

The US$100 million plan is to push these probes out at speeds up to a fifth of the speed of light. To do this would require huge technological innovation, but it's certainly not beyond the bounds of possibility.

But if the project is to bear fruit, where should these minute spacecraft be sent? The first suggested target is the Alpha Centauri system, the closest stars to the solar system.

The first stop on an interstellar journey

Alpha Centauri appears a single star when seen with the unaided eye, and is the third brightest star in the night sky. But when observed through binoculars or a telescope, you can see the star is double – a binary star system.

The two bright components, Alpha Centauri A and B, are similar to our sun. One (A) is a bit brighter and bigger than our star and the other (B) a little fainter and smaller.

Alpha Centauri (the left-hand bright star), and Proxima Centauri (circled) are the closest stars to the sun. Beta Centauri (right-hand bright star) is almost a hundred times farther away. **Skatebiker**

They move together in lockstep, orbiting their common centre of mass roughly every 80 years. As they do, they follow an elliptical path, with their closest approach (periapse) roughly 11 times further than the Earth is from the sun.

And the two are not alone; they are accompanied by Proxima Centauri. Proxima is a dim red dwarf star, about an eighth the mass of the sun.

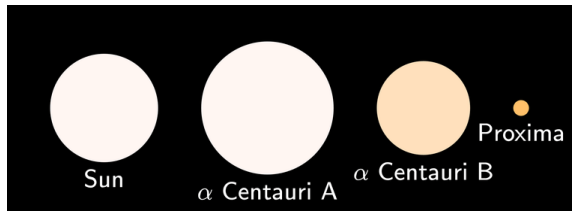
It currently lies a little closer to the Solar system than the other two, and so holds the distinction of being the closest star to the sun. Despite this, it is so dim that it is far too faint to see with the unaided eye.

Sun-like stars, but where are the planets?

As our nearest stars, the Alpha Centauri system has been an obvious target for the search for exoplanets. Dedicated search programs, such as the Mt John Alpha Centauri Project, look at the stars every single clear night, trying to uncover even the slightest hints that they might host planets.

Other programs on the world's largest telescopes observe less frequently, but with exquisite precision.

The result? Well, a few years back, the discovery of a planet around Alpha Centauri B was announced to much fanfare.



The relative sizes and colours of the stars in the Alpha Centauri system and the sun. **David Benbennick**

Had that planet been real, spotting it would have been groundbreaking. A tiny, broiled world, skirting the top of the star's atmosphere.

Sadly, though, as more observations have come in, the planet's existence has fallen into doubt. An extensive reanalysis has effectively added it to the pile of planets that never were.

So why go to Alpha Centauri?

Given that Alpha Centauri is currently viewed as a planet-free zone, why would we want to go there?

Probably the first and foremost reason is that it is nearby, closer than any other star. If the new spacecraft were to achieve the proposed fifth of the speed of light, it would only take 21 years or so to get there (depending on the time taken to accelerate). That is far shorter than the travel time to any other known star.

Sending our first probes out to Alpha Centauri would mean we get our first closeup look at another star, far sooner than for any other known star. We'd also get a two-for-one peek, whizzing past Alpha Cen A and B up-close and personal.

We'd even get a wealth of data on Proxima Centauri, thrown in for good measure.

We couldn't get all that close, though, since these spacecraft are going to be more like bullets than racing cars, fired outward from Earth.

And if there are planets around these stars, then we'd see them. In fact, if there are planets there, they'd likely be found before our tiny explorers reach the area (given the rate at which our techniques and telescopes are improving).

So we'd be able to let the spacecraft know, and plan its observations to take advantage.

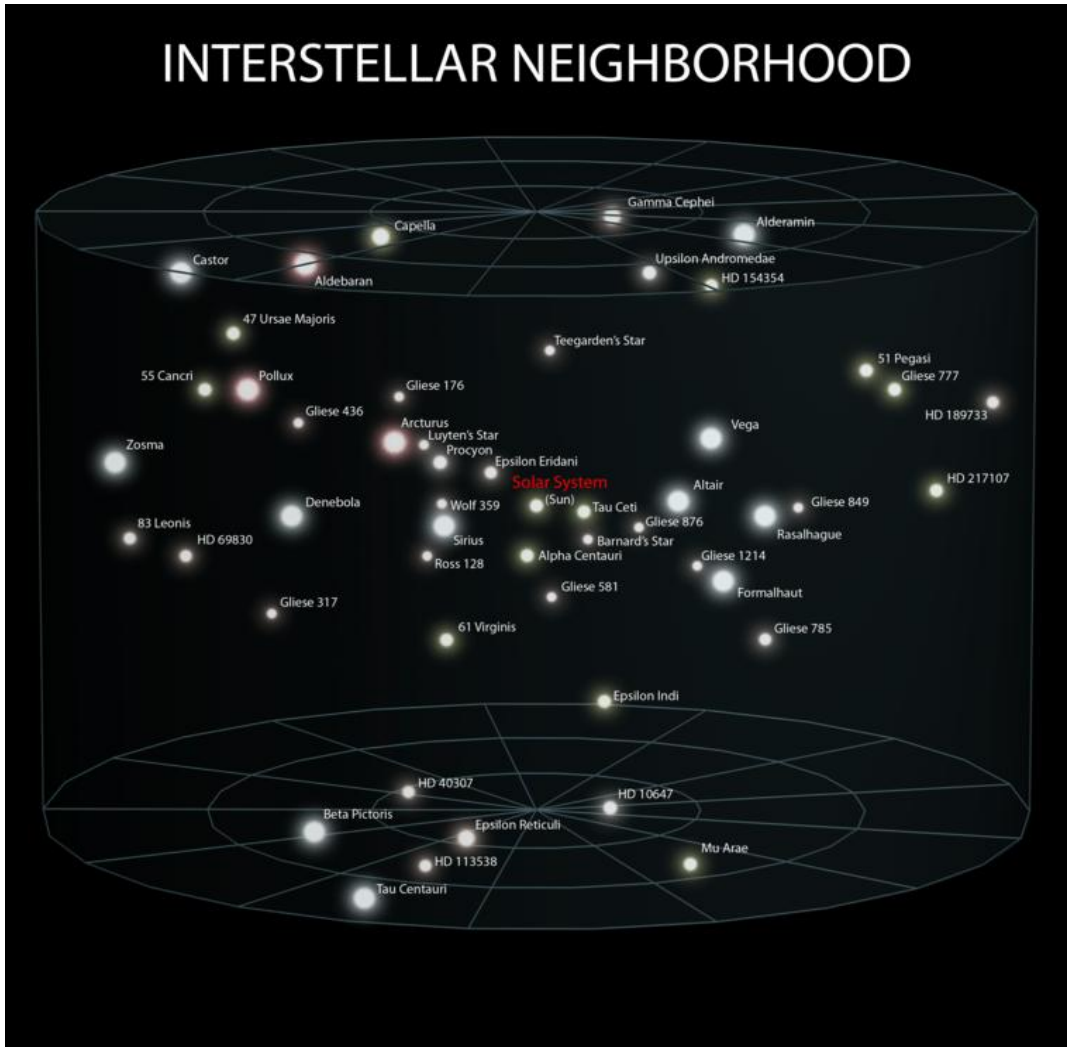
Looking further afield

Let's say the mission to Alpha Centauri is a success. Where should we go next?

One exciting target lies just a little further away than the stars in our table (above) and that's Epsilon Eridani. At just 10.5 light years distant (a travel time of a meagre 55 years for our tiny explorers), it is still one of our nearest neighbours.

Where Alpha Centauri is a multiple star system, with its sun-like stars so close as to render the formation of truly Earth-like planets challenging, if not impossible, Epsilon Eridani is a solitary wanderer, just like the sun.

A little smaller and dimmer than our star, it is known to have two disks of debris orbiting around it. Again, this is just like our sun. The inner disk looks a bit like our asteroid belt, around the same distance, around the same size.



The relative locations of some famous stars, relative to the sun. **Andrew Z Colvin**

Observations have revealed the presence of at least one massive planet in the system, moving on an orbit just outside the inner asteroid belt. Just like Jupiter in our solar system. There may well be others, lurking and awaiting discovery.

If we want to explore a system that might just be uncannily like our own, then Epsilon Eridani is probably the place we should look. But with a travel time of more than 50 years with the proposed technology, it makes sense to shoot for the closest stars first.

All aboard for Alpha Centauri!

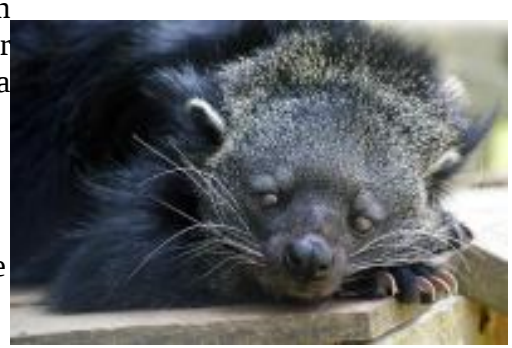
http://www.eurekalert.org/pub_releases/2016-04/du-wbs041316.php

Why bearcats smell like buttered popcorn

Researchers pinpoint chemical compound that gives rare animal its popcorn-like scent

DURHAM, N.C. -- The bearcat. The binturong. Whatever you call this shy, shaggy-haired creature from Southeast Asia, many people who have met one notice the same thing: it smells like a movie theater snack bar.

Most describe it as hot buttered popcorn. And for good reason -- the chemical compound that gives freshly made popcorn its mouthwatering smell is also the major aroma emitted by binturong pee, finds a new study.



Most people have never heard of a binturong, let alone caught a whiff of one up close. But for many zookeepers, the smell wafting from the binturong enclosure is so striking that they name their resident binturongs after the popular snack.

The binturong, or bearcat, is neither a bear nor a cat, but a shy member of the civet family that lives in the rainforests of Southeast Asia. Binturongs owe their popcorn-like scent to a chemical compound in their urine that also happens to be the major aroma compound in toasted bread and cooked rice. **Photo courtesy of Carolina Tiger Rescue**

Solitary animals that rarely come face to face, binturongs use their roasty, popcorn-like aroma as a calling card to say "this is my turf" and find potential mates. Previous studies searched for compounds in secretions from the scent glands under the binturong's tail that could explain its signature scent, but nothing turned up.

In a paper appearing online in the journal The Science of Nature - Naturwissenschaften, researchers analyzed urine samples collected during routine physical examinations of 33 binturongs at Carolina Tiger Rescue, a nonprofit wildlife sanctuary in Pittsboro, North Carolina.

Binturongs pee in a squatting position, soaking their feet and bushy tails in the process. They also drag their tails as they move about in the trees, leaving a scent trail on the branches and leaves behind them.

Using a technique called gas chromatography-mass spectrometry, the researchers identified 29 chemical compounds in the animals' urine. The one compound that emanated from every sample was 2-acetyl-1-pyrroline, or 2-AP -- the same compound that gives popcorn its tantalizing scent.

What's more, 2-AP was among the few compounds that lingered and became more dominant over time, a fact the researchers discovered when a rush airmail shipment of frozen binturong urine was delayed on a hot tarmac en route to co-author Thomas Goodwin of Hendrix College in Arkansas for analysis.

Males secrete more 2-AP than females. "The fact that the compound was in every binturong we studied, and at relatively high concentrations, means it could be a signal that says, 'A binturong was here,' and whether it was male or female," said first author Lydia Greene, a graduate student at Duke University.

The compound 2-AP normally forms in popcorn during the popping process, when heat kicks off reactions between sugars and amino acids in the corn kernels. The cooking produces a variety of new odor and flavor molecules in a chemical reaction called the Maillard reaction. The same compound is also responsible for the comforting aromas of toasted bread and cooked rice.

The question was: how do they do it? "If you were to make this compound, you would have to use temperatures above what most animals can achieve physiologically," said Christine Drea, a professor of evolutionary anthropology at Duke who led the study. "How does this animal make a cooking smell, but without cooking?"

It could be that binturong pee smells funny because of something they eat. The team searched for 2-AP in the binturongs' kibble, the one cooked item in their diet, but they didn't detect any.

A more likely explanation, the researchers say, is that 2-AP is produced when binturong urine comes in contact with bacteria and other microorganisms that live on the animal's skin or fur or in its gut. Bacteria make smelly compounds as they break down sweat in our armpits in much the same way, Drea said.

The time-release action of the microbes could help the binturongs' urine smell-o-grams last long after the animals move on, an essential mode of communication for solitary animals that rarely encounter each other, the researchers say.

This research was supported by Duke, Hendrix College, and a grant from the National Science Foundation (IOS-1021633). Other authors include Tim Wallen of the Centers for Disease Control and Prevention and Anneke Moresco of the Cincinnati Zoo.

CITATION: "Reproductive Endocrine Patterns and Volatile Urinary Compounds of Arctictis Binturong: Discovering Why Bearcats Smell Like Popcorn," Lydia Greene, Timothy Wallen, Anneke Moresco, Thomas Goodwin and Christine Drea. The Science of Nature - Naturwissenschaften, April 7, 2016. DOI: 10.1007/s00114-016-1361-4

http://www.eurekalert.org/pub_releases/2016-04/uoih-sdl041316.php

Study discovers link between cancer and autism

UI researchers find patients with autism have increased gene mutations that drive cancer, but lower rates of cancer

A group of University of Iowa researchers has shown that although patients who have been diagnosed with an autism spectrum disorder (ASD) have a higher burden of mutations in cancer-promoting oncogenes, they actually have lower rates of cancer.

The multidisciplinary team, led by Benjamin Darbro, MD, PhD, assistant professor of medical genetics in the Stead Family Department of Pediatrics at the UI Carver College of Medicine, analyzed large, publicly available genomic databases of patients with autism and found that, compared to a control set , autistic patients have significantly higher rates of DNA variation in oncogenes. The team followed up this result with an analysis of the University of Iowa Hospitals and Clinics' electronic medical record (EMR) and discovered that patients with a diagnosis of autism are also significantly less likely to have a co-occurring diagnosis of cancer.

"It's a very provocative result that makes sense on one level and is extremely perplexing on another," Darbro says.

The study was published recently in the journal PLOS ONE: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0149041.

Darbro and his team used exome sequencing data from the ARRA Autism Sequencing Collaboration and compared that data to a control cohort from the Exome Variant Server database. They found that rare, coding variants within oncogenes were greatly enriched in the ARRA ASD cohort. By comparison, variants were not significantly enriched in tumor suppressor genes.

To ensure that the genetic differences were not simply technical artifacts but actually bona fide differences in genetic architecture in autism, the researchers ran numerous controls. As expected, they found that individuals with autism had many more DNA variations in genes previously associated with autism, epilepsy, and intellectual disability compared to control individuals. There was no difference between the autism and control groups when they examined genes involved in other, unrelated conditions such as skeletal dysplasia, retinitis pigmentosa, dilated cardiomyopathy, and non-syndromic hearing loss.

They then turned their attention to the EMR at UI Hospitals and Clinics and conducted a retrospective case-control analysis comparing 1,837 patients with autism spectrum disorder to 9,336 patients with any other diagnosis, and determined what proportion of each group of patients carried a cancer diagnosis. They found that for children and adults with ASD there appeared to be a

protective effect against cancer; 1.3 percent of patients with ASD also had a diagnosis of cancer compared to 3.9 percent of the control patients. However, the protective effect was strongest for the youngest group of patients and decreased with age.

For those individuals with autism who were under 14 years of age, the odds of having cancer were reduced by 94 percent compared to individuals in the same age range without autism. Both males and females with ASD demonstrated the protective effect.

When the research team determined the rates of other systemic diseases besides cancer in the autistic population, such as high blood pressure and diabetes, they found no relationship. Furthermore, unlike what they found for autism, they found no relationship with cancer when they examined the rates of other common conditions such as heartburn (esophageal reflux), allergies (allergic rhinitis), eczema (atopic dermatitis), and short stature. This demonstrated that the inverse relationship observed between autism and cancer is not due to a technical artifact.

Autism spectrum disorder is a general term for a group of disorders that affect brain development. Autism is characterized by impaired social interaction, verbal and nonverbal communication skills, and repetitive behaviors. As Darbro points out, autism is also one symptom of many inherited cancer syndromes caused by mutations in a single gene. In fact, several genes implicated in causing hereditary tumor syndromes overlap with those involved in syndromic causes of neurodevelopmental disorders such as autism.

"The overlap in genes between those known to promote cancer and those implicated in syndromic neurodevelopmental disorders is not new, but what we've shown is that this overlap is much broader at the genetic level than previously known and that somehow it may translate into a lower risk of cancer," Darbro says.

Researchers also ran their datasets through stringent control analyses, examining the autism cohort for differences in genes associated with diseases other than cancer. They found that while patients with autism showed enrichment of variation in genes linked with autism (epilepsy and intellectual disability) they were not enriched for variation in genes linked to unrelated disorders including retinitis pigmentosa, dilated cardiomyopathy, and non-syndromic hearing loss. These genetic controls demonstrate that the team's findings are not simply technical artifacts of differences in sequencing coverage, but reflect the genetic architecture of an autism cohort.

The findings raise questions that might have implications for new ways of treating both cancer and ASD. For example, could the genetic variants that seem to provide protection against cancer in people with ASD, be exploited to develop new anti-cancer treatments? Or could current cancer drugs that target the genetic pathways found to overlap with ASD also be useful for treating ASD? This last question is already being pursued by other scientists in clinical trials testing the potential benefits of anti-cancer drug for autism patients.

Other members of the research team include Rohini Singh, MD, MPH, M. Bridget Zimmerman, PhD, Vinit Mahajan, MD, PhD, and Alexander Bassuk, MD, PhD.

http://www.eurekalert.org/pub_releases/2016-04/asfg-cto041316.php

Certain types of polyps may warrant keeping closer tabs on the colon

Being on the lookout for certain features of polyps may help physicians keep a closer eye on patients at risk for colorectal cancer.

Downers Grove, Ill - Starting at age 50, or earlier with certain risk factors, patients are advised to be screened for colon cancer at regular intervals. Colonoscopy is an effective screening test because it allows doctors to find and view individual polyps (growths), and to remove them before they become cancerous.

Adenomas are polyps (small growths in the lining of the colon) that can vary in their size and shape, but are potentially precursors to colon cancer. Removal of these polyps reduces the risk of colon cancer. Flat adenomas are precancerous polyps that do not have a typical polyp- like appearance during endoscopy.

A new study in GIE: Gastrointestinal Endoscopy, the journal of the American Society for Gastrointestinal Endoscopy (ASGE), "Prevalence of advanced histological features and synchronous neoplasia in patients with flat adenomas," indicates that a patient who had at least one flat adenoma had a higher chance of having multiple lesions with more advanced changes.

The researchers looked at data from three clinical trials conducted at two medical centers that included patients undergoing screening or surveillance colonoscopy. The location, size, form and structure of each removed polyp was documented and sent for microscopic examination.

A total of 2931 polyps were removed in 1340 patients. Of the 1911 adenomas (65.2%), 293 (15.3%) were flat. The analysis showed that the presence of at least one flat adenoma was a predictor of the presence of a large adenoma, adenomas with advanced microscopic features, and three or more adenomas.

The authors concluded that flat adenomas are associated with more frequent occurrence of large and advanced adenomas as well as multiple adenomas appearing at the same time. This could mean that patients with these results should be examined more often and more closely than patients with other types of polyps.

http://www.eurekalert.org/pub_releases/2016-04/uotm-pwh041316.php

People with hepatitis C are two to five times more likely to develop certain head and neck cancers

MD Anderson study first to find association with new cancer types; findings have strong implications for screening and treatment

Long associated with liver cancer and non-Hodgkin's lymphoma, a study from The University of Texas MD Anderson Cancer Center reveals for the first time that the hepatitis C virus (HCV) is associated with certain head and neck cancers. The findings, published in the Journal of the National Cancer Institute, could have significant implications for both the screening of those with the virus and the treatment of those with head and neck cancers.

Hepatitis C, the most common blood-borne infection in the U.S., is a virus that affects up to 1.5 percent of the population. It's estimated that as many as 3.9 million are chronically infected with the virus, according to the researchers.

In the last few years, new antiviral drugs have made it possible to cure more than 90 percent of the HCV population, says Harrys A. Torres, M.D., associate professor, Infectious Disease, Infection Control and Employee Health. The antivirals are oral medications taken once or twice daily with almost no side effects, he explains.

In 2009, MD Anderson opened what remains the only clinic of its kind at a comprehensive cancer center to address the unmet medical needs of its patients with HCV.

"Obviously, a hepatitis C infection could impact how patients respond to their cancer therapy. We also realized that many of our hepatitis patients were excluded from clinical trials. Now that many with hepatitis C can be cured, it is important that we first address and potentially cure the virus, so that they can have access to necessary cancer therapy."

When Torres started the clinic, he expected to see a number of patients with liver cancers and non-Hodgkin's lymphoma, as these have documented associations with HCV of 48-fold and two- to three-fold increased risk, respectively. Other recent studies have recognized HCV's increased association with additional cancers, says Torres, but there was no known association with a significant number of head and neck cancers.

"To our surprise, we saw a number of head and neck cancer patients who tested positive for the hepatitis C virus. With this observation we began to wonder if there was an undiscovered correlation between the two. Our findings tell us that the association between hepatitis C and oropharyngeal and nonoropharyngeal cancers is as high as its link to non-Hodgkin's lymphoma."

Oropharyngeal cancers occur in the oropharynx, or the middle part of the throat, including the back one-third of the tongue, the soft palate, tonsil, and side and back walls of the throat. Nonoropharyngeal cancers include those occurring in the oral cavity, nasal cavity and larynx.

For the retrospective, case-controlled study, the researchers identified 34,545 MD Anderson patients who were tested for HCV between 2004 and 2014. All patients were tested for HCV antibodies and viral RNA tests were used to confirm chronic infection, when available.

The researchers included 409 head and neck cancer patients as case subjects (164 with oropharyngeal and 245 with nonoropharyngeal). Also paramount to the research, said Torres, was to control for smoking, a major risk factor for head and neck cancers. Therefore, they identified 694 control subjects, all with a diagnosis of smoking-related cancers (378 with lung, 168 with esophageal and 148 with bladder).

The study revealed that 14 percent of patients with oropharyngeal cancers tested positive for HCV antibodies, compared to just 6.5 percent in the control group. In those with nonoropharyngeal cancer, 20 percent tested positive for HCV antibodies. All findings were highly statistically significant.

Compared to the controls, the researchers found that the risk for HCV patients of developing specific head and neck cancers was increased 2.4 times for oral cavity cancers, 2.04 times for oropharynx cancers, and 4.96 times for larynx cancers.

Of note, 145 of all the oropharyngeal cancer patients were also tested for human papillomavirus (HPV), allowing researchers to compare possible associations between the two viruses. Patients with HCV-positive head and neck cancers were more likely to also test positive for HPV.

This finding, says Torres, is an area of great interest for future research study. Given the association found between the two viruses in this patient population, Torres and colleagues plan to look at other HPV-associated cancers and their possible link to HCV, under MD Anderson's Moon Shots Program.

Torres notes that it will be important to screen for HCV because treatment with antiviral drugs may possibly prevent cancer from ever developing, as reported for liver cancers and non-Hodgkin's lymphoma.

It may also impact treatment for patients who have already developed cancer. In fact, for patients with HCV and some indolent non-Hodgkin's lymphoma, Torres notes that the National Comprehensive Cancer Network guidelines now recommend that the HCV be treated first, given that it is curable. In some cases, explains Torres, the lymphoma has disappeared upon treating the HCV with antiviral therapies.

With these findings, MD Anderson plans to screen and treat all head and cancer patients with HCV and follow their outcomes.

Educating both the general hepatology and infectious disease communities -- those primarily treating patients with HCV -- is critical so they understand HCV impacts not only the liver, but is a systemic infection.

"What we are trying to make all understand is that this is an infection that has consequences -- and it's an infection we can cure," says Torres.

The study was supported by the NIH/NCI, award number P30CA016672 and was the recipient of the 2015 Conquer Cancer Foundation of American Society of Clinical Oncology Merit Award.

In addition to Torres, other authors on the all-MD Anderson study include: Parag Mahale, M.D., and Ella J. Ariza-Heredia, M.D., both of Infectious Disease, Infection Control and Employee Health; Erich M. Sturgis, M.D., Head and Neck Surgery; and David J. Tweardy, MD., Infectious Diseases and Molecular and Cellular Oncology. Harrys A. Torres is a consultant for Gilead Sciences, Janssen Pharmaceuticals, Inc., Merck & Co., Inc., Vertex Pharmaceuticals, Novartis, Genentech, Astellas, Pfizer, and Theravance, Inc., and received research grants from Gilead Sciences, Merck & Co., Inc., and Vertex Pharmaceuticals. David J. Tweardy has ownership interests in StemMed, Ltd. All other authors have no conflicts of interest to disclose.

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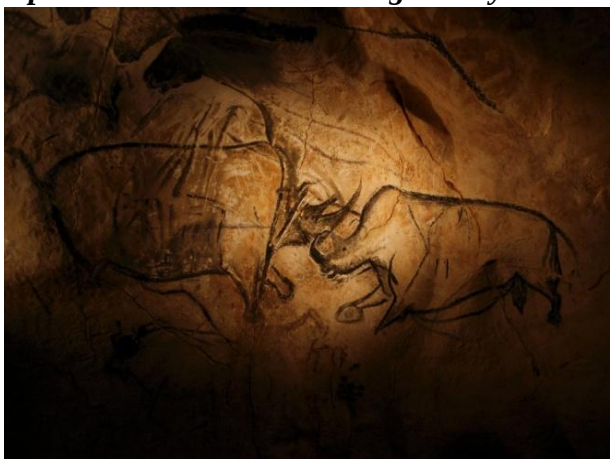
New Timeline Zeros in on the Creation of the Chauvet Cave Paintings

Radiocarbon dates help reconstruct the cave's long history

By Jason Daley



In 1994, amateur spelunkers discovered a cave near the Ardeche River in southern France that contained hundreds of handprints and black and red line drawings. The images depict ancient animals, like horses, rhinos and the now-extinct auroch. Chauvet Cave, as it has come to be called, contains the oldest known figurative art in the world.

Line drawing of fighting rhinoceroses in Chauvet Cave in southern France, which contains the oldest known cave art in the world. **(Javier Trueba Rodriguez/Science Photo Library/Corbis)**

The site has garnered much attention in recent years, being named a UNESCO World Heritage Site and featured in Werner Herzog's documentary, Cave of Forgotten Dreams. But despite the attention, Chauvet still holds many mysteries, and a new study helps straighten out the cave's timeline.

The study, published this week in Proceedings of the National Academy of Science, uses 259 radiocarbon dates from the rock art pigments as well as the materials showing human activity in the cave, including bones and charcoal.

Researchers previously believed that most of the paintings in the cave were created around 36,000 years ago, with a second wave roughly 5,000 years later.

The new study constructs a more accurate timeline suggesting that artists worked there from 37,000 to 33,500 years ago and again from 31,000 to 28,000 years ago, writes Deborah Netburn at the Los Angeles Times.

Depiction of horses in Chauvet Cave in southern France. (Javier Trueba Rodriguez/Science Photo Library/Corbis)

The research suggests that though two different groups visited the site over several thousand years to produce art, neither lived in the cave. Each wave of artistry ended with a rock fall that blocked the cave from human entrance, writes Netburn.

Yet the timeline still isn't quite complete. "Only the black paintings have been dated," Quiles tells Netburn.

"The dating technique for the red paintings has yet to be developed." So scientists don't know yet if the red paintings are as old as the black. The current dates of the charcoal drawings show that all but two are from the oldest period of occupation.

The dating also shows that cave bears, an extinct species weighing almost 900 pounds, also used the cave 48,500 to 33,300 years ago, though its unlikely they were there with the humans.

"Now, we understand that even at this time, humans were capable of creating such magnificent and elaborate artworks," Quiles tells Léa Surugue of The International Business Times.

"The drawings are full of dynamism, they reflect a real desire to transmit something to an audience."

http://bit.ly/1YAG96T

Cancerous Coconspirators: Tumor Cells That Travel Together Spread Cancer

Contrary to expectations, most metastatic tumors are seeded not by single cells from the primary tumor but by clusters of cancer cells

By Viviane Callier on April 1, 2016

Metastasis is behind the vast majority of cancer deaths: when cancer cells break away from a tumor and lodge in new places, the disease becomes harder to treat. A new study shows that, contrary to expectations, most metastatic tumors are seeded not by single cells from the primary tumor but by clusters of diverse cancer cells that leave in a group and travel through the bloodstream together. The cells in these circulating clusters communicate with one another and produce specific proteins that could be used as drug targets or biomarkers for risk of metastasis.

To determine how metastases form, cancer cell biologist Andrew Ewald and his team at Johns Hopkins University created tumors in mice by injecting a mixture of multicolored cancer cells into the rodents' mammary glands. If tumors originated elsewhere from single cells, then they would show up under the microscope as one uniform color. If instead tumors were seeded by clusters of cells, then they would grow into rainbow-colored balls. The team found that about 95 percent of the cancers that formed were in fact multicolored and therefore derived from multiple cells (lung metastasis, above).

In a second experiment, the researchers examined hundreds of cancerous cells grown together in a petri dish but placed so that they were not touching. Almost all of them died. In contrast, cells in another dish that were aggregated into clusters subsequently formed more colonies—even though there were fewer "seeds" to begin with. "Controlling for cell number, there is more than a 100-fold increase in efficiency of metastasis formation in the aggregated cells," Ewald says. The findings were published in February in the Proceedings of the National Academy of Sciences USA.

It is not yet entirely clear why the aggregated cells survive and metastasize more effectively, but it is likely that cooperation among tumor cells within clusters—for example, exchanging signaling molecules—protects against cell death in the bloodstream or at distant sites, explains Joan Brugge, a cancer cell biologist at Harvard Medical School who was not involved in the study.

As for potential benefits to patients, Ewald's team also found that the traveling clusters share molecular features and nearly all make the protein keratin 14. "We could potentially use this [insight] to develop targeted ways to attack all the metastatic cells," Ewald says. The idea would be to wipe out those cells wherever they are in the body, whether or not they are proliferating—a different approach from most standard therapies, which focus on attacking rapidly proliferating cells but not the circulating, invasive ones that initiate secondary cancers.

http://www.eurekalert.org/pub_releases/2016-04/wuis-fww041416.php

For women, waiting to have children until after 30 minimizes career income losses

Findings hold true for those with or without college degrees

Working women who want to minimize career income losses related to motherhood should wait until they are about 30 years old to have their first children, suggests new research from Washington University in St. Louis.

The findings, published in PLOS ONE, hold true regardless of whether a woman has earned a college degree.

For college graduates and those without a college degree, the researchers found lower lifetime incomes for women who gave birth for the first time at age 30 or younger. The hit was particularly stark for women without college degrees who had their first children before age 25.

"The findings highlight the financial trade-offs women make when considering their fertility and career decisions," said Man Yee (Mallory) Leung, PhD, a postdoctoral research associate at Washington University School of Medicine. "Other studies have focused on the effect of children on women's wages, but ours is the first to look at total labor income from ages 25 to 60 as it relates to a woman's age when she has her first baby."

For this study, Leung and colleagues analyzed work experience, birth statistics and other household data of nearly 1.6 million Danish women ages 25-60 from 1995 to 2009 to estimate how a woman's lifetime earnings are influenced by her age at birth of first child.

Study co-authors are Raul Santaeulalia-Llopis, an assistant professor of economics in Arts & Sciences at Washington University, and Fane Groes, an economics professor with the Copenhagen Business School in Denmark.

Denmark is a gold mine for researchers because the nation collects socioeconomic and health register data on 100 percent of the population. The Danish experience supports the notion that children can substantially affect the potential career path of their mothers.

"Children do not kill careers, but the earlier children arrive the more their mother's income suffers. There is a clear incentive for delaying," said Santaeulalia-Llopis. "Our main result is that mothers lose between 2 and 2.5 years of their labor income if they have their first children before the age of 25."

Researchers arrived at these estimates by calculating average annual salaries for each woman and using this average as a measuring stick for both short- and long-term income losses associated with age at birth of first child. Income losses were estimated for women who had their first children before age 25 and for each subsequent three-year age range (ie. 25-to-28), with the last range being 40 years of age or older.

Other findings include:

College-educated women who had children before age 25 lose about two full years of average annual salary over their careers; women in this category with no college degree lose even more, forgoing about 2.5 years of average annual salary during their working careers.

Women who first give birth before age 28, regardless of college education, consistently earn less throughout their careers than similarly educated women with no children.

College-educated women who delay having their first children until after age 31 earn more over their entire careers than women with no children.

Noncollege-educated women who give birth after age 28 experience a short-term loss in income but eventually catch up with the lifetime earnings of women who have no children. Those who delay their first children until age 37 add about a half year of salary to lifetime earnings.

In terms of short-term income loss, women with no college education take a greater hit than their college-educated counterparts in almost every age range, with one notable exception - those who first give birth from ages 28 to 31. Here, college-educated women experience income losses equal to 65 percent of average salary, compared with 53 percent for women with no degree. Both groups lose less short-term income the longer they delay having their first children.

The researchers noted these income trends while studying the effects of in vitro fertilization on women's labor and fertility choices. Here, they found a general shift toward women having a first child later in life, with a greater proportion of college-educated women pushing first birth into the 28-34 age range.

"The emergence of IVF technology has a significant impact on labor trends," said Leung, who has a doctorate in economics.

As this trend progresses, more women will have the option to consider delaying motherhood until later in their careers, a choice that can have significant impact on lifetime earning potential, the researchers suggest.

The impact of age at first birth on lifetime earnings may be even more dramatic in countries such as the United States, where women generally receive 12 weeks of unpaid leave. Denmark's more generous policies provide new mothers with up to 18 months of paid maternity leave.

"The fact that highly productive women who have children earlier enter a lower income path is not only a loss for them, but for the entire society," said Santaeulalia-Llopis. "If children are shutting down women's career growth and these pervasive effects vanish after the mid-30s, then we should start taking seriously the case for employer-covered fertility treatments. But we need to dig deeper to establish causation and assess costs and benefits."

http://www.eurekalert.org/pub_releases/2016-04/cu-dco041416.php

Don't count on strangers in medical emergencies, especially if you're African-American

People who have a medical emergency in a public place can't necessarily rely on the kindness of strangers

In the first study of its kind, Cornell sociologists have found that people who have a medical emergency in a public place can't necessarily rely on the kindness of strangers. Only 2.5 percent of people, or 1 in 39, got help from strangers before emergency medical personnel arrived, in research published April 14 in the American Journal of Public Health.

For African-Americans, these dismal findings only get worse. African-Americans were less than half as likely as Caucasians to get help from a bystander, regardless of the type of symptoms or illness they were suffering - only 1.8 percent, or fewer than 1 in 55 African-Americans, received assistance. For Caucasians, the corresponding number was 4.2 percent, or 1 in 24.

People in lower-income and densely populated counties were also less likely to get help, the researchers said. Conversely, those in less-densely populated counties with average socioeconomic levels were most likely to get assistance.

"It's very surprising and disappointing to find such low rates of people helping each other and that African-American patients and those in poorer counties are left to wait longer for help," said lead author Erin York Cornwell, assistant professor of sociology and Sesquicentennial Faculty Fellow. York Cornwell wrote the study with Alex Currit, a doctoral student in the field of sociology at Cornell.

York Cornwell points out that the types of support bystanders could offer require little to no training, and could include offering a glass of water, covering someone with a blanket, putting pressure on a wound or assisting with medications.

"We find evidence that bystanders can provide help in a huge range of scenarios, but the rates of assistance are so incredibly low," she said.

In the paper, "Racial and Social Disparities in Bystander Support During Medical Emergencies in U.S. Streets," York Cornwell and Currit analyzed data on nearly 22,500 patients from the 2011 National Emergency Medical Services Information System (NEMSIS) data set, which they linked to characteristics of counties where the incidents occurred. The data came from emergency medical services providers, who fill out a form after each ambulance call. The form includes an indication of

what type of help, if any, patients received from bystanders before medical staff arrived on the scene. Because of underrepresentation of Latinos in the data, the researchers focused on African-Americans and Caucasians.

York Cornwell thinks that disparities in receiving help could stem from differences in the social context of the neighborhoods where emergencies occurred. Sociological research suggests that socioeconomic disadvantage within an area shapes how people relate to each other. For example, neighborhoods that have a high degree of poverty and residential instability tend to have fewer social institutions like synagogues, churches and community organizations - and this can make it difficult for residents to get to know each other.

"When you have a neighborhood environment where people don't know each other, where people are wary of strangers on the street, and someone needs help right in that moment, people may be more likely to just look away or keep walking without lending a hand," she said.

Sociologists have used this theory to explain disparities in the development of stress-related illnesses over the long term. But York Cornwell is applying the theory to brief, urgent moments when people could use help but don't get it; over time those moments could add up and contribute to health disparities across racial groups, she said.

"Disparities in health across race are persistent and growing in many cases. We don't really have a good understanding of the reasons why we see such large disparities. These day-to-day processes could be an important contributor," York Cornwell said.

The study was supported in part by Cornell's Institute for the Social Sciences, where York Cornwell is a faculty fellow.

http://www.eurekalert.org/pub_releases/2016-04/uoe-bpd041416.php

Blood pressure difference linked to heart disease risk

Blood pressure differences between each arm can signal an increased risk of dying of heart disease, even in healthy people, a new large-scale study has found

The University of Exeter Medical School has led an analysis of more than 3,000 people in Scotland who each had blood pressure measurements taken from both arms, published today in the British Journal of General Practice. Researchers say the findings show the importance of routinely measuring blood pressure in both arms.

Up to now, such research has mainly focussed on people who have already encountered heart disease or hypertension. Now, the new research, funded by RCGP, The South West GP Trust, NIHR and the NIHR CLAHRC South West Peninsula (PenCLAHRC), analysed a cohort of people who had been identified as having a greater risk of heart disease or hypertension, but who had not yet had any episode of either. They were healthy, but identified as being at higher risk of cardiovascular disease when recruited to the study.

The team found that a difference in systolic blood pressure measurements between the two arms (of 5mm Hg) was associated with almost double the risk of death from heart-related disease, when the cohort was followed up over a period of eight years. In the analysis, which was based on one pair of blood pressure readings, 60 per cent of the cohort had this difference. The researchers wanted to examine this single check of blood pressure in both arms to reflect currently available measurement methods in general practice. It is known, however, that the proportion of people confirmed to have a blood pressure difference will fall substantially on repeated testing.

Dr Chris Clark, a GP and NIHR Clinical Lecturer at the University of Exeter Medical School, said: "Current guidelines state that blood pressure should be measured in both arms when assessing patients for hypertension, but often this advice is not followed due to time constraints or lack of awareness amongst clinicians. For accuracy, to overcome natural blood pressure fluctuations, it is important to test both arms simultaneously to confirm any difference. However, our previous research has found that if one arm is tested before the other, with just a single pair of measures, it is still possible to identify nearly all those who will prove to have an inter-arm difference on further testing. This new study confirms that people identified with only a single pair of measurements are still at higher risk of heart disease than those without an inter-arm difference. Repeated assessments to confirm the existence of an inter-arm difference, and suitable lifestyle advice, can then be targeted at individuals identified in this way, and could make a difference to their future health. The next stage of our research is to quantify the extra risk that an inter-arm difference indicates, and after that, to discover the extent to which this can be protected against."

The cohort was from the Aspirin for Asymptomatic Atherosclerosis (AAA) trial, a randomised controlled trial conducted from April 1998 to October 2008. That study, led by the University of Edinburgh and funded by the British Heart Foundation, recruited 3350 males and females aged 50-75 years living in central Scotland and free of pre-existing clinical cardiovascular disease. The study involved taking blood pressure from both arms, and the Exeter team worked with the authors of the AAA trial to analyse their data.

Professor Jeremy Pearson, Associate Medical Director at the British Heart Foundation which funded the initial clinical trial, said: "Differences in blood pressure between arms has previously been linked with an increased risk of dying from cardiovascular disease in those that already have the condition or are at very

high risk. But this study found that healthy people without pre-existing heart disease may also have an increased risk. The findings support current guidance that blood pressure should be measured in both arms when assessing someone for hypertension."

The study, Inter-arm blood pressure difference and mortality: a cohort study in an asymptomatic primary care population at elevated cardiovascular risk, is published in the print edition of the British Journal of General Practice on April 29, 2016. Authors are Christopher E Clark, Rod S Taylor, Isabella Butcher, Marlene CW Stewart, Jackie Price, F Gerald R Fowkes, Angela C Shore and John L Campbell. C Shore

http://bit.ly/1r8jAwd

Wireless signal sent through meat fast enough to watch Netflix

Your pacemaker could soon be streaming video

By Aviva Rutkin

Your data rate is about to be beefed up. Researchers have fired a wireless signal through slabs of pork and beef at speeds fast enough to transmit high-definition video. The technique, which the team has nicknamed "meat-comms", could help doctors interact better with medical devices implanted in our bodies.

Existing implants use radio to communicate with the outside world. But radio waves do not travel well through the soft tissue in our bodies. Ramping up the power to improve the signal can be dangerous, as it heats up the tissue it passes through.

These limitations have stopped us developing medical implants that can send and receive useful amounts of wireless data, says Andrew Singer, at the University of Illinois at Urbana Champaign. So his team turned to ultrasound instead.

Singer has spent years building ultrasonic systems for the navy and suspected that a similar approach would work well in the body. "You're a big bag of salt water, with some bones and some other tissues," he says. "Communicating in the ocean and communicating in your body are very similar."

Ultrasound is sometimes used to perform surgery without having to cut open the body. High-intensity sound waves focused on a tiny area can burn away unwanted tissue without harming the surrounding area. But Singer was interested in using it to send data.

To test the idea, Singer and his colleagues first submerged their transmitter and receiver in a tank of water. The system transmitted at 120 megabits a second – far faster than most home internet connections – over a distance of two centimetres.

They then tried sending data through meat. The team tested two different types of tissue: a pork loin and beef liver. They suspended the pieces of meat in the water tank and found that the ultrasonic signal passed through both types of meat at speeds of up to 30 megabits a second. That is 1000 times faster than existing implants, which send radio signals through tissue at a maximum of 50 kilobits a second. "You could stream Netflix through the pork loin," says Singer.

"For high-definition video, this is more than sufficient," says Akram Alomainy, at Queen Mary University of London in the UK, who was not involved in the research. Alomainy thinks the technology could be particularly useful for wireless endoscopy, in which a person swallows a pill that broadcasts a video feed from inside their digestive tract. At the moment, wireless endoscopy requires a laptop-sized device placed on the outside of your body to pick up the feed. A system that transmitted using ultrasonic waves would be far less cumbersome.

But Alomainy would first like to see the team send a signal through multiple layers of organs. "We don't just have one organ in our body," he says. "A liver has different properties from the kidney or the stomach." He thinks the data might not move as quickly when it has to travel through different types of tissue.

The meat-comms team is planning to test the approach with real medical implants or living tissue, but the initial results already suggest some exciting future possibilities, says Singer. Software updates could potentially be beamed directly to medical implants without the need to remove them surgically.

He also thinks we could have wireless networks inside us, with an implant in our gut sharing information with one in our liver, for example. For now, that's science fiction, says Singer. "But at the root of science fiction are questions about what is possible. We wanted to show that it was possible."

http://www.medscape.com/viewarticle/861772

Aspirin for Primary Prevention: 2016 USPSTF Recommendations

Taking aspirin after a heart attack or a stroke can literally be lifesaving.

Kenneth W. Lin, MD, MPH

Hi, everyone. I'm Dr Kenny Lin. I am a family physician at Georgetown University School of Medicine, and I blog at Common Sense Family Doctor.

Taking aspirin after a heart attack or a stroke can literally be lifesaving. The benefits of daily low-dose or "baby" aspirin, 81 mg, to prevent a second cardiovascular event are also well established. A more challenging question in primary care is: Who should take aspirin for primary prevention—that is, to prevent a first heart attack or stroke? The issue at stake here is that even if aspirin reduces the *relative* risk for initial cardiovascular events (which it appears to do), in a patient with low *absolute* risk for heart attack or stroke, the small preventive benefit can easily be outweighed by the increased risk for gastrointestinal bleeding.

Since 2009, the US Preventive Services Task Force (USPSTF) has recommended that we encourage men age 45-79 years and women age 55-79 years without known heart disease to use preventive aspirin when the potential benefit of a

reduction in myocardial infarctions or ischemic strokes outweighs the potential harm of bleeding.[1] In practice, I have found this recommendation very challenging to implement. It requires using one of two different calculators to estimate 10-year heart attack or stroke risk, then consulting a table that compares cardiovascular events prevented to bleeding harms by age group. Some patients will have comparable offsetting risks, which then requires clinicians to use shared decision-making to determine whether to start aspirin on the basis of a patient's values and preferences.

Even family physicians who are willing to spend the time to have this complicated discussion with patients about the benefits and risks of aspirin may be concerned by recent analyses that have appeared to contradict the Task Force's guidance. A 2013 meta-analysis[2] contended that the absolute benefits of aspirin for primary prevention were small and generally outweighed by the increased bleeding risk. In 2014, the US Food and Drug Administration advised the general public against using aspirin for primary prevention of heart attack or stroke.[3] Nonetheless, more than one third of Americans age 40 years or older reported taking daily aspirin in a recent national survey, 97% for primary prevention purposes.[4]

Last September, the USPSTF signaled that it was preparing to update its 2009 recommendations on aspirin for the primary prevention of cardiovascular events and include an updated assessment of the benefits of long-term aspirin use in preventing colorectal cancer.[5] The recently finalized recommendations[6] should be much easier to follow. This time around, the Task Force narrowed the age range of patients for whom clinicians should consider preventive aspirin to 50-69 years and removed the previous distinction between men and women, recognizing newer evidence that both sexes benefit from reductions in heart attacks and strokes, as well as a decreased incidence of colorectal cancer. The USPSTF recommends that adults in their 50s start low-dose aspirin if they have a 10% or greater 10-year cardiovascular disease (CVD) risk, do not have bleeding risk factors, and are willing to take aspirin for at least 10 years. Adults in their 60s with similar CVD risk can also consider starting low-dose aspirin but are at higher risk of bleeding and so are less likely to benefit overall. The Task Force found insufficient evidence to assess the balance of benefits and harms of starting aspirin for primary prevention in adults younger than 50 or older than 69.

Some other important points are that preventive aspirin only reduces the future risk for cardiovascular events and colorectal cancer but doesn't appear to affect the numbers of deaths from those conditions. Taking aspirin does not modify the need for adults age 50-75 years to undergo regular colorectal cancer screening. And once a patient decides to start taking aspirin for primary prevention, his or her CVD and bleeding risk factors should be periodically reassessed to make sure that it still makes sense to continue.

Although many patients take aspirin on the advice of their doctors, there are also many adults who start taking aspirin on their own. Some may consider aspirin to be more along the lines of a vitamin supplement and neglect to mention it when asked what medications they are taking. Because only a limited group of patients should use preventive aspirin, family doctors should view the new USPSTF recommendations as an opportunity to make sure that our patients' aspirin use is consistent with the likelihood of health benefits. This has been Dr Kenny Lin for Medscape Family Medicine. Thank you for listening.

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'Wrong' scale used to evaluate results of brain surgery

Scale originally created to monitor the recovery process of stroke victims

Surgery has become a volatile field during the past few years, with study after study challenging prevailing treatment practices. For example, surgical treatment of acute appendicitis and arthroscopic surgery on degenerative knees have been called into question by recent research results reached by Finnish researchers.

In neurosurgery, the evaluation of the success of treatment is challenging. Many patients undergoing surgery are either practically asymptomatic or extremely ill, meaning that the patient cannot him- or herself explain the impact of the surgery.

Consequently, the modified Rankin Scale (mRS) has been commonly used to evaluate outcome and even success of neurosurgical treatment. However, the scale was originally created to monitor the recovery process of stroke victims, not to assess the success of neurosurgery. The mRS runs from 0 to 6, and describes the patient's ability to function in broad terms, with 0 indicating no symptoms and 6 meaning that the patient is deceased. For example, a patient classified as mRS 2 exhibits slight disability, caused by whatever reason.

At least three outcome studies on cerebrovascular surgery which resulted in significant changes to neurosurgical treatment everywhere in the world used the modified Rankin Scale to compare and evaluate treatment results.

A study at the Department of Neurosurgery at the Helsinki University Hospital -- one of the largest neurosurgical units in the western world -- has now for the first time studied whether mRS is suitable for measuring the treatment results of brain surgery.

"We were astonished to see the results which indicate that mRS is very poorly suited to evaluating and reporting on the quality of neurosurgical treatment and related complications," says Dr. Elina Reponen, principal investigator and specialist in anaesthesiology and intensive care medicine.

According to the results, 24% of patients who underwent a normal procedure with no complications were classified with a worse mRS score 30 days after the procedure than before the surgery. This is to say that according to the mRS score, their ability to function decreased even when the treatment had been excellent and free from complications. On the other hand, 28% of patients who had experienced significant complications after surgery received an identical or better mRS score upon release. This means that the mRS score did not reflect the fact that the treatment may have been less than perfect and safe.

"The next surprise came when we found out how difficult it was to get these negative results published," Reponen says.

The non-selective follow-up study monitored patients who underwent brain surgery at the Helsinki University Hospital during one year. This means that the study is based on real patient data from a major academic neurosurgical unit.

"This is the first study examining the applicability of mRS for the assessment of neurosurgical treatment results. Based on the research, we should perhaps re-evaluate the previous studies in which the modified Rankin Scale has been used to measure treatment results and even to compare different forms of treatment. In any case, we are likely to see changes in outcomes reporting ," says Reponen.

"Neurosurgeons rarely conduct extensive research themselves, since their work is hectic and they have scant time for research. Many neurosurgical studies are led by neurologists and radiologists, who understandably choose to employ research methods and indicators which are accepted and established in their own field. However, neurosurgeons should be aware of this and consider participating in the development of the indicators used to measure their work and not outsource this task to people who are less familiar with the field," reasons neurosurgeon Miikka Korja, one of the authors of the new study.

According to Dr. Hanna Tuominen, specialist in anaesthesiology and one of the authors of the study, anaesthesiologists have been pivotal in improving and measuring patient safety in many areas of surgery, and they also have a crucial role to play in neurosurgery.

"The anaesthesiologist is on the side of both the patient and the surgeon. It is in the anaesthesiologist's interests to provide the best possible working conditions for the surgeon and the best possible outcome for the patient. This is why anaesthesiologists have been active in measuring patient safety and the quality of treatment."

http://www.eurekalert.org/pub_releases/2016-04/mc-mcl041516.php

Mayo clinic: Long-term benefits to the liver-kidney transplant

Researchers find lower incidence of chronic damage to the kidney due to rejection and better overall kidney function at 5 years post transplant

ROCHESTER, Minn. -- A new study from physicians at Mayo Clinic in Rochester, found there may be long-term benefits to simultaneous liver-kidney transplantation versus kidney transplantation alone. The study, "Decreased Chronic Cellular and Antibody-Mediated Injury in the Kidney Following Simultaneous Liver-Kidney Transplantation" published recently in the journal Kidney International. Among patients with high and low levels of donor-specific alloantibodies, the study showed those who received simultaneous liver-kidney transplants demonstrated a lower incidence of cellular and antibody-mediated rejection and chronic injury to the kidney, and demonstrated better overall kidney function five years post procedure.

Rejection of transplanted organs can occur within minutes (hyperacute rejection) or days to months (acute) after a transplant. In other cases, the damage takes place over a number of years and can lead to decreased kidney function and, potentially, rejection of the transplanted organ. This is known as chronic kidney injury. While past research has shown that patients who have a combined or simultaneous liver-kidney transplant can be protected from hyperacute and acute rejection, the recent Mayo Clinic study is the first to examine the potential long-term affects of simultaneous liver-kidney transplant and chronic kidney injury or function.

"We know that a healthy liver can reduce the levels of circulating donor-specific alloantibodies, which can lead to rejection of a transplanted organ in kidney transplant recipients," says Timucin Taner, M.D., Ph.D., a transplant surgeon at

Mayo Clinic. "The findings from this study indicate that these positive benefits of a healthy liver in simultaneous liver-kidney transplants may be long-standing and that the liver may have a protective role against cellular rejection, as well"

Mayo Clinic physicians studied kidney biopsies from 68 consecutive liver-kidney transplant recipients, 14 with donor-specific alloantibodies and 54 with low or no donor-specific alloantibodies. These results were compared to biopsies from patients who had received a kidney transplant alone, with a comparable break down of high and low donor-specific alloantibodies.

Factors studied included the overall five-year patient and graft or transplant survival; the incidence of acute rejection and chronic kidney damage; and overall measures of kidney function. Findings indicate that, at five years post-transplant in patients with donor-specific alloantibodies, those who had a simultaneous liver-kidney transplant kidney transplant had a:

7.1 percent rate of acute rejection, compared to 46.4 percent for similar patients who had a kidney transplant alone

No chronic transplant-related kidney injury, compared to 53.6 percent incidence of chronic injury for patients who had a kidney transplant alone

Stable glomerular filtration rate (a measure known as a glomerular filtration rate [GFR], which indicates how well the kidneys are functioning), compared to a decline in GFR of 44 percent for patients who had a kidney transplant alone.

"This study is promising, because it demonstrates the power of a well-functioning liver allograft in modulating host immune responses and positively influencing long-term outcomes of the kidney transplant in simultaneous liver-kidney transplant recipients," says Dr. Taner. "More work is needed to better understand how far this benefit extends beyond transplantation, as well as how immunosupressive therapies impact these outcomes."

http://www.eurekalert.org/pub_releases/2016-04/uow-itm041516.php

In these microbes, iron works like oxygen

A variety of fascinating microorganisms thrive without oxygen

MADISON, Wis. -- A pair of papers from a UW-Madison geoscience lab shed light on a curious group of bacteria that use iron in much the same way that animals use oxygen: to soak up electrons during biochemical reactions. When organisms -- whether bacteria or animal -- oxidize carbohydrates, electrons must go somewhere. The studies can shed some light on the perennial question of how life arose, but they also have slightly more practical applications in the search for life in space, says senior author Eric Roden, a professor of geoscience at UW-Madison.

Animals use oxygen and "reduce" it to produce water, but some bacteria use iron that is deficient in electrons, reducing it to a more electron-rich form of the element. Ironically, electron-rich forms of iron can also supply electrons in the opposite "oxidation" reaction, in which the bacteria literally "eat" the iron to get energy.

Iron is the fourth-most abundant element on the planet, and because free oxygen is scarce underwater and underground, bacteria have "thought up," or evolved, a different solution: moving electrons to iron while metabolizing organic matter.

These bacteria "eat organic matter like we do," says Roden. "We pass electrons from organic matter to oxygen. Some of these bacteria use iron oxide as their electron acceptor. On the flip side, some other microbes receive electrons donated by other iron compounds. In both cases, the electron transfer is essential to their energy cycles."

Whether the reaction is oxidation or reduction, the ability to move an electron is essential for the bacteria to process energy to power its lifestyle.

Roden has spent decades studying iron-metabolizing bacteria. "I focus on the activities and chemical processing of microorganisms in natural systems," he says. "We collect material from the environment, bring it back to the lab, and study the metabolism through a series of geochemical and microbiological measurements."

The current studies focus on bacteria samples from Chocolate Pot hot spring, a relatively cool geothermal spring in Yellowstone National Park that is named for the dark, reddish-brown color of ferric oxide. Related studies deal with a culture obtained from a much less auspicious environment -- a ditch in Germany. Both studies are online, in Applied and Environmental Microbiology and in Geobiology.

During the studies, Roden and doctoral student Nathan Fortney and research scientist Shaomei He explored how the cultured organisms changed the oxidation state -- the number of electrons -- in the iron compounds. They also used an advanced genome-sequencing instrument at the UW-Madison Biotechnology Center to identify strings of DNA in the genomes.

"More than 99 percent of microbial diversity cannot be obtained in pure culture," says He, meaning they cannot be grown as a single strain for analysis. "Instead of going through the long, laborious and often unsuccessful process of isolating strains, we apply genomic tools to understand how the organisms were doing what they were doing in mixed communities."

The researchers found some unknown bacteria capable of iron metabolism, and also got genetic data on a unique capacity that some of them have: the ability to transport electrons in both directions across the cell's outer membrane. "Bacteria have not only evolved a metabolism that opens niches to use iron as an energy," says He, "but these new electron transport mechanisms give them a way to use forms of iron that can't be brought inside the cell."

"These are fundamental studies, but these chemical transformations are at the heart of all kinds of environmental systems, related to soil, sediment, groundwater and waste water," says Roden. "For example, the Department of Energy is interested in finding a way to derive energy from organic matter through the activity of iron-metabolizing bacteria." These bacteria are also critical to the life-giving process of weathering rocks into soil.

Iron-metabolizing bacteria have been known for a century, Roden says, and were actually discovered in Madison-area groundwater. "Geologists saw organisms that formed these unique structures that were visible under the light microscope. They formed stalks or sheaths, and it turned out they were used to move iron."

Roden and He are geobiologists, interested in how microbes affect geology, but the significance of microbes in Earth's evolution is only now being fully appreciated, Roden says. "Eyebrows rose when we contacted the Biotech Center three or four year ago to discuss sequencing: 'Who are these people from geology, and what are they talking about?' But we stuck with it, and it's turned into a pretty cool collaboration that has allowed us to apply their excellent tools that are more typically applied to biomedical and related microbial issues."

Some of the iron-metabolizing bacteria appear quite early on the tree of life, making the studies relevant to discovering the origins of life, but the findings also have implications in the search for life in space, Roden says. "Our support comes from NASA's astrobiology institute at UW-Madison. It's possible that on a rocky planet like Mars, life could rely on iron metabolism instead of oxygen.

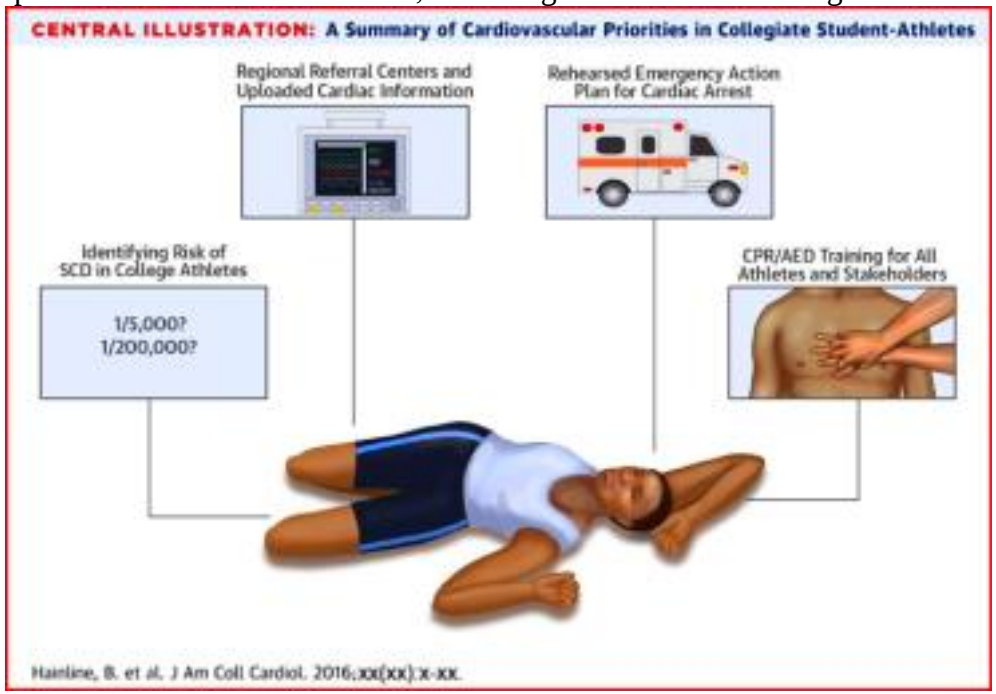
"A fundamental approach in astrobiology is to use terrestrial sites as analogs, where we look for insight into the possibilities on other worlds," Roden continues. "Some people believe that use of iron oxide as an electron acceptor could have been the first, or one of the first, forms of respiration on Earth. And there's so much iron around on the rocky planets."

http://www.eurekalert.org/pub_releases/2016-04/acoc-ngo041416.php

New guidance on preventing sudden cardiac death in athletes published

NCAA, medical specialists recommend all universities have well-rehearsed emergency action plan for sudden cardiac arrest

The Journal of the American College of Cardiology today published a consensus statement that establishes guidance for conducting pre-participation screenings of college athletes and encourages emergency action plans for quickly responding to sudden cardiac arrest. The statement was developed by a 29-person task force convened by the NCAA in September 2014. Task force members included multidisciplinary physician specialists and athletic trainers representing national sports and medical associations, including the American College of Cardiology.



The Journal of the American College of Cardiology today published a consensus statement that establishes guidance for conducting pre-participation screenings of college athletes and encourages emergency action plans for quickly responding to sudden cardiac arrest. **The Journal of the American College of Cardiology**

Sudden cardiac death is the most common nontraumatic cause of death among college athletes, and 75 percent of college student-athlete deaths occur during sports and exercise. The NCAA currently requires every student-athlete to undergo a pre-participation evaluation conducted by a licensed medical doctor or doctor of osteopathic medicine prior to participation in any sport it sponsors. However, the purpose of that pre-participation evaluation is not defined, nor is it required to be conducted or reviewed by a team physician.

The NCAA-convened task force addressed concerns over cardiovascular care for student-athletes, such as how to conduct pre-participation screenings, and reached a consensus on recommendations across disciplines for approaching the identification of cardiovascular conditions and responding to unanticipated cardiac events in athletics venues.

"The interassociation statement, developed and endorsed by leading national medical and sports medicine organizations, is the result of an exceptional collaborative effort and will serve as a meaningful resource for our member

schools in support of the cardiac health of college athletes," said Brian Hainline, M.D., lead author of the study and NCAA chief medical officer.

The task force noted that the common element of screening objectives is to identify potentially life-threatening conditions for which participation in competitive sports would place an athlete at an elevated level of risk.

The American College of Cardiology and the American Heart Association both recommend taking an athlete's family history using the AHA's 14-point questionnaire and conducting a physical examination to determine the athlete's risk of cardiovascular disease before the athlete participates in sports. Routine, large-scale use of electrocardiograms is not recommended by either the ACC or the AHA. However, the consensus statement acknowledges that NCAA-member institutions that have the ability to conduct ECGs on all athletes are already doing so. It outlines specific guidance for conducting ECGs in an entire student-athlete population, including the guidance that only physicians trained according to ACC/AHA/Heart Rhythm Society recommendations should be conducting the ECGs.

The field of sports cardiology is a highly specialized segment of cardiology and very few physicians and institutions across the country have the knowledge base, skill and experience in this discipline to accurately interpret an athlete's ECG. This could put smaller colleges and universities located in low-density population areas at a disadvantage when it comes to accessing expertise in sports cardiology.

The task force recommended establishing regional referral centers that can provide pre-participation ECG interpretation, clarity on the cardiovascular status of athletes with irregular findings during their pre-participation screening, evaluations of new cardiovascular symptoms that develop during training or competition, and consultations on when a player with a cardiac issue is cleared to play.

A major finding of the task force was the need to streamline how cardiac arrest in student-athletes is recognized and responded to. It was recommended that all universities have a written emergency action plan for treatment of cardiac arrest that is well-rehearsed, with different protocol for treatment during a practice versus during a game/championship event since treatment during a game can be vastly different due to traffic delays and access problems for emergency medical services.

The task force recommended that the emergency action plan include training anticipated responders, establishing an emergency communications system, ensuring automated external defibrillators are easily accessible and properly charged, integrating on-site response protocols with the local emergency management system, and practicing and reviewing the plan at least annually.

The consensus statement is being co-published in the British Journal of Sports Medicine and the April issue of the Journal of Athletic Training.

The task force included representation from the American Academy of Pediatrics' Council on Sports Medicine and Physical Fitness, the American College of Cardiology Sports and Exercise Cardiology Council, the American College of Sports Medicine, the American Heart Association, the American Medical Society for Sports Medicine, the American Orthopaedic Society for Sports Medicine, the American Osteopathic Academy of Sports Medicine, the National Athletic Trainers' Association, the NCAA Committee on Competitive Safeguards and Medical Aspects of Sports, the NCAA Student Athlete Advisory Council, the National Federation of State High School Associations, and the National Strength and Conditioning Association.

http://bit.ly/1SoPDDV

How to Talk to Someone with a Terminal Illness

If someone is facing a health emergency or terminal illness, it can be difficult to know the right thing to say.

by Laura Geggel

Do you tell them everything will be OK? Change the subject? Share the story of your Aunt Sally, who died of cancer 10 years ago?

The best response is something along the lines of, "I'm so sorry to hear the news. I'll be here to support you in any way I can," sociologists told Live Science. But you'd be smart to tweak this message on a person-by-person basis.

"There are no easy answers to what you should say or what you should do," said Amanda Gengler, an assistant professor of sociology at Wake Forest University in North Carolina.

If the person is a close friend, family member or even an acquaintance, contact them as you normally would, by phone or email, for instance, the experts said.

"The best advice I can give is to offer to help in concrete ways," Gengler told Live Science. Often, people will say they can help, but the sick person has no idea what they are willing to do. It's easier for someone to take you up on a specific offer to babysit, drive them to treatment, or deliver groceries or meals, she said.

Sometimes, the sick person might just want to binge-watch Netflix for 3 hours with you. "Ask if they want company, or if they would rather have some time alone," Gengler said.

While it's good to reach out, be mindful that the person might be receiving dozens of well wishes, and that it's hard to respond to all of them. Don't expect an immediate, or even any, response.

"If the person reaches out, great," Gengler told Live Science. "And if not, don't get angry about it. Don't make this about you."

There are many reasons a sick person might not answer. They might feel too sick or tired. Also, while it's nice to get sympathetic messages from friends, it also can

be emotionally exhausting. Countless somber reactions can emphasize the gravity of the situation, Gengler said.

"There's no easy solution to this, because the answer would obviously not be for other people to be flippant about an extremely catastrophic situation that someone is facing," she said.

But there is a way to take off the pressure. If you're emailing, you can include, "You don't have to answer this, but I'm here if you need me," said Deborah Carr, a professor of sociology at Rutgers University in New Jersey.

What NOT to do

If you learn that a friend is sick, don't evade them, Carr advised.

"In general, people avoid circumstances that make them uncomfortable," she said. "We're so worried that we're going to do the wrong thing or say the wrong thing, and so people often go underground."

But that's problematic, Carr said. "The most important factor that helps people deal with any problem, from terminal illness to divorce, is social support," she said. "It's really important that people are there — just simply showing up can be really powerful."

After reaching out, don't minimize their situation by saying, "Look on the bright side: At least it's not X," or "Don't worry; it will be all right," the sociologists said. Also, don't try to one-up them by talking about someone who is worse off, they added.

"You don't want to invalidate their concern — that's going to shut the conversation down," said Linda Francis, an associate professor of sociology at Cleveland State University. "Because, quite possibly, everything isn't going to be all right. Any kind of forced or false cheerfulness is going to make the speaker feel better; it's not going to make the sufferer feel better."

Instead, you can validate their situation by saying, "I'm so sorry; how awful," Francis said.

Then again, it's hard to know how someone will react. One mother at a Ronald McDonald House whom Gengler interviewed disliked it when people said, "I don't know how you do it," Gengler recalled. "She thought, 'I'm a mom; you're a mom — of course you do whatever you can to save your kids.'"

After expressing concern and support, you can ask general questions, such as "How are you doing this week?" This allows the other person to take control of the conversation and share as much or as little as they want. In addition, don't give unsolicited advice, the experts said.

"It's OK to be encouraging, as long as you're not being unrealistic," Francis said. "The important thing is just to express your concern."

http://bit.ly/1SoPDDV

Shackled Skeletons Could Be Ancient Greek Rebels

A trove of shackled skeletons unearthed in a mass grave near Athens may have once belonged to the followers of a tyrant who sought to overthrow the leader of ancient Greece.

by Tia Ghose

"These might be the remains of people who were part of this coup in Athens in 632 [B.C.], the Coup of Cylon," said Kristina Killgrove, a bioarchaeologist at the University of West Florida, in Pensacola, who was not involved in the current study.

Ancient burial complex

The mass grave was uncovered as archaeologists were excavating a huge cemetery in the ancient port city of Phaleron, just 4 miles (6.4 kilometers) from Athens. Over the last several years, archaeologists led by Stella Chrysoulaki, of Greece's Department of Antiquities of the Hellenic Ministry of Culture, have unearthed a huge complex filled with ancient skeletons dating to between the eighth and fifth centuries B.C.

A mass grave found outside of Athens may contain the burial of followers of Cylon, a tyrant who sought to take over the Acropolis in 632 B.C. **Greek Ministry of Culture**

"For the most part they are anomalous burials - the shackled people and people buried facedown, but also a lot of kids and a lot of nonelite individuals," Killgrove said. Some of the graves at Phaleron, including those of shackled individuals, have been known for about a century, but in the last four years, newer excavations have uncovered a huge trove of additional bodies.

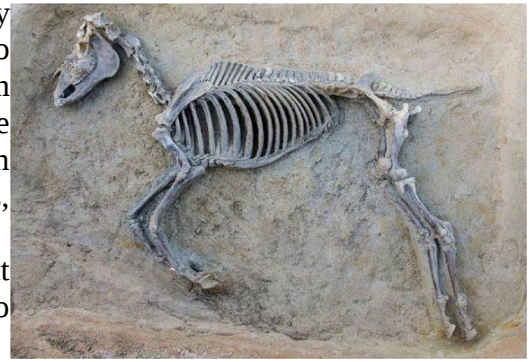
All told, the burial site is about 1 acre (4,046 square meters) in area and holds at least 1,500 skeletons. "This is just a massive number of burials, which is absolutely fantastic," Killgrove told Live Science.

Doomed to die

Among the skeletons found were a group of about 80 people who were lined up in the mass grave, with 36 whose hands were bound with iron shackles, according to the Greek Ministry of Culture.

A few pieces of pottery found near the skeletons suggest that these ancient prisoners died between 650 B.C. and 625 B.C., the Greek Ministry of Culture said in a statement.

That date could tie the prisoners to an ancient coup. In 632 B.C., the former Olympic champion Cylon tried to take over the Acropolis in Athens. His revolt was put down, and though Cylon may have escaped, his followers were put to death, after an initial promise to let them live was broken, according to "The Date of Cylon: A Study in Early Athenian History" (Harvard University Press, 1982).



However, it's not certain these ancient prisoners are in any way connected to Cylon, Killgrove said.

A new excavation at Phaleron, a mass cemetery just outside Athens, has revealed a mass of shackled prisoners. One of the graves includes an equine burial. **Greek Ministry of Culture**

"One of the problems is that historical records are really spotty for that century, so we really have no history and so it might be a stretch for them to connect these shackled skeletons with this coup," Killgrove said.

Other skeletons at the site were buried in jars, in open pits, or in funeral pyres. The site even contains a horse burial, the researchers said.

While the backstory of these doomed prisoners is fascinating, the site is also unique because of what it may reveal about the lives of the average Joe (or "Ioseph"?) in the centuries before the golden age of the Greek city-states, between the fifth and the third centuries B.C., Killgrove said.

"We don't have information about people who aren't in historical records," Killgrove said. "Learning more about the lower social classes in Athens tells us a lot about the rise of the city-state in Athens."

http://www.bbc.com/news/health-36055507

Vaccine switched in 'milestone' towards ending polio

More than 150 countries have begun switching to a different polio vaccine - an important milestone towards polio eradication, health campaigners say.

By Jane Dreaper Health correspondent, BBC News

The new vaccine will target the two remaining strains of the virus under a switchover 18 months in the planning. There were just 74 cases of the paralysing disease in 2015 and there have been 10 so far this year. All of the cases were in Afghanistan and Pakistan. Africa has been free of polio for more than a year.

Switching the vaccine from one successfully used to fight polio for more than 30 years is a huge logistical exercise.

Thousands of monitors

Thousands of people will monitor the changeover in 155 countries during the next fortnight. It is taking effect mainly in developing countries, but also in richer ones such as Russia and Mexico. The new vaccine will still be given as drops in the mouth, so healthcare workers will not need fresh training. It will no longer include a weakened version of type 2 polio virus, which was eradicated in 1999.

'Rare mutations'

Dr Stephen Cochi, from the US-based Centers for Disease Control (CDC), said: "The current vaccine contains live weakened virus relating to three types of polio. "But we don't need the type 2 component, as it's not in the world any longer. "And in very rare cases it can mutate and lead to polio, through what's called circulating vaccine-derived virus. "So removing type 2 from the vaccine takes away that risk - and ensures we have a vaccine which will work better dose by dose."

What is polio?

Polio, or poliomyelitis, mainly affects children aged under five

It is a highly infectious disease caused by a virus. It invades the nervous system and can cause total paralysis in a matter of hours

Initial symptoms include fever, fatigue, headache, vomiting, stiffness of the neck and pains in the limbs

One in 200 infections leads to irreversible paralysis. Among those paralysed, 5% to 10% die when their breathing muscles become immobilised

Today, only two countries - Afghanistan and Pakistan - remain polio-endemic, down from more than 125 in 1988

Source: World Health Organisation

Global stockpile

The planning involved in the switchover has included dealing with a global stockpile of 100 million doses of vaccine targeting just type 2, built up as an insurance policy in case of any outbreak. The World Health Organization denied some media reports that "millions" of doses of the old vaccine would need to be destroyed, by incineration or other approved means.

Its director of polio eradication, Michel Zaffran, said: "Some will need to be destroyed - but this will be a few vials, not trucks full of vaccine. "This has been carefully planned because of the huge amount of resources, so countries have been using up the old vaccine, to minimise leftover quantities. "We're closer than ever to ending polio worldwide, which is why we are able to move forward with the largest and fastest globally synchronised vaccine switchover."

Mike Ray, who contracted polio when he was six years old and has been affected for decades afterwards, told BBC Breakfast he was "absolutely delighted" at the

latest news. He said he was "exceedingly lucky" that he had never had calipers and has been able to get around using crutches and walking sticks. "I'm not happy it's taken this long [to get close to eradicating the disease] because it has affected so many other people but more power to their elbow. [It is] great news."

http://www.eurekalert.org/pub_releases/2016-04/iof-ros041216.php

Risk of second major osteoporotic fracture is greatest immediately after first fracture

Results suggest that pharmacological treatment for secondary fracture prevention may be most usefully initiated immediately following a first fracture

Malaga, Spain - Today, at the World Congress on Osteoporosis, Osteoarthritis and Musculoskeletal Diseases, an international research team presented the preliminary results of a new study which aimed to determine whether the predictive value of a past major osteoporotic fracture (MOF) for future MOF changed with time.

They studied a database of 118,872 men and women born between 1907 and 1935 who were part of the Reykjavik Study during 1967-1991. Data on all fractures from participant entry into the study until December 31, 2012 were extracted.

Of the 5039 patients who experienced one or more major osteoporotic fractures and were included in the analysis, 1919 patients experienced a second fracture. The analysis showed:

The risk of a second major osteoporotic fracture after a first increased by 4% for each year of age and was 41% higher for women than men.

The risk of a second major osteoporotic fracture was greatest immediately after the first fracture. Although the risk thereafter decreased with time, it remained higher than the population risk throughout follow-up.

One year after the first major osteoporotic fracture the risk of a second fracture was 3 times higher than that risk amongst those who had not experienced a fracture. After 10 years this risk was still elevated, at 2 times the risk in the non-fracture population but was lower than at one year.

Presenting author Prof. Nicholas C. Harvey of the MRC Lifecourse Epidemiology Unit, University of Southampton, stated, "The results of our study show that the risk of further fracture after a first major osteoporotic fracture is greatest immediately following the first event, with a declining, but still increased, risk in subsequent years. These results suggest that pharmacological treatment for secondary fracture prevention should be considered during the period immediately following a first fracture."

The results of this study support international efforts to promote secondary fracture prevention in clinics worldwide. Studies have shown that half of all individuals who suffer a hip fracture have already come to clinical attention because of a prior fragility fracture. All too often the broken bone is simply 'repaired' and the patient is sent home without proper diagnosis and management of the underlying cause of the first fracture. It is estimated that approximately 80% of patients who suffer a first fracture are never diagnosed and treated. In order to address this serious problem, the implementation of coordinated systems of secondary fracture prevention has become a major health-policy focus of the International Osteoporosis Foundation (IOF) through its Capture the Fracture® initiative: http://www.capturethefracture.org

OC35 Imminent Risk of Major Osteoporotic Fracture After Fracture (Reykjavik Study) N. C. Harvey, H. Johansson, K. Siggeirsdottir, A. Oden, V. Gudnason, E. McCloskey, G. Sigurdsson, J. A. Kanis