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Millions of modern men found to be descendants of 11 Asian dynastic leaders

University of Leicester researchers discover that many modern men have genetic links to ancient figures such as Genghis Khan

Geneticists from the University of Leicester have discovered that millions of modern Asian men are descended from 11 powerful dynastic leaders who lived up to 4,000 years ago - including Mongolian warlord Genghis Khan.

The study, which is funded by the Wellcome Trust and published in the journal European Journal of Human Genetics, examined the male-specific Y chromosome, which is passed from father to son, in more than 5,000 Asian men belonging to 127 populations.

Most Y-chromosome types are very rare, but the team discovered 11 types that were relatively common across the sample and studied their distributions and histories.

Two common male lineages have been discovered before, and have been ascribed to one well-known historical figure, Genghis Khan, and another less-known one, Giocangga.

The Leicester team found genetic links via a chain of male ancestors to both Genghis Khan and Giocangga, in addition to nine other dynastic leaders who originated from throughout Asia and date back to between 2100 BC and 700 AD.

The project's leader, Professor Mark Jobling from the University of Leicester's Department of Genetics, said: "The youngest lineages, originating in the last 1700 years, are found in pastoral nomadic populations, who were highly mobile horse-riders and could spread their Y chromosomes far and wide.

For these lineages to become so common, their powerful founders needed to have many sons by many women, and to pass their status - as well as their Y chromosomes - on to them. The sons, in turn, could then have many sons, too. It's a kind of trans-generation amplification effect."

First author of the study, Patricia Balaresque (now at Université Paul Sabatier in Toulouse), added: "Identifying the ancestors responsible for these lineages will be difficult or impossible, as it would rely on finding their remains and extracting and analysing ancient DNA. This hasn't yet been done for Genghis Khan, for example, so the evidence remains circumstantial, if pretty convincing."

The study was published in the European Journal of Human Genetics and is available at: http://www.nature.com/ejhg/journal/vaop/ncurrent/full/ejhg2014285a.html / doi: 10.1038/ejhg.2014.285

http://www.eurekalert.org/pub_releases/2015-03/uom-uoc030915.php

Understanding of cell enzyme flipped on its head

Certain molecules thought to promote cancer growth, in fact suppress tumours

Researchers from Manchester, working with scientists in California, have found that certain molecules long thought to promote cancer growth, in fact suppress tumours, suggesting that therapeutic approaches should aim to restore, rather than block, their activity.

The protein kinase C (PKC) family of molecules are enzymes that facilitate a range of cellular processes, including cell survival, proliferation, migration and death. In the 1980s it was found that PKCs were activated by cancer-causing phorbol esters, and led to the conclusion that PKCs themselves induced the development of tumours.

However, attempts to develop new treatments that prevent tumour cell growth by blocking the activity of PKCs have had little success. A recent study involving Manchester scientists, the findings of which have been published in the journal Cell, has explored the effect of mutations in PKC on tumour growth.

Dr John Brognard, from the Cancer Research UK Manchester Institute at The University of Manchester - part of the Manchester Cancer Research Centre - said: "Despite phorbol esters being known to cause cancers, we've seen frustratingly little progress when targeting PKCs to stop tumour growth."

The Manchester group collaborated with a team from the University of California, San Diego, to analyse PKC mutations in human cancer cells. They found that most were 'loss of function' mutations, meaning that the genetic changes stopped PKC from working.

When they corrected these mutations in bowel cancer cells, they saw a reduction in tumour growth, meaning that contrary to our previous understanding, PKC normally acts to block cancer. "Clinical trials have so far been working on the incorrect assumption that PKC enzymes cause cancer growth. This new insight from our studies has turned current thinking on its head. Looking ahead, instead of blocking PKC activity, new therapies should instead be targeting mechanisms to restore its activity," added Dr Brognard.

http://www.eurekalert.org/pub_releases/2015-03/uob-tlf030915.php

Traffic light food labels strengthen self-control

Researchers at the University of Bonn decode the interaction of brain regions involved in purchase decisions

Should food products be labeled with traffic light symbols to make health-related information on ingredients easier to understand? This question has remained a subject of debate. Now researchers at the University of Bonn have reached the

conclusion that the traffic light label is more effective in helping consumers resist high-calorie foods than a purely information-based label. Scientists observed study participants in the brain scanner as they made purchase decisions. The study has just been published in the journal Obesity.

Red, yellow, green: The traffic signal labels on packages are supposed to be an easy-to-understand indication of the overall "healthiness" of a food product. For example, "red" symbolizes a high percentage of fat, sugar or salt, "green" a lower percentage. Just as on an actual traffic light, yellow falls in the middle. " This is the first study that analyzes the effect that traffic light signals have on the evaluation processes in the consumer's brain when making a purchase decision", says Prof. Dr. Bernd Weber of the Center for Economics and Neuroscience (CENs) at the University of Bonn. Do the "traffic lights" help consumers choose a healthier diet when grocery shopping? Scientists from the CENs have addressed this question in a recent study.

100 products - from chocolate to ready-to-serve meals

A total of 35 adult study participants, 19 of which were women, participated in the study at the Life & Brain Center in Bonn. 100 products and their nutritional information were shown to the participants lying in the brain scanner - from chocolate to yogurt to ready-to-serve meals. The participants were shown this information either in the form of currently used nutrition labels with grams and percentages per portion, or in the form of traffic light labels. Then participants had to indicate how much they were willing to pay for a particular product.

The participants were willing to pay significantly more money for the same product when the traffic light label was "green" compared to an information-based label. However, if the label was "red", the willingness to pay decreased more compared to the conventional information. "You can conclude that the traffic light label acts as a reinforcer: The health relevance of the ingredients is weighed more heavily into purchasing decisions compared to simple nutrition information", says first author Laura Enax of CENs.

Two brain regions affect the reward system

While study participants were thinking about what price they wanted to pay for a particular product, the scientists recorded the activity of various brain regions using functional magnetic resonance imaging. A red traffic light label activated a structure in the left inferior frontal gyrus, which has been repeatedly shown to be important for self-control. Activity in this region influenced the ventromedial prefrontal cortex, a region that "calculates" the subjective value of a product via the reward system, leading to decreased willingness to pay for unhealthy products. "The traffic light label appears to enable the study participants to better resist unhealthy foods compared to a label containing the traditional information on grams and percentages of the particular ingredients. A traffic light label probably implicitly increases the weight consumers place on healthiness in their decision", says Prof. Weber, summarizing the result. The scientists at the University of Bonn now want to examine more closely how different types of food labels can be used to support consumers in their decision-making.

Publication: Nutrition labels influence value computation of food products in the ventromedial prefrontal cortex, "Obesity", 10.1002/oby.21027

http://bit.ly/1Hu3IXe

Will the Leaning Tower of Pisa Ever Topple?

Imperceptible changes are occurring, but no worries, a collapse is not in the forecast

By Alicia Ault

But it's no miracle that the bell tower - built as a companion to a cathedral - is still standing. It's due to multiple feats of engineering that may preserve the Tower of Pisa's lean at a precise angle for potentially centuries to come.

Construction began in 1173, but by the time the third floor was complete, the foundation started settling and the tower began leaning to the north.

The Tower builders hadn't exactly picked the most auspicious site for a heavy marble-laden monument - the ground was primarily made up of mud, sand and clay. Builders tried to compensate by making the columns and arches on that north side a bit longer. Soon after, there was the first of several work stoppages.

Construction did not resume until 1272, and by that time, the tower was listing south - the opposite direction. Work was interrupted again just six years later, with seven stories completed. After yet another very long hiatus, the tower was finally completed in 1370 with the eighth story.

It took some 200 years to complete the Tower, but there were only about 20 years of actual work. Talk about a nightmare construction project!

Meanwhile, the Tower had continued to settle over those two centuries, sometimes at a pace that seemed to surely threaten its ability to stay upright. At its completion, the builders angled the eighth story to the north, as a kind of counterbalance to the southern drift.

In 1911, engineers began more precise measurements of the Tower's movement. Additional measures of the movement of the Tower's various levels were begun in the late 1920s. Engineers took a crack at propping up the Tower in the 1930s, and again in the 1960s. But it was clear by the late 1980s that the southward lean was taking an inexorable path towards failure in the 20th century.

By the 1990s, the top of the Tower was documented to be moving about 1.5 millimeters (.05 inches) per year. That may sound small, but it was moving at a far greater pace than had been observed in previous centuries.

Italian authorities became increasingly concerned that the famed Tower might fall over. Thus began a massive 10-year restoration project that closed the Tower to tourism starting in 1990. The job specifications were tough: the monument's character could not be changed in any way, which meant that engineers could not add any visible supports, and they couldn't do any rebuilding, no matter how minor, said John B. Burland, one of the leaders of the restoration project, and emeritus professor of civil and environmental engineering at the Imperial College of London.

Initially, engineers used almost 900 tons of lead counterweights that were affixed to the north side of the Tower to control the southward lean while they pondered how best to achieve the end goal. The weights would not be allowed to stay. They determined that controlled extraction of soil from under the north side - called underexcavation - held promise. The extraction began in early 2000 and was completed just over a year later, moving the Tower back towards the north.

"As it turns out, we straightened the Tower by about 48 centimeters," said Burland. That 19 inches of straightening stabilized the Tower, but was small enough to not be noticeable to all the selfie-taking tourists.

"Over the last few years it has continued to move northwards, but by only a very small amount - fractions of a millimeter - and at a decreasing rate," Burland said. That's because engineers put equipment in place that allows them to make small adjustments to the water pressure beneath the foundation, which helps to stabilize the water table under the Tower, he said.

Burland predicts that the northward movement will stop in a few years, but that the tower will then begin to move south again, albeit at a very slow rate.

Despite the small movements, "it is extremely unlikely that the foundations of the tower will fail," said Burland. If anything causes the tower to collapse "it is much more likely that it would be due to a very large earthquake," he said. But he gauges that risk as fairly low.

The Leaning Tower of Pisa is likely to continue to amaze for centuries to come.

http://www.eurekalert.org/pub_releases/2015-03/dnnl-tci030515.php

The climate is starting to change faster

The speed with which temperatures change will continue to increase over the next several decades, intensifying the impacts of climate change

COLLEGE PARK, Md. - An analysis of changes to the climate that occur over several decades suggests that these changes are happening faster than historical levels and are starting to speed up. The Earth is now entering a period of changing climate that will likely be faster than what's occurred naturally over the last thousand years, according to a new paper in Nature Climate Change, committing people to live through and adapt to a warming world.

In this study, interdisciplinary scientist Steve Smith and colleagues at the Department of Energy's Pacific Northwest National Laboratory examined historical and projected changes over decades rather than centuries to determine the temperature trends that will be felt by humans alive today.

"We focused on changes over 40-year periods, which is similar to the lifetime of houses and human-built infrastructure such as buildings and roads," said lead author Smith. "In the near term, we're going to have to adapt to these changes."

See CMIP run

Overall, the Earth is getting warmer due to increasing greenhouse gases in the atmosphere that trap heat. But the rise is not smooth - temperatures bob up and down. Although natural changes in temperature have long been studied, less well-understood is how quickly temperatures changed in the past and will change in the future over time scales relevant to society, such as over a person's lifetime. A better grasp of how fast the climate might change could help decision-makers better prepare for its impacts.

To examine rates of change, Smith and colleagues at the Joint Global Change Research Institute, a collaboration between PNNL and the University of Maryland in College Park, turned to the Coupled Model Intercomparison Project. The CMIP combines simulations from over two-dozen climate models from around the world to compare model results.

All the CMIP models used the same data for past and future greenhouse gas concentrations, pollutant emissions, and changes to how land is used, which can emit or take in greenhouse gases. The more models in agreement, the more confidence in the results.

The team calculated how fast temperatures changed between 1850 and 1930, a period when people started keeping records but when the amount of fossil fuel gases collecting in the atmosphere was low. They compared these rates to temperatures reconstructed from natural sources of climate information, such as from tree rings, corals and ice cores, for the past 2,000 years.

Taken together, the shorter time period simulations were similar to the reconstructions over a longer time period, suggesting the models reflected reality well.

While there was little average global temperature increase in this early time period, Earth's temperature fluctuated due to natural variability. Rates of change over 40-year periods in North America and Europe rose and fell as much as 0.2 degrees Celsius per decade. The computer models and the reconstructions largely agreed on these rates of natural variability, indicating the models provide a good representation of trends over a 40-year scale.

Now versus then

Then the team performed a similar analysis using CMIP but calculated 40-year rates of change between 1971 to 2020. They found the average rate of change over North America, for example, to be about 0.3 degrees Celsius per decade, higher than can be accounted for by natural variability. The CMIP models show that, at the present time, most world regions are almost completely outside the natural range for rates of change.The team also examined how the rates of change would be affected in possible scenarios of future emissions [link to RCP release http://www.pnl.gov/news/release.aspx?id=779]. Climate change picked up speed in the next 40 years in all cases, even in scenarios with lower rates of future greenhouse gas emissions. A scenario where greenhouse gas emissions remained high resulted in high rates of change throughout the rest of this century.

Still, the researchers can't say exactly what impact faster rising temperatures will have on the Earth and its inhabitants.

"In these climate model simulations, the world is just now starting to enter into a new place, where rates of temperature change are consistently larger than historical values over 40-year time spans," said Smith. "We need to better understand what the effects of this will be and how to prepare for them."

This work was supported by the Department of Energy Office of Science.

Reference: Steven J. Smith, James Edmonds, Corinne A Hartin, Anupriya Mundra, and Katherine Calvin. Near-term acceleration in the rate of temperature change, Nature Climate Change March 9, 2015, doi: 10.1038/nclimate2552.

http://www.eurekalert.org/pub_releases/2015-03/uoo-zi030615.php

'Ouch zone' in the brain identified

Activity in brain area linked to brain intensity

Activity in a brain area known as the dorsal posterior insula is directly related to the intensity of pain, a brain imaging study of 17 people has found.

Researchers at the Oxford Centre for Functional Magnetic Resonance Imaging of the Brain used a new brain imaging technique to look at people experiencing pain over many hours. Activity in only one brain area, the dorsal posterior insula, reflected the participants' ratings of how much the pain hurt.

These results, published in the journal Nature Neuroscience, could help detect pain in people with limited communication abilities, such as those in a coma, small children and dementia patients.

"We have identified the brain area likely to be responsible for the core, 'it hurts', experience of pain," said Professor Irene Tracey, University of Oxford, whose team made the discovery. "Pain is a complex, multidimensional experience, which causes activity in many brain regions involved with things like attention, feeling emotions such as fear, locating where the pain is, and so on. But the dorsal posterior insula seems to be specific to the actual 'hurt level' of pain itself."

"We were able to find this area by developing a new method of tracking brain activity, based on a technique called arterial spin labelling. This allowed us to look at more complex brain states that stretch over much longer periods. By tracking pain felt over many hours, we were able to filter out more momentary experiences, such as variations in attention or fear," said Professor Tracey.

The research team tracked brain activity in 17 healthy volunteers who had a cream containing capsaicin (the active ingredient in chillies) applied onto their right leg, causing a burning sensation. The volunteers indicated how much this burning sensation hurt.

Once the pain sensation began to fade, the researchers 'rekindled' the sensation by putting a hot water bottle where the cream was applied. A few minutes later, they provided pain relief by switching to a cooling water bottle. The volunteers' ratings of how much the pain hurt accordingly went up and then down.

Activity changes in the dorsal posterior insula tracked these changes in the volunteers' ratings of pain.

The research team plans to verify these results by attempting to switch off this brain region in relevant patients suffering from intractable pain. The team hopes that changing activity in the dorsal posterior insula will help to treat pain where other methods have failed.

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Surprising finding provides more support for Alzheimer's being an autoimmune disease

Brain levels of the lipid ceramide are high in Alzheimer's disease, and now scientists have found increased levels of an antibody to the lipid in their disease model.

AUGUSTA, Ga - While some members of this lipid family are a plus in skin cream, inside the brain, ceramide appears to increase beta amyloid production and help the iconic plaque kill brain cells in Alzheimer's, said Dr. Erhard Bieberich, neuroscientist at the Medical College of Georgia at Georgia Regents University.

Bieberich's lab and others have identified elevated ceramide levels as a risk factor for Alzheimer's and have shown that amyloid triggers excess production of the lipid, although precisely how and why remain a mystery. That synergy had the scientists expecting that generating antibodies against ceramide would hamper plaque formation. Studies published last summer in Neurobiology of Aging showed that a drug that inhibited ceramide formation did just that.

Instead they found that the excessive ceramide had already worked its way into the bloodstream, generating antibodies that supported disease progression, particularly in female mice.

The surprising science, published in the Journal of Alzheimer's Disease, appears to support the theory that Alzheimer's is an autoimmune disease, which tends to be more common in women and is characterized by the immune system producing antibodies against a patient's tissue, said Bieberich, corresponding author.

It also has them thinking that measuring blood levels of the lipid or some of its byproducts could be an early test for Alzheimer's since ceramide levels were elevated well before mice showed signs of substantial plaque formation.

"It's a chicken-egg situation," said Dr. Michael B. Dinkins, MCG postdoctoral fellow and the study's first author. "We don't know if the anti-ceramide antibodies that may develop naturally during disease might be a result or a cause of the disease."

They do know that excess ceramide in the brain results in the production of vesicles, which Dinkins likens to "lipid bubbles," called exosomes, that start piling up around brain cells. What's in them depends on which cell type makes them, but Bieberich's lab had previous evidence that when exosomes get taken up by other cells, they trigger cell death, which is one way his team thought ceramide contributes to neurodegeneration in Alzheimer's.

"It takes a while before that becomes toxic because you have ongoing traffic and clearance mechanisms," he said. At some point - they are not certain at exactly what point - the clearance system stops working, and toxic levels of amyloid and ceramide pile up. That's what led them to adjust the ceramide levels downward by injecting even more ceramide under the skin, where it would mount an immune response and ideally slow disease progression.

That's when they found elevated antibody levels already existed in their animal model, and when they gave more ceramide, it not only increased antibody levels, but levels of plaque and exosomes, Dinkins said.

"We thought, we can immunize the mouse against its own ceramide; it develops antibodies, which neutralize the ceramide; and we get a similar affect as blocking its production, like a vaccination against it," Bieberich said. It should also block the subsequent chain of events that contribute to brain cell loss.

Instead they found female Alzheimer's mice treated with more ceramide experienced about a 33 percent increase in amyloid formation and that serum exosome levels increased 2.4 times.

"They immunize themselves," Bieberich said. The finding also has them wondering if maybe exosomes, which can have a variety of functions including aiding communication, may be trying to intervene and that ceramide antibodies are blocking their efforts. "We don't really know what the exosomes do in Alzheimer's. Maybe it's not always bad to have them around," Bieberich said. "Maybe the antibodies actually interrupt some good functions of exosomes."

Now they are circling back to a previous approach of more directly blocking ceramide, this time, using a genetically engineered mouse that from birth lacks the enzyme, which was targeted in previous drug studies and is needed to make ceramide, then crossbreeding it with an Alzheimer's mouse model.

And this time, they expect to be right: that the mice genetically programmed to get Alzheimer's will produce less ceramide, less exosomes, and less plaques. "In the face of more antibody, there is more plaque, but that is because there is more ceramide," Bieberich said.

One in nine individuals over age 65 has Alzheimer's, and nearly two-thirds of Americans with it are women, possibly because women tend to live longer, according to the Alzheimer's Association.

The leading hypothesis of Alzheimer's is that an accumulation of beta amyloid plaque first alters communication between brain cells, then prompts cell death.

The researchers note that ceramide is pervasive throughout the human body as well as other animal and plant species. "We synthesize it in each and every cell in the body," Bieberich said. His team reported in 2007 in the Journal of Biological Chemistry that, in the first few days of life, ceramide helps stem cells line up to form the primitive ectoderm from which embryonic tissue develops. In 2012, they reported in Molecular Biology of the Cell that ceramide additionally helps with wayfinding by helping cells keep their natural antennas up.

http://www.eurekalert.org/pub_releases/2015-03/mu-mii030915.php

Most information in drug development is lost

Stalled drug trials provide information that needs to be shared

Lots of potentially useful medical information is getting lost. McGill researchers discovered this when they looked into the lack of reporting of information from "stalled drug" trials in cancer, cardiovascular and neurological diseases.

"Stalled drugs" are drugs that fail to make it to the market either because they prove to be ineffective or unsafe or both. Because only one in ten of the drugs that goes into human testing actually gets licensed, most of the information collected in developing new drugs is currently being lost. This is despite the fact that this information is critical for effective care, protecting patients, and discovering better drugs.

"We focused on drug trials in these three areas because they are a major focus for drug development," says Prof. Jonathan Kimmelman who is Associate Professor of Biomedical Ethics at McGill University and is the lead author on the study that was published today in the British Medical Journal. "We expected to see that many of these trials are never published. What surprised us was the magnitude of the data withholding."

Indeed, between 2005 and 2009, the period that the researchers studied, only about 37 per cent of registered trials for "stalled" drug trials were actually published. For the approved drugs developed in the same period, 75 per cent of the trials were published.

The researchers believe information sharing - even for drugs that stall in development -offers clues about how to deliver care or develop drugs more effectively. Findings from trials of stalled drugs:

1. Allow drug developers to discover what didn't work, and then adjust the compound or method of delivery so that it might work for other conditions. For example, the drug Viagra failed initially as a drug for treatment of angina. We now know it to be a very effective drug for erectile dysfunction.

2. Help us learn about the safety of other approved drugs. Often, trials of experimental drugs generate valuable evidence about the safety of approved drugs - especially if the approved drugs are in the same chemical family.

3. Help drug discoverers learn about the limits of animal models and other experimental techniques. "When a drug works in animal models but not in patients, we have an opportunity to study why our model fell short and to improve it," says Amanda Hakala, a Master's student who is first author on the study.

4. Contain safety and efficacy information that might be useful in other parts of the world. Often, drugs that are considered unsafe and ineffective in one part of the world are approved in another. "Failure to publish these trials deprives patients in those other jurisdictions of state of the art evidence of safety and efficacy," says Kimmelman.

A further reason to share the information about "stalled" drugs is that many patients who take part in these trials are given either placebos or ineffective or unsafe drugs. "The failure of the drug developers to share their findings runs contrary to the Declaration of Helsinki which lays out clear ethical guidelines for medical research involving human subjects," says Kimmelman. "In our study, we found that over 20,000 patients were involved in "stalled" drug trials that were never reported. That's a lot of people whose altruism is not being honoured."

"There are many reasons that drug developers do not report findings in 'stalled' drug trials. One is an unwillingness to share information with competitors," says Amanda Hakala, the Master's student who is the first author on the study. "However, the value of this lost information is starting to be recognized." The European Parliament recently passed legislation that requires sponsors to report on "stalled" trials. And the U.S. is considering policies that would encourage limited transparency about stalled drug trials. "Policies like these are no substitute for full publication, but they go a long way to redeeming the sacrifices of the research subjects and advancing the cause of more effective healthcare and better drug development."

The research was funded by: Canadian Institutes of Health Research.

To read the full paper in the British Medical Journal:
http://www.bmj.com/content/350/bmj.h1116.full

http://www.eurekalert.org/pub_releases/2015-03/afot-are030915.php

A real eye-opener: Narcolepsy bears classic autoimmune hallmarks

Tel Aviv University researcher finds an autoimmune process plays major role in triggering neurological disorder

Narcoleptics suffer from bouts of sleepiness and sleep attacks, which impair their ability to function in daily life. But the precise cause of narcolepsy has long eluded scientists, and the cure for the devastating neurological disorder afflicting an estimated three million people worldwide - and one in 3,000 Americans - remains at bay.

A new study published in Pharmacological Research by the world's leading autoimmune disease expert, Tel Aviv University's Prof. Yehuda Shoenfeld, finds that narcolepsy bears the trademarks of a classic autoimmune disorder and should be treated accordingly. The research, led by Prof. Shoenfeld, the Laura Schwarz-Kipp Chair for Research of Autoimmune Diseases at TAU's Sackler Faculty of Medicine and Head of Zabludowicz Center for Autoimmune Diseases at Chaim Sheba Medical Center, Tel Hashomer, and conducted by doctoral student María-Teresa Arango, points to a particular autoimmune process as the trigger for the specific loss of orexin neurons, which maintain the delicate equilibrium between sleep and wakefulness in the brain.

Not just the genes

"Narcolepsy is interesting, because although it has been considered to be strictly genetic, it is induced by environmental factors, such as a burst of laughter or stress," said Prof. Shoenfeld. "Narcolepsy is devastating to those suffering from it and debilitating to children, in particular. There is no known therapy to treat it."

Narcolepsy first strikes people aged 10 to 25, plaguing them for life. Narcoleptics may experience any or all of the following symptoms: falling asleep without warning, anywhere, anytime, making it difficult to concentrate and fully function; excessive daytime sleepiness; the sudden loss of muscle tone; slurred speech or weakness of most muscles for a few seconds or a few minutes; a temporary inability to move or speak while falling asleep or upon waking; and hallucinations.

Prof. Shoenfeld first became interested in the subject after an avalanche of narcolepsy diagnoses swept Finland in 2009 following the administering of the H1N1 flu vaccine. "Following the H1N1 vaccine, 16 times the average incidence of narcolepsy was reported," said Prof. Shoenfeld.

Prof. Shoenfeld discovered that a group of researchers from the Sleep Control Project at the Tokyo Metropolitan Institute of Psychiatry in Japan had published a

study on an autoantibody presence attacking tribbles, small granules in our brains containing regulatory orexin neurons, which maintain the balance between sleep and wakefulness in the brain.

Fingering the culprit

"In patients and animals that develop narcolepsy, we have seen an evident depletion of orexin in the brain, and therefore a lack of balance, and later attacks of narcolepsy," said Prof. Shoenfeld. "Why is the orexin disappearing? We think the culprit is an autoimmune reaction - the binding of autoantibodies to the tribble granules to destroy them."

For the purpose of the new study, Prof. Shoenfeld and his team collaborated with the Japanese research group led by Dr. Makoto Honda to isolate the specific antibodies. These antibodies were then injected directly into laboratory mice. Ms. Arango monitored their behavior for several months, tracking their sleep patterns. "What we saw was an increased number of sleep attacks and irregular patterns of sleep in mice," said Prof. Shoenfeld. "Mice fall asleep like dogs, circling around before going to sleep. Suddenly, in this experiment, the mice just dropped off to sleep and then, just two minutes later, woke up as though nothing had happened. "Our hope is to change the perception and diagnosis of narcolepsy, to define it as the 81st known autoimmune disease, because a better understanding of the mechanism causing this disease, which debilitates and humiliates so many people, will lead to better treatment and, maybe one day, a cure," Prof. Shoenfeld says. He is currently collaborating with Dr. Honda and his team to locate the area of the brain to which the targeting autoantibodies bind.

http://www.eurekalert.org/pub_releases/2015-03/ki-hbg030515.php

How blood group O protects against malaria

It has long been known that people with blood type O are protected from dying of severe malaria.

In a study published in Nature Medicine, a team of Scandinavian scientists explains the mechanisms behind the protection that blood type O provides, and suggest that the selective pressure imposed by malaria may contribute to the variable global distribution of ABO blood groups in the human population.

Malaria is a serious disease that is estimated by the WHO to infect 200 million people a year, 600,000 of whom, primarily children under five, fatally. Malaria, which is most endemic in sub-Saharan Africa, is caused by different kinds of parasites from the plasmodium family, and effectively all cases of severe or fatal malaria come from the species known as Plasmodium falciparum. In severe cases of the disease, the infected red blood cells adhere excessively in the microvasculature and block the blood flow, causing oxygen deficiency and tissue damage that can lead to coma, brain damage and, eventually death. Scientists have therefore been keen to learn more about how this species of parasite makes the infected red blood cells so sticky.

It has long been known that people with blood type O are protected against severe malaria, while those with other types, such as A, often fall into a coma and die. Unpacking the mechanisms behind this has been one of the main goals of malaria research.

A team of scientists led from Karolinska Institutet in Sweden have now identified a new and important piece of the puzzle by describing the key part played by the RIFIN protein. Using data from different kinds of experiment on cell cultures and animals, they show how the Plasmodium falciparum parasite secretes RIFIN, and how the protein makes its way to the surface of the blood cell, where it acts like glue. The team also demonstrates how it bonds strongly with the surface of type A blood cells, but only weakly to type O.

Principal investigator Mats Wahlgren, a Professor at Karolinska Institutet's Department of Microbiology, Tumour and Cell Biology, describes the finding as "conceptually simple". However, since RIFIN is found in many different variants, it has taken the research team a lot of time to isolate exactly which variant is responsible for this mechanism.

"Our study ties together previous findings", said Professor Wahlgren. "We can explain the mechanism behind the protection that blood group O provides against severe malaria, which can, in turn, explain why the blood type is so common in the areas where malaria is common. In Nigeria, for instance, more than half of the population belongs to blood group O, which protects against malaria."

The study was financed by grants from the Swedish Foundation for Strategic Research, the EU, the Swedish Research Council, the Torsten and Ragnar Söderberg Foundation, the Royal Swedish Academy of Sciences, and Karolinska Institutet. Except Karolinska Institutet, co-authors of the study are affiliated to Stockholm University, Lund University, Karolinska University Hospital, and the national research facility SciLifeLab in Sweden, and to the University of Copenhagen in Denmark, and University of Helsinki in Finland. Mats Wahlgren is a shareholder and board member of drug company Dilaforette AB, which is working on an anti-malaria drug. The company was founded with support from Karolinska Development AB, which helps innovators with patent-protected discoveries reach the commercial market.

Publication: 'RIFINs are Adhesins Implicated in Severe Plasmodium falciparum Malaria', Suchi Goel, Mia Palmkvist, Kirsten Moll, Nicolas Joannin, Patricia Lara, Reetesh Akhouri, Nasim Moradi, Karin Öjemalm, Mattias Westman, Davide Angeletti, Hanna Kjellin, Janne Lehtiö, Ola Blixt, Lars Ideström, Carl G Gahmberg, Jill R Storry, Annika K. Hult, Martin L. Olsson, Gunnar von Heijne, IngMarie Nilsson and Mats Wahlgren, Nature Medicine, AOP 9 March 2015, doi: 10.1038/nm.3812.

http://nyti.ms/1BwlTtj

Hand-Wringing Over Bacteria

Q. Does the widespread use of hand sanitizers risk breeding resistant bacteria?

A. Alcohol-based hand sanitizers containing 60 percent to 95 percent alcohol do not increase the chances of producing resistant bacteria, according to research cited by the Centers for Disease Control and Prevention, but some other kinds may do so.

Furthermore, even the recommended kinds of sanitizers do not eliminate all germs, the C.D.C. warns in its guidelines for sanitizer use. Soap and water are still more effective than hand sanitizers for removing or inactivating certain kinds of germs, like Cryptosporidium, norovirus and Clostridium difficile, especially when hands are grimy, not just contaminated.

Hand sanitizers that are not based on alcohol - notably those that rely on substances called chlorhexidine and triclosan - are both less effective and slower to act than alcohol, other studies have found, and both of these agents do present a risk of producing bacterial resistance.

Triclosan especially may increase the risk of antibiotic-resistant E. coli and salmonella, a 2006 review concluded, possibly presenting a public health hazard with widespread use.

http://nyti.ms/1EB0djo

Safety of Herbal Supplements Pulls Prosecutors Together

A group of attorneys general is expected to announce on Tuesday that they are forming a coalition to crack down on fraud and quality control issues in the herbal supplement industry.

By Anahad O'Connor

The coalition would signal a shift in the way law enforcement agencies ensure the safety of herbal supplements, a $5 billion-a-year industry that has been plagued by complaints of mislabeling. An investigation by the New York State attorney general's office led to accusations last month that four national retailers were selling supplements that contained either little or none of the medicinal herbs advertised on their labels or, in many cases, included cheap fillers and contaminants like powdered rice, wheat and houseplants.

The retailers - GNC, Target, Walmart and Walgreens - were forced to pull the products from their shelves. The state attorney general, Eric T. Schneiderman, later issued subpoenas to the manufacturers of the products, demanding that they explain how they verify the quality of their products and what testing they do to support a variety of claims on their labels, like "gluten free" and "hypoallergenic."

On Monday, the attorney general's office said that because problems in the supplement industry were not limited to New York, the agency had enlisted the help of other attorneys general, a group that so far includes those from Connecticut, Indiana and Puerto Rico. Mr. Schneiderman said that the agencies were pooling their resources "to examine labeling, quality control and other aspects of the herbal supplement industry," but he did not provide details.

"Clearly, the questions we raised about the herbal supplements sold in New York resonate outside of our borders," Mr. Schneiderman said. "New Yorkers and consumers nationwide deserve confidence that when an herbal supplement is represented as authentic, pure and natural, that it really is."

Critics of the industry have argued that the Food and Drug Administration does not have enough power to keep fraudulent or dangerous products from reaching store shelves. The F.D.A. is restricted by a 1994 federal law - sponsored by Senator Orrin G. Hatch, Republican of Utah, who has strong financial ties to the industry - that prevents it from subjecting supplements to the strict approval process applied to prescription drugs.

As a result, unsafe herbal products generally are pulled from stores only after they have caused harm. But Dr. Arthur P. Grollman, an expert on herbal supplements at Stony Brook University, said he believed that greater action at the state level might pressure the supplement industry to address some of its safety issues.

Dr. Grollman was among the experts who more than a decade ago led calls for a ban on ephedra, an herbal supplement that was linked to many heart attacks, strokes and deaths. The F.D.A. eventually banned ephedra in 2004, only after several states and counties had introduced legislation outlawing its sale in their local stores.

"It was only when these individual states banned it that people started to pay attention," Dr. Grollman said. "I would hope that this new change would lead states to do what they can to ensure the safety that presently the F.D.A. is unable to provide."

Some industry trade groups have questioned the New York attorney general's investigation, saying it relied on a DNA testing procedure that is inappropriate for herbal extracts. One trade group, the Council for Responsible Nutrition, called the investigation "uninformed" and "reckless."

The group said that the testing would not reveal plant DNA in herbal extracts because the genetic material is destroyed during the extraction process. The group also said that the procedure could not determine whether unlisted ingredients like gluten and rice were present in large quantities, or only in trace amounts below the legal thresholds.

One of the attorneys general involved in the coalition, George Jepsen of Connecticut, said he had joined because the New York investigation "raised

serious public health and consumer protection concerns potentially impacting consumers in Connecticut and across the country."

"As attorneys general have shown time and time again in recent years," he said, "we have a strong and unique ability to work together on behalf of our respective constituents on issues of national concern."

Related: "New York Attorney General Targets Supplements at Major Retailers" | "What's in Those Supplements?"

http://www.eurekalert.org/pub_releases/2015-03/asfm-mcl030915.php

MRSA can linger in homes, spreading among its inhabitants

Households can serve as a reservoir for transmitting methicillin-resistant Staphylococcus aureus

WASHINGTON, DC - Households can serve as a reservoir for transmitting methicillin-resistant Staphylococcus aureus (MRSA), according to a study published this week in mBio®, the online open-access journal of the American Society for Microbiology. Once the bacteria enters a home, it can linger for years, spreading from person to person and evolving genetically to become unique to that household.

MRSA are strains of the bacterium Staphylococcus aureus that are resistant to almost all antibiotics related to penicillin, known as the beta-lactams. Since the 1990s, community-associated MRSA infections, mostly skin infections, have been seen in healthy people. The predominant community-associated strain of MRSA, called USA300, is virulent and easily transmissible.

For the study, researchers used a laboratory technique called whole genome sequencing on 146 USA300 MRSA samples. These samples were collected during a previous study from 21 households in Chicago and Los Angeles where a family member had presented to the emergency room with a skin infection found to be caused by USA300 MRSA. During that study, published in 2012 in the journal Clinical Infectious Diseases, investigators visited the homes of 350 skin infection patients, culturing their and their family members' noses, throats and groins for bacterial colonization. Among 1,162 people studied (350 skin infection patients and 812 household members), S. aureus colonized at one or more body sites of 40 percent (137 of 350) of patients with skin infections and 50 percent (405 of 812) of their household contacts.

For the current study, investigators evaluated the samples to understand transmission dynamics, genetic relatedness, and microevolution of USA300 MRSA within households. They also compared genetic information from these MRSA samples with previously published genome sequences of 35 USA300 MRSA isolates from San Diego and 277 USA300 MRSA isolates from New York City, as well as with the completed genomes of the bacteria USA300 TCH1516 and FPR3757. They created an evolutionary tree to show the relationships among the bacterial strains.

The researchers found that isolates within households clustered into closely related groups, suggesting a single common USA300 ancestral strain was introduced to and transmitted within each household. Researchers also determined from a technique called Bayesian evolutionary reconstruction that USA300 MRSA persisted within households from 2.3 to 8.3 years before their samples were collected, and that in the course of a year, USA300 strains had a 1 in a million chance of having a random genetic change, estimating the speed of evolution in these strains. Researchers also found evidence that USA300 clones, when persisting in households, continued to acquire extraneous DNA.

"We found that USA300 MRSA strains within households were more similar to each other than those from different households," said senior study author Michael Z. David, MD, PhD, an assistant professor of medicine at the University of Chicago. Although MRSA is introduced into households rarely, he said, once it gets in, "it can hang out there for years, ping-ponging around from person to person. Our findings strongly suggest that unique USA300 MRSA isolates are transmitted within households that contain an individual with a skin infection."

USA300 broke down into two big groups or clades, with the vast majority of isolates from Los Angeles genetically different from those in Chicago. Fluoroquinolone-resistant USA300 clones emerged around 1995 and were more widespread in Los Angeles, San Diego and New York City than in Chicago.

"The study adds to the knowledge base of how USA300 MRSA has spread throughout the country," said study coauthor Timothy D. Read, PhD, an associate professor of infectious diseases at the Emory University School of Medicine in Atlanta. "We're also getting hints at how it evolves inside households. Decolonization of household members may be a critical component of prevention programs to control USA300 MRSA spread in the United States."

The study was supported by the National Institutes of Health.

http://nyti.ms/1KZKpKS

Blocking the Paths to Suicide

Every year, nearly 40,000 Americans kill themselves. The majority are men, and most of them use guns.

By CELIA WATSON SEUPEL

In fact, more than half of all gun deaths in the United States are suicides. Experts and laymen have long assumed that people who died by suicide will ultimately do it even if temporarily deterred. "People think if you're really intent on dying, you'll find a way," said Cathy Barber, the director of the Means Matters campaign at Harvard Injury Control Research Center.

Prevention, it follows, depends largely on identifying those likely to harm themselves and getting them into treatment. But a growing body of evidence challenges this view.

Suicide can be a very impulsive act, especially among the young, and therefore difficult to predict. Its deadliness depends more upon the means than the determination of the suicide victim.

Now many experts are calling for a reconsideration of suicide-prevention strategies. While mental health and substance abuse treatment must always be important components in treating suicidality, researchers like Ms. Barber are stressing another avenue: "means restriction."

Instead of treating individual risk, means restriction entails modifying the environment by removing the means by which people usually die by suicide. The world cannot be made suicide-proof, of course. But, these researchers argue, if the walkway over a bridge is fenced off, a struggling college freshman cannot throw herself over the side. If parents leave guns in a locked safe, a teenage son cannot shoot himself if he suddenly decides life is hopeless.

With the focus on who dies by suicide, these experts say, not enough attention has been paid to restricting the means to do it - particularly access to guns.

"You can reduce the rate of suicide in the United States substantially, without attending to underlying mental health problems, if fewer people had guns in their homes and fewer people who are at risk for suicide had access to guns in their home," said Dr. Matthew Miller, a director of Harvard Injury Control Research Center and a professor of health sciences and epidemiology at Northeastern University.

About 90 percent of the people who try suicide and live ultimately never die by suicide. If the people who died had not had easy access to lethal means, researchers like Dr. Miller reason, most would still be alive.

The public has long held the opposite perception. In 2006, researchers at the Harvard center published an opinion survey about people who jump from the Golden Gate Bridge. Seventy-four percent of respondents believed that most or all jumpers would have completed suicide some other way if they had been deterred.

"People think of suicide in this linear way, as if you get more and more depressed and go on to create a more specific plan," Ms. Barber said.

In fact, suicide is often a convergence of factors leading to a sudden, tragic event. In one study of people who survived a suicide attempt, almost half reported that the whole process, from the first suicidal thought to the final act, took 10 minutes or less.

Among those who thought about it a little longer (say, for about an hour), more than three-quarters acted within 10 minutes once the decision was made.

"We're very bad at predicting who from a group of at-risk people will go on to complete suicide," Dr Miller said. "We can say it will be about 10 out of the 100 who are at risk. But which 10, we don't know."

Dr. Igor Galynker, the director of biological psychiatry at Mount Sinai Beth Israel, noted that in one study, 60 percent of patients who were judged to be at low risk died of suicide after their discharge from an acute care psychiatric unit.

"The assessments are not good," he said. So Dr. Galynker and his colleagues are developing a novel suicide assessment to predict imminent risk, based upon new findings about the acute suicidal state.

"What people experience before attempting suicide is a combination of panic, agitation and franticness," he said. "A desire to escape from unbearable pain and feeling trapped."

Sometimes, depression isn't even in the picture. In one study, 60 percent of college students who said they were thinking about ways to kill themselves tested negative for depression.

"There are kids for whom it's very difficult to predict suicide - there doesn't seem to be that much that is wrong with them," said Dr. David Brent, an adolescent psychiatrist who studies suicide at the University of Pittsburgh.

Dr. Brent's research showed that 40 percent of children younger than 16 who died by suicide did not have a clearly definable psychiatric disorder.

What they did have was a loaded gun in the home.

"If the kids are under 16, the availability of a gun is more important than psychiatric disorder," Dr. Brent said. "They're not suicidal one minute, then they are. Or they're mad and they have a gun available."

Availability is a consistent factor in how most people choose to attempt suicide, said Ms. Barber, regardless of age. People trying to die by suicide tend to choose not the most effective method, but the one most at hand.

"Some methods have a case fatality rate as low as 1 or 2 percent," she said. "With a gun, it's closer to 85 or 90 percent. So it makes a difference what you're reaching for in these low-planned or unplanned suicide attempts."

Statistically, having a gun in the home increases the probability of suicide for all age groups. If the gun is unloaded and locked away, the risk is reduced. If there is no gun in the house at all, the suicide risk goes down even further.

Findings like these are far from popular. Taxpayers resist spending public money on infrastructure that they believe will not prevent people determined to die by suicide, and the political tide has turned against gun control. But growing evidence of suicide's unpredictability, coupled with studies showing that means restriction can work, may leave public health officials little choice if they wish to reduce suicide rates.

Ken Baldwin, who jumped from the Golden Gate Bridge and lived, told reporters that he knew as soon as he had jumped that he had made a terrible mistake. He wanted to live. Mr. Baldwin was lucky.

Ms. Barber tells another story: On a friend's very first day as an emergency room physician, a patient was wheeled in, a young man who had shot himself in a suicide attempt. "He was begging the doctors to save him," she said. But they could not.

http://www.eurekalert.org/pub_releases/2015-03/uoe-lba031015.php

Link between autism genes and higher intelligence, study suggests

Genes linked with a greater risk of developing autism may also be associated with higher intelligence, a study suggests.

Researchers have found new evidence linking genetic factors associated with autism to better cognitive ability in people who do not have the condition.

The relationship between autism and intelligence is not clear, researchers say.

Although up to 70 per cent of individuals with autism have an intellectual disability, some people with the disorder have relatively well-preserved, or even higher than average, non-verbal intelligence, the team says.

Autism is a developmental disability that can cause significant language and speech difficulties. Non-verbal intelligence enables people to solve complex problems using visual and hands-on reasoning skills requiring little or no use of language.

Researchers at the Universities of Edinburgh and Queensland analysed almost 10,000 people recruited from the general population of Scotland. Individuals were tested for general cognitive ability and had their DNA analysed.

The team found that even among people who never develop autism, carrying genetic traits associated with the disorder is, on average, linked to scoring slightly better on cognitive tests. Researchers found further evidence of a link between autism-associated genes and intelligence when they carried out the same tests on 921 adolescents who were part of the Brisbane Adolescent Twin Study.

The study is published in the journal Molecular Psychiatry. The research was funded by the Chief Scientist Office of the Scottish Government Health and Social Care Directorates, Scottish Funding Council, The Wellcome Trust, The Medical Research Council and Age UK.

Dr Toni-Kim Clarke, of the University of Edinburgh's Division of Psychiatry, who led the study, said: "Our findings show that genetic variation which increases risk for autism is associated with better cognitive ability in non-autistic individuals. As we begin to understand how genetic variants associated with autism impact brain function, we may begin to further understand the nature of autistic intelligence."

Professor Nick Martin, of the Queensland Institute for Medical Research, said: "Links between autism and better cognitive function have been suspected and are widely implied by the well-known "Silicon Valley syndrome" and films such as "Rain Man" as well as in popular literature. This study suggests genes for autism may actually confer, on average, a small intellectual advantage in those who carry them, provided they are not affected by autism."

http://wapo.st/1D8dpf4

Can India become the low-cost drug lab of the world?

India has long been known as a country that knows how to reproduce generic versions of patented drugs at lower cost.

By Rama Lakshmi March 10

This week it broke new ground when it unveiled the first indigenously developed vaccine against a diarrhea-causing virus that is one of the leading causes of early childhood deaths around the world. With this, Indians' desire to be the low-cost drug laboratory of the world got a boost.

"India has an image of being a producer of mass generic drugs that copies other patented drugs. How long can a country continue by just copying, copying, copying?" asked Krishna Ella, the chairman of Bharat Biotech, the company that developed and produced the vaccine in southern India, during an interview Tuesday. "But with this successful vaccine, we have innovated without violating a single patent."

Rotavirus, which spreads through contaminated surfaces, kills over 80,000 small children in India every year and about 450,000 other children across the world. The new vaccine, called Rotavac, was developed as part of an ambitious U.S.-India collaboration that began about 25 years ago. The Vaccine Action Program that was signed between the two countries in the late 1980s was supported by government scientific institutions in India as well as the U.S. National Institute of Health, the Centers for Disease Control and Prevention, the Bill and Melinda Gates Foundation and the Stanford University School of Medicine.

Launching the vaccine on Monday, Prime Minister Narendra Modi, who is a passionate advocate of Make-in-India projects, said he hoped the vaccine would "inspire higher levels of research, development and manufacturing activities in India." Modi added that "solutions found in India would have great relevance to the rest of the world, especially the developing world."

Over the years, India has earned the nickname of the "pharmacy of the developing world" because of the relatively inexpensive India-made generic cocktail of antiretroviral drugs, which are used by international agencies such as Doctors Without Borders and the Gates Foundation. But global drug makers have also said that India's patent protection system for drugs is weak.

Global drug companies sell Rotavirus vaccines in India for about US $ 20 a dose. The new Indian vaccine will be available at about $1 per dose, Ella said. “But the phrase ‘low cost’ hurts me. I would say that our efficiency is very high,” said Ella. Apart from India, the company is now exploring markets including Kenya, Nigeria, Bolivia, Peru and Indonesia.

To appeal to Muslim communities around the world, Ella is promoting the vaccine as the first “halal vaccine” for the disease because it does not contain porcine gelatin. Ella said he has applied for four global patents for the vaccine.

Rama Lakshmi has been with The Post's India bureau since 1990. She is a staff writer and India social media editor for Post World.

http://bit.ly/1AmCg7U

Male Serial Killers Are 'Hunters,' Female Serial Killers Are 'Gatherers'

A recent study from Penn State has put together a definitive profile of the average American female serial killer, combing through the 64 "FSKs" who committed their crimes in the US between 1821 and 2008.

It's completely fascinating. From the study's abstract:

Consistent with other studies, our data showed that FSKs were typically White, educated, have been married, and held a caregiving role (e.g. mother, health care worker). Nearly 40% of FSKs in this sample experienced some form of mental illness. Their most common motive for murder was financial gain, and their most common method of killing was poisoning. FSKs knew all or most of their victims, and most were related to their victims. In all cases, FSKs targeted at least one victim who was a child, elderly, or infirm – those who had little chance of fighting back.

In an interview with the Washington Post, Penn State psychology professor Marissa Harrison, the lead author on the study, drew interesting comparisons to the typical characteristics of male serial killers - who generally do not know their victims and whose crimes tend to involve sex. "Female serial killers gather and male serial killers hunt," Harrison said. "That was very interesting to me, as an evolutionary psychologist, that it reflects kind of ancestral tendencies."

Harrison also saw evidence of evolutionary influences in what drove women to kill. While most murders by male serial killers tend to involve sex in some way - a 1995 study found that male serial killings are characterized by a desire for domination, control, humiliation and sadistic sexual violence - women are more likely to kill for money or power.

"It struck me that women would kill for resources, which was their primary drive in the ancestral environment, and men kill for sex," she said.

Harrison emphasized in her study that female serial killers, on average, evade arrest for twice as long as their male counterparts - possibly because our culture has a tough time believing women are capable of committing these types of atrocities.

Misogyny kills, I guess.

http://www.eurekalert.org/pub_releases/2015-03/p-das030515.php

Document analysis shows influence of sugar industry on 1971 US National Caries Program

Sugar industry sought to influence the setting of research priorities for the NCP

The sugar industry used several tactics to influence the setting of research priorities for the 1971 US National Caries Program (NCP), according to a study published by Cristin Kearns, Stanton Glantz and Laura Schmidt from the University of California San Francisco, US, in this week's PLOS Medicine.

The researchers analyzed an archive of 319 internal sugar industry documents from 1959 to 1971 (the "Roger Adams papers") and US National Institute of Dental Research (NIDR) documents to explore how the sugar industry sought to influence the setting of research priorities for the NCP. Their analysis indicates that, as early as 1950, sugar industry trade organizations had accepted that sugar damaged teeth and recognized that the dental community favored restricting sugar intake as a key way to control caries. The sugar industry therefore adopted a strategy to deflect attention towards public health interventions that would reduce the harms of sugar consumption. This included funding research on enzymes that break up dental plaque and looking into a vaccine against tooth decay, and cultivating relationships with the NIDR leadership. Notably, 78% of a report submitted to the NIDR by the sugar industry was directly incorporated into the NIDR's first request for research proposals for the NCP. Research that could have been harmful to sugar industry interests (specifically, research into methods to measure the propensity of specific foods to cause caries) was omitted from the research priorities identified at the launch of the NCP.

These findings, although limited by the researchers' reliance on a single source of industry documents and by the inability to interview key actors in the launch of the NCP, reveal an alignment of research agendas between the NIDR and the sugar industry in the early 1970s. The authors say: "Actions taken by the sugar industry to impact the NIDR's NCP research priorities, which echo those of the tobacco industry, should be a warning to the public health community."

Funding: This work was supported by the UCSF Philip R. Lee Institute for Health Policy Studies, a donation by the Hellmann Family Fund to the UCSF Center for Tobacco Control Research and Education, the UCSF School of Dentistry Department of Orofacial Sciences and Global Oral Health Program, National Institute of Dental and Craniofacial Research

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http://www.eurekalert.org/pub_releases/2015-03/uow-aiu031015.php

An injectable UW polymer could keep soldiers, trauma patients from bleeding to death

New injectable polymer strengthens blood clots

Most military battlefield casualties die before reaching a surgical hospital. Of those soldiers who might potentially survive, most die from uncontrolled bleeding. In some cases, there's not much medics can do - a tourniquet won't stop bleeding from a chest wound, and clotting treatments that require refrigerated or frozen blood products aren't always available in the field.

That's why University of Washington researchers have developed a new injectable polymer that strengthens blood clots, called PolySTAT. Administered in a simple shot, the polymer finds any unseen or internal injuries and starts working immediately.

The new polymer, described in a paper featured on the cover of the March 4 issue of Science Translational Medicine, could become a first line of defense in everything from battlefield injuries to rural car accidents to search and rescue missions deep in the mountains. It has been tested in rats, and researchers say it could reach human trials in five years.

In the initial study with rats, 100 percent of animals injected with PolySTAT survived a typically-lethal injury to the femoral artery. Only 20 percent of rats treated with a natural protein that helps blood clot survived.

"Most of the patients who die from bleeding die quickly," said co-author Dr. Nathan White, an assistant professor of emergency medicine who teamed with UW bioengineers and chemical engineers to develop the macromolecule.

"This is something you could potentially put in a syringe inside a backpack and give right away to reduce blood loss and keep people alive long enough to make it to medical care," he said.

The UW team was inspired by factor XIII, a natural protein found in the body that helps strengthen blood clots. Normally after an injury, platelets in the blood begin to congregate at the wound and form an initial barrier. Then a network of specialized fibers - called fibrin - start weaving themselves throughout the clot to reinforce it. If that scaffolding can't withstand the pressure of blood pushing against it, the clot breaks apart and the patient keeps bleeding.

Both PolySTAT and factor XIII strengthen clots by binding fibrin strands together and adding "cross-links" that reinforce the latticework of that natural bandage.

"It's like the difference between twisting two ropes together and weaving a net," said co-author Suzie Pun, the UW's Robert J. Rushmer Professor of Bioengineering. "The cross-linked net is much stronger."

But the synthetic PolySTAT offers greater protection against natural enzymes that dissolve blood clots. Those help during the healing process, but they work against doctors trying to keep patients from bleeding to death.

The enzymes, which cut fibrin strands, don't target the synthetic PolySTAT bonds that are now integrated into the clot. That helps keep the blood clots intact in the critical hours after an injury.

"We were really testing how robust the clots were that formed," said lead author Leslie Chan, a UW doctoral student in bioengineering. "The animals injected with PolySTAT bled much less, and 100 percent of them lived." The synthetic polymer offers other advantages over conventional hemorrhaging treatments, said White, who also treats trauma patients at Harborview Medical Center.

Blood products are expensive, need careful storage, and they can grow bacteria or carry infectious diseases, he said. Plus, the hundreds of proteins introduced into a patient's body during a transfusion can have unintended consequences.

After a traumatic injury, the body also begins to lose a protein that's critical to forming fibrin. Once those levels drop below a certain threshold, existing treatments stop working and patients are more likely to die.

In the study, researchers found PolySTAT worked to strengthen clots even in cases where those fibrin building blocks were critically low.

The UW team also used a highly specific peptide that only binds to fibrin at the wound site. It does not bind to a precursor of fibrin that circulates throughout the body. That means PolySTAT shouldn't form dangerous clots that can lead to a stroke or embolism.

Though the polymer's initial safety profile looks promising, researchers said, next steps include testing on larger animals and additional screening to find out if it binds to any other unintended substances. They also plan to investigate its potential for treating hemophilia and for integration into bandages.

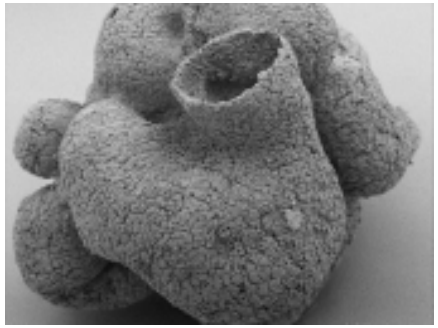
Funding came from the National Institutes of Health and its National Center for Advancing Translational Science, the UW Institute of Translational Health Sciences, the Washington Research Foundation, an NIH-supported UW Bioengineering Cardiovascular Training Grant and discretionary funds from private donations.

http://bit.ly/1xgMK8x

One of the Oldest Known Animals Is This Tiny, Ancient Sponge

A new fossil find pushes back the start of the evolution of multicellular animals

By Marissa Fessenden



Sponges seem like humble creatures - especially if you associate them with the synthetic pads we use to clean - but they are actually awesome. True, they don't have nervous, digestive or circulatory systems. But the simple sponge represents the most ancient lineage of multicellular animals on Earth. Now, a new fossil dug up in Southern China pushes the advent of the first animals back even earlier in history.

A scanning electronic microscope image of the 600 million-year-old sponge-like fossil
(Image courtesy of Zongjun Yin)

The Earth is nearly four billion years old and for much of that long history, life was basically just bacteria, plankton or algae - small, simple creatures. But about 570 million to 530 million years ago, something sparked and suddenly (in geological time, anyway) the complex, multicellular life we see around us started appearing during the Cambrian explosion. Sponges were a major part of that evolutionary flowering of complexity.

The new fossil is 600 million years old, according to the paper published in *Proceedings of the National Academy of Sciences*, meaning it predates that explosion. That puts it in a time period earlier than many scientists expect to find sponges and could shake up what we know about the timing of animal evolution. While the fossil can't be properly classified in any of the major sponge classes we see today, the porous surface and tubes of the fossil make it unmistakably sponge-like, the researchers say, according to *International Business Times*. It is "just over 1 millimeter high and wide, the size of a small bead, and was found in a phosphorus-rich geological formation known for preserving animal fossils in an excellent state," reports Michael Balter for *Science*.

The fossil represents a possible ancestor not only of the many sponges we know today but of all animals. And at the very least, organisms like this one may have helped turn the oxygen-poor environment of the early Earth into one more conducive to the evolution of complex life because they helped munch excess organic matter, which would have drawn oxygen from water as it decayed. It seems we have a lot of reasons to thank the primitive sponge.

http://www.eurekalert.org/pub_releases/2015-03/gcrc-dtc031115.php

Deadly to cancer cells only

A molecular cause for selective effectiveness of parvovirus therapy discovered

Parvoviruses are a class of viruses that normally infect rodents; in humans, they do not cause any disease symptoms. However, they are able to infect and kill cancer cells. The details behind this biological selectivity on the part of the viruses have not been understood until now. "Since the viruses might soon play a role in cancer medicine, it is important to know why they replicate exclusively in tumor cells in humans," says virologist Dr. Jürg Nüesch from the German Cancer Research Center (Deutsches Krebsforschungszentrum, DKFZ).

In order to complete their life cycle within the cell and to produce the next generation of viruses, the viruses depend on the activity of a specific cellular enzyme called PDK1 kinase. This kinase acts like a main switch for numerous cellular functions. Normally, it is activated from the outside by growth factors that attach to the cell.

Nüesch and his colleagues, Séverine Bär and Jean Rommelaere, have now discovered that in the cells of mice, which are natural hosts for parvovirus H1, the virus is able to activate PDK1 via an internal pathway that is independent of growth factors. An enzyme complex called PKCη/Rdx is involved in this process. This complex transfers a phosphate group to a specific protein building block of PDK1, leading to its activation.

In normal human cells, however, where the virus cannot replicate, it is unable to activate PDK1 using this alternative pathway. When the researchers equipped these normal cells in the Petri dish with permanently activated PDK1, the virus was successfully able to infect the cells and replicate inside of them.

The situation is different in cancer cells, especially in glioblastoma - the most malignant kind of brain tumor. Nüesch and his colleagues examined 70 glioblastoma tissue samples and discovered that in 36 percent of these samples, PDK1 was already phosphorylated from the start and, therefore, permanently activated.

"For the cancer cells, permanent activation of PDK1 is biologically useful because it allows them to be independent of growth factors," Nüesch explains. "The parvoviruses, in turn, exploit this for their own purposes. Thus, we have found, for the first time, a molecular cause for the virus's natural selectivity for cancer cells. Additionally, in PDK1 phosphorylation we have discovered a biomarker that enables us to predict whether therapy with parvoviruses can be effective in a particular tumor."

In the treatment of brain cancer, one approach currently being tested is the use of substances that block growth factor receptors on the cell surface. The detection of

PDK1 phosphorylation also has predictive value in this regard. If PDK1 is activated via the alternative pathway, then the cancer cell is independent of growth factors; therefore, blocking them would not help the patient.

Under the leadership of Jean Rommelaere, scientists at the DKFZ have been studying parvoviruses since 1992. Their goal is to develop a viral therapy to attack glioblastoma. At Heidelberg Neurosurgical University Hospital, a preliminary clinical trial has been ongoing since 2011, where the safety of treatment with H1 virus is currently being evaluated.

Séverine Bär, Jean Rommelaere, and Jürg P.F. Nüesch: PKCη/Rdx-driven Phosphorylation of PDK1: A Novel Mechanism Promoting Cancer Cell Survival and Permissiveness for Parvovirus-induced Lysis. PLOS Pathogens 2015, DOI: 10.1371/journal.ppat.1004703

http://www.eurekalert.org/pub_releases/2015-03/mbae-nge031115.php

New genetic evidence resolves origins of modern Japanese

Was there a single migration event or gradual mixing of cultures that gave rise to modern Japanese?

According to current theory, about 2,000-3,000 years ago, two populations, the hunter-gatherer Jomon from the Japanese archipelago, and the agricultural Yayoi from continental East Asia, intermingled to give rise to the modern Japanese population.

However, some researchers have suggested otherwise, with the Jomon culture gradually transformed into the Yayoi culture without large migrations into modern day Japan.

To resolve the controversy, researchers Oota, Mano, Nakagome et al., identified the differences between the Ainu people (direct descendants of indigenous Jomon) with Chinese from Beijing (same ancestry as Yayoi).

The results from a genome-wide, single nucleotide polymorphism (SNP) data strongly support the hybridization model as the best fit for Japanese population history.

An initial divergence between the Ainu and Beijing group was dated to approximately 20,000 years ago, while evidence of genetic mixing occurred 5,000 to 7,000 years ago, older than estimates from the archaeological records, probably due to the effect of a further sub-population structure of the Jomon people.

The authors caution that further studies will need to be undertaken (especially ancient genome analysis of Jomon and Yayoi skeletal remains and genomic analysis of northeast Asians) to untangle the true evolutionary history of Japanese, in particular, the origins of the Jomon and Yayoi people and the source of gene flow to the Ainu.

http://www.eurekalert.org/pub_releases/2015-03/du-uhv031115.php

Urging HPV vaccine for boys could protect more people at same price

Finding willing parents of boys may be easier at this point

Duke University

DURHAM, N.C. - A Duke University study proposes a strategy to better use limited public health care dollars for protecting more people from a sexually transmitted infection called human papillomavirus (HPV) and the cancers it can cause.

Public health programs that devote a portion of their funding to encourage more boys to be vaccinated against HPV - rather than merely attempting to raise coverage among girls - may ultimately protect more people for the same price, the study suggests. The findings appear online in the journal Epidemics.

Whether vaccinating boys against HPV in addition to girls would only divert scarce resources from a campaign originally designed to help prevent cervical cancer has been hotly debated. But with HPV-related cancers in men on the rise, and HPV vaccine coverage in U.S. girls stagnating well below the critical levels needed to ensure that most people are protected, researchers have been re-examining the case for a girls-only approach.

Although the virus is most frequently associated with cervical cancer, women aren't the only ones at risk. The Centers for Disease Control estimates that a third of the 27,000 cases of cancer HPV causes in the U.S. each year occur in men, where it can cause cancers of the throat, tongue, tonsils, penis and anus.

More than half of all people in the U.S. will get HPV at some point in their lives. Most infections go away on their own within one or two years. But some persist, and if left untreated can become cancer.

Studies suggest that HPV-related throat and mouth cancers are on the rise in the U.S., and could outnumber HPV-related cervical cancers by 2020.

Many of these cancers could be prevented with vaccination. But despite Centers for Disease Control recommendations that both boys and girls ages 11 to 12 should receive the HPV vaccine, only 37 percent of girls and 14 percent of boys in the U.S. have received all three shots in the HPV vaccine series - much lower than the proportion needed to keep the disease in check.

To find out whether different strategies for allocating public funds might protect more people, Duke mathematicians Marc Ryser, PhD, and Kevin McGoff, PhD, and obstetrician/gynecologist Evan Myers, MD, MPH, and colleagues developed a mathematical model of HPV transmission among sexually active 14-18 year olds. They then compared the effectiveness of HPV vaccination campaigns based on different cost scenarios. One set of scenarios reflected the costs of vaccinating

more people based on the per-dose price of the vaccine. Another set of scenarios also accounted for the patient education costs that could be required to reach people who are less willing to have their children vaccinated.

Over the past three years, HPV vaccination coverage in girls has stagnated. Studies suggest that 44 percent of U.S. parents are reluctant to vaccinate their kids against a sexually transmitted infection before their child becomes sexually active - even though the vaccine works best if given before there is any chance of exposure, when there is still time to build up immunity.

Boosting coverage in girls to sufficient levels to protect everyone could become increasingly expensive, Ryser said, especially as the pool of willing parents shrinks and only the more skeptical parents remain.

"Imagine that 100 parents are offered HPV vaccines for their children," said co-author Evan Myers, the Walter L. Thomas Professor of Obstetrics and Gynecology in the Duke University School of Medicine. "Some fraction will be willing to have their child vaccinated without any questions, some won't have their child vaccinated under any circumstances, and the rest will be in between." "Along the spectrum of 'Whatever you say, doctor' to 'I don't believe in any vaccinations,' families who are currently unvaccinated are closer to the resistant end of the spectrum, and so it takes more work and costs more money to try to persuade them," Myers said.

Real-world data on actual patient education costs are needed before the results can be translated into policy, the authors say. But their analysis suggests that public health officials may actually be able to protect more people for the same price by shifting some funds to encourage vaccination of boys, since the fraction of parents willing to vaccinate has yet to be exhausted among boys.

"The gender with the lowest coverage is the low-hanging fruit," Ryser said. "Stagnating vaccination rates, coupled with parental opposition, suggest that it could cost less to raise coverage in boys from, say, 14 to 15 percent than to raise coverage in girls from 37 to 38 percent." "Making that trade-off would be beneficial to the entire population," said co-author Kevin McGoff of Duke, since boosting coverage in either sex means fewer people can transmit the disease to uninfected people.

David Herzog of Drake University and David Sivakoff of Ohio State University were also authors of the study. This research was supported by the National Institutes of Health (R01-GM096190-02, R01-GM096190-02) and the National Science Foundation (10-45153, 10-57675, 0854879). Additional funding was provided by Duke University. Dr. Evan Myers serves as a consultant to Merck, Inc., manufacturer of the HPV vaccine Gardasil. Merck was not involved in any way with this study.

"Impact of Coverage-Dependent Marginal Costs on Optimal HPV Vaccination Strategies," Ryser, M., et al. Epidemics, Feb. 2015.http://dx.doi.org/10.1016/j.epidem.2015.01.003.

http://www.eurekalert.org/pub_releases/2015-03/bps-bps031115.php

British Psychological Society report challenges received wisdom about mental illness

21st March 2015 will see the US launch of the British Psychological Society's Division of Clinical Psychology's ground-breaking report 'Understanding Psychosis and Schizophrenia'.

The report, which will be launched at 9am at the Cooper Union, Manhattan, NYC by invitation of the International Society for Psychological and Social approaches to Psychosis (ISPS), challenges received wisdom about the nature of mental illness and has led to widespread media coverage and debate in the UK.

Many people believe that schizophrenia is a frightening brain disease that makes people unpredictable and potentially violent, and can only be controlled by medication. However the UK has been at the forefront of research into the psychology of psychosis conducted over the last twenty years, and which reveals that this view is false.

Rather:

The problems we think of as 'psychosis' - hearing voices, believing things that others find strange, or appearing out of touch with reality - can be understood in the same way as other psychological problems such as anxiety or shyness.

They are often a reaction to trauma or adversity of some kind which impacts on the way we experience and interpret the world.

They rarely lead to violence.

No-one can tell for sure what has caused a particular person's problems. The only way is to sit down with them and try and work it out.

Services should not insist that people see themselves as ill. Some prefer to think of their problems as, for example, an aspect of their personality which sometimes gets them into trouble but which they would not want to be without.

We need to invest much more in prevention by attending to inequality and child maltreatment.

Concentrating resources only on treating existing problems is like mopping the floor while the tap is still running.

The report is entitled 'Understanding psychosis and schizophrenia: why people sometimes hear voices, believe things that others find strange, or appear out of touch with reality, and what can help'. It has been written by a group of eminent clinical psychologists drawn from eight UK universities and the UK National Health Service, together with people who have themselves experienced psychosis. It provides an accessible overview of the current state of knowledge, and its conclusions have profound implications both for the way we understand 'mental illness' and for the future of mental health services. ?

The report's editor, Consultant Clinical Psychologist Anne Cooke from the Salomons Centre for Applied Psychology, Canterbury Christ Church University, said: "The finding that psychosis can be understood and treated in the same way as other psychological problems such as anxiety is one of the most important of recent years, and services need to change accordingly.

In the past we have often seen drugs as the most important form of treatment. Whilst they have a place, we now need to concentrate on helping each person to make sense of their experiences and find the support that works for them. My dream is that our report will contribute to a sea change in attitudes so that rather than facing prejudice, fear and discrimination, people who experience psychosis will find those around them accepting, open-minded and willing to help."

Dr Geraldine Strathdee, NHS England's National Clinical Director for Mental Health, said: "I am a passionate advocate of supporting people to develop an understanding of the events and difficulties that led them to mental health services. That is the first step to getting back in control, and this important report will be a vital resource both for them and for those of us who design and deliver services. The British Psychological Society are a great force for change right at the grass roots of frontline services, in both acute care and long term conditions, and are at the forefront of innovations that integrate physical and psychological care in primary care, community and acute hospital settings".

Rt Hon Norman Lamb, UK Minister of State for Care and Support, said: "I strongly welcome the publication of this report. The Government is committed to the provision of psychological therapies, and has recently announced that, for the first time, maximum waiting times will be introduced for NHS mental health services, including for Early Intervention in Psychosis.

We have also committed substantial resources to support the provision of psychological care for people with a range of mental health problems, including psychosis. I am delighted, therefore, to add my voice in recommending this report, which explains in everyday language the psychological science of why people sometimes hear voices, believe things other people find strange, or appear out of touch with reality. I am particularly pleased that it is the product of a partnership between expert psychologists in universities and NHS Trusts, and experts by experience - people who have themselves experienced psychosis. It helps us to understand such experiences better, to empathise with those who are distressed by them and to appreciate why the Government has made the psychological care of mental health problems a priority."

Professor Jamie Hacker-Hughes, President Elect of the British Psychological Society, said: "This report will be remembered as a milestone in psychological health".

Jacqui Dillon, Chair of the UK Hearing Voices Network, said "This report is an example of the amazing things that are possible when professionals and people with personal experience work together. Both the report's content and the collaborative process by which it has been written are wonderful examples of the importance and power of moving beyond 'them and us' thinking in mental health".

Beth Murphy, Head of Information at the UK Mental Health Charity Mind, said: "We welcome this report which highlights the range of ways in which we can understand experiences such as hearing voices. Anyone of us can experience problems with our mental health, whether we are diagnosed or not.

People describe and relate to their own experiences in very different ways and it's important that services can accommodate the complex and varied range of experiences that people have. This can only be done by offering the widest possible range of treatments and therapies and by treating the person as whole, rather than as a set of symptoms." ***http://www.understandingpsychosis.net***

http://www.eurekalert.org/pub_releases/2015-03/cums-rbp031115.php

Rat brains point to lead's role in schizophrenia

Brains of rats exposed to lead show striking similarities with the brains of human schizophrenia patients

A study of the brains of rats exposed to lead has uncovered striking similarities with what is known about the brains of human schizophrenia patients, adding compelling evidence that lead is a factor in the onset of schizophrenia.

Results of the study by scientists at Columbia University's Mailman School of Public Health appear in the journal Translational Psychiatry.

The researchers found that lead had a detrimental effect on cells in three brain areas implicated in schizophrenia: the medial prefrontal cortex, the hippocampus, and the striatum of rats exposed to lead before birth and in the early part of their lives. Density of brain cells known as Parvalbumin-Positive GABAergic interneurons, or PVGI, declined by approximately a third - at roughly the same percentage decline seen in schizophrenia patients. And, using imaging technology, they identified higher levels of a dopamine receptor called D2R. Again, the magnitude of the increase matched what has been documented in human schizophrenia patients, and in a previous study of genetically engineered mice.

"The similarities in the brain structure and neuronal systems between what we see in lead-exposed rats and human schizophrenia patients are striking, and adds to a growing body of literature suggesting that early lead exposure primes the brain for schizophrenia later in life," says senior author Tomás Guilarte, PhD, chair of Environmental Health Sciences at the Mailman School.

Cocaine Insights

In a related finding, the researchers found that rats exposed to lead had a much stronger reaction to cocaine than healthy rat controls. In the experiment, lead-exposed rats that were injected with cocaine ran around in their cages at twice the distance of lead-free control rats. The rat behavior is meaningful because it mirrors what is seen in schizophrenia patients, who are known to have a heightened response to the drug.

Schizophrenia is not the only possible consequence of lead exposure. A follow-up experiment will allow the rats to self-administer cocaine in order to test whether lead exposure plays a role in addiction.

"We are currently assessing the impact of lead exposure on both the rewarding and reinforcing properties of addictive drugs like cocaine while exploring the biological underpinnings of how lead exposure plays a role in addiction," says first author Kirstie Stansfield, PhD, associate research scientist at the Mailman School.

Additional authors of the current study include Kristen N. Ruby, Barbara Soares, Jennifer L. McGlothan, and Xinhua Liu - all of Columbia's Mailman School of Public Health. The research was supported by grants from the National Institute of Environmental Health Sciences (ES006189, ES020465, and P30ES009089).

http://nyti.ms/19gIOQ0

Suddenly, It Seems, Water Is Everywhere in Solar System

Oceans trapped under ice appear to be pretty common in the solar system and one of them, on a small moon of Saturn's, appears to be quite hot.

By KENNETH CHANG

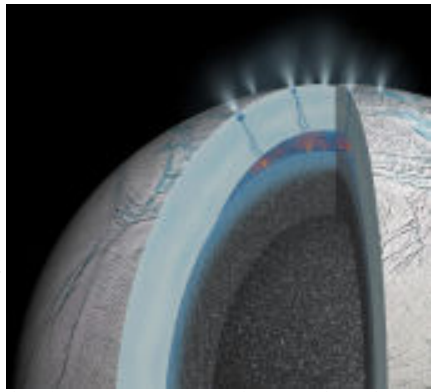
This week in the journal Nature, an international team of scientists reported evidence for hydrothermal vents on the Saturnian moon Enceladus, with temperatures of its rocky core surpassing 194 degrees Fahrenheit (90 degrees Celsius) in spots. The discovery, if confirmed, would make Enceladus the only place other than Earth where such chemical reactions between rock and heated water are known to be occurring today - and for many scientists, it would make Enceladus a most promising place to look for life.

"The most surprising part is the high temperature," said Hsiang-Wen Hsu, a scientist at the University of Colorado's Laboratory for Atmospheric and Space Physics and lead author of the paper. "But that's the number we could derive."

Meanwhile, in a paper published Thursday in The Journal of Geophysical Research: Space Physics, another team reported signs of another under-ice ocean, on Ganymede, the largest of Jupiter's moons. Scientists are already convinced that there is a large ocean, also covered by ice, on another Jovian moon, Europa. NASA's Galileo spacecraft had also found hints of hidden water on Ganymede and on another of Jupiter's moons, Callisto.

The new research, using the Hubble Space Telescope, fits with the earlier hints. "This is now stronger evidence for an ocean," said Joachim Saur, a professor of geophysics at the University of Cologne in Germany and the lead author of the Ganymede paper.

"Surprising is the understatement," Christopher P. McKay, a planetary scientist at the NASA Ames Research Center in Mountain View, Calif., said of the multitude of watery moons.



This cutaway view of Saturn's moon Enceladus is an artist's rendering that depicts possible hydrothermal activity that may be taking place on and under the seafloor of the moon's subsurface ocean, based on recently published results from NASA's Cassini mission. **NASA**

"After spending so many years going after Mars, which is so dry and so bereft of organics and so just plain dead, it's wonderful to go to the outer solar system and find water, water everywhere," said Dr. McKay, who studies the possibility of life on alien worlds. He was not involved in either of the papers.

For the Enceladus findings, Dr. Hsu and his colleagues based their conclusions on minuscule dust particles that NASA's Cassini spacecraft encountered as it approached Saturn and after it entered orbit. Instruments on Cassini determined that the particles, less than a millionth of an inch in diameter, were high in silicon but had little or no metals like sodium or magnesium. Dr. Hsu said the dust was probably silica, a molecule of one silicon and two oxygen atoms, the building block of the mineral quartz.

The researchers were also able to trace the dust to Saturn's E Ring, and the material in the E Ring originates from Enceladus, from plumes that emanate near the moon's south pole. "That's the circumstantial part of the work," Dr. Hsu acknowledged.

They performed laboratory experiments to see which conditions could produce the silica particles. The result was alkaline water, with a pH of 8.5 to 10.5, heated to at least 194 degrees. The results fit in with findings last year by other scientists who suggested that Enceladus concealed not just pockets of water but a sea at least as large as Lake Superior.

The mystery is how the interior of Enceladus, just 313 miles wide, grows that hot. A moon that small probably does not have enough radioactive elements at its core to provide continued warmth. A chemical reaction between water and rock called

serpentinization could also provide some heat, but the primary mechanism is probably the tidal forces that Saturn exerts on Enceladus.

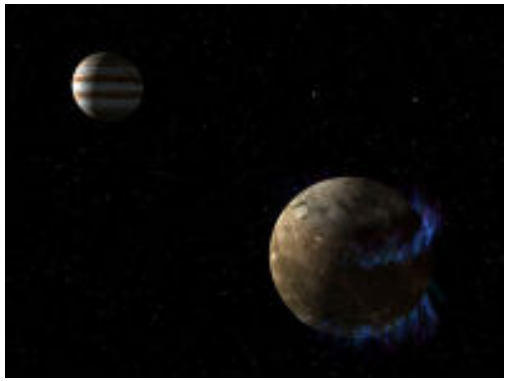
"The amount of energy being dissipated currently, as well as the location of heating, is not well understood," said Terry A. Hurford, a scientist at NASA's Goddard Space Flight Center in Maryland. "So it is possible that heating can bring water to those temperatures locally."

The earlier evidence for an ocean on Ganymede came from magnetic measurements during flybys by the Galileo probe, which suggested a conductive layer below the surface. Ice is not a good conductor. Saltwater is. But the readings could also be explained by oddities in Ganymede's magnetic field.

In the new research, the Hubble telescope scrutinized Ganymede for seven hours. It could not see below the surface, but it observed the shimmering lights of Ganymede's auroras.

As Jupiter rotates, once every 10 hours, its changing magnetic field causes the auroras to sway. If Ganymede were frozen, computer simulations showed, its aurora would sway by 6 degrees. But the salts of an under-ice ocean would generate a counteracting magnetic field, and the auroras would sway by only 2 degrees.

The auroras swayed 2 degrees. "It was exactly like all our computer modeling and all our theory predicted," Dr. Saur said. "It was right on."



A depiction of aurora on Ganymede, as it orbits Jupiter. Observations of the aurora suggest the moon has an ocean under ice. **NASA**

The scientists are now applying the approach to Io, a fiery world that certainly does not have an ocean of water. But it might have an underground ocean of magma that would similarly dampen the swaying of auroras.

The technique could one day be used to explore planets around distant stars and see if they, too, might have oceans.

As a place for life, Ganymede is less promising, because the ocean looks to be sandwiched between layers of ice and not in contact with rock. By contrast, Enceladus appears to possess all of the necessary ingredients - heat, liquid water and organic molecules - and a future probe could analyze the water by simply flying through the plumes.

"My mantra now is follow the plume," Dr. McKay said.

http://www.eurekalert.org/pub_releases/2015-03/uoa-ddo031115.php

Discovery demystifies origin of life phenomenon

University of Akron polymer scientist finds that certain amino acids and sugars were simply meant to be in life

The origin of life is still a mystery with many unsolved puzzles. How were molecules created? How did they assemble into large structures? Among the conundrums, the "homochirality" phenomenon upon which amino acids and sugars form is particularly fascinating. University of Akron A. Schulman Professor of Polymer Science Tianbo Liu has discovered that Mother Nature's clear bias toward certain amino acids and sugars and against others isn't accidental.

Liu explains that all life molecules are paired as left-handed and right-handed structures. In scientific terms, the phenomenon is called chirality. Nature's selection of only right-handed sugars and left-handed amino acids upon which to build life might be much simpler than we expected before.

Liu found that any molecules, if large enough (several nanometers) and with an electrical charge, will seek their own type with which to form large assemblies. This "self-recognition" of left-handed and right-handed molecule pairs is featured in the March 10, 2015 issue of Nature Communications .

"We show that homochirality, or the manner in which molecules select other like molecules to form larger assemblies, may not be as mysterious as we imagined," Liu says.

While an understanding of how homochirality occured at the onset of life remains a mystery, this new finding emphasizes that Mother Nature's inner workings may not be as complex as we think.

Funded by the National Science Foundation, this research was led by The University of Akron Department of Polymer Science,with collaborators from Northeast Normal University (China), Emory University, Argonne National Laboratory and Tsinghua University.

http://www.eurekalert.org/pub_releases/2015-03/ucl-esp031015.php

Epoch-defining study pinpoints when humans came to dominate planet Earth

The Anthropocene probably began around the year 1610

The human-dominated geological epoch known as the Anthropocene probably began around the year 1610, with an unusual drop in atmospheric carbon dioxide and the irreversible exchange of species between the New and Old Worlds, according to new research published today in Nature.

Previous epochs began and ended due to factors including meteorite strikes, sustained volcanic eruptions and the shifting of the continents. Human actions are now changing the planet, but are we really a geological force of nature driving Earth into a new epoch that will last millions of years?

Scientists at UCL have concluded that humans have become a geological power and suggest that human actions have produced a new geological epoch.

Defining an epoch requires two main criteria to be met. Long-lasting changes to the Earth must be documented. Scientists must also pinpoint and date a global environmental change that has been captured in natural material, such as rocks, ancient ice or sediment from the ocean floor. Such a marker - like the chemical signature left by the meteorite strike that wiped out the dinosaurs - is called a golden spike.

The study authors systematically compared the major environmental impacts of human activity over the past 50,000 years against these two formal requirements. Just two dates met the criteria: 1610, when the collision of the New and Old Worlds a century earlier was first felt globally; and 1964, associated with the fallout from nuclear weapons tests. The researchers conclude that 1610 is the stronger candidate.

The scientists say the 1492 arrival of Europeans in the Americas, and subsequent global trade, moved species to new continents and oceans, resulting in a global re-ordering of life on Earth. This rapid, repeated, cross-ocean exchange of species is without precedent in Earth's history.

They argue that the joining of the two hemispheres is an unambiguous event after which the impacts of human activity became global and set Earth on a new trajectory. The first fossil pollen of maize, a Latin American species, appears in marine sediment in Europe in 1600, becoming common over subsequent centuries. This irreversible exchange of species satisfies the first criteria for dating an epoch - long-term changes to Earth.

The researchers also found a golden spike that can be dated to the same time: a pronounced dip in atmospheric carbon dioxide centred on 1610 and captured in Antarctic ice-core records [(1)]. The drop occurred as a direct result of the arrival of Europeans in the Americas. Colonisation of the New World led to the deaths of about 50 million indigenous people, most within a few decades of the 16th century due to smallpox. The abrupt near-cessation of farming across the continent and the subsequent re-growth of Latin American forests and other vegetation removed enough carbon dioxide from the atmosphere to produce a drop in CO2. Thus, the second requirement of a golden spike marker is met.

The researchers have named the 1610 dip in carbon dioxide the 'Orbis Spike'. They chose the Latin word for 'world' because this golden spike was caused by once-disconnected peoples becoming globally linked.

Lead author, Dr Simon Lewis (UCL Geography and University of Leeds), said: "In a hundred thousand years scientists will look at the environmental record and know something remarkable happened in the second half of the second millennium. They will be in no doubt that these global changes to Earth were caused by their own species. Today we can say when those changes began and why. The Anthropocene probably began when species jumped continents, starting when the Old World met the New. We humans are now a geological power in our own right - as Earth-changing as a meteorite strike."

He added: "Historically, the collision of the Old and New Worlds marks the beginning of the modern world. Many historians regard agricultural imports into Europe from the vast new lands of the Americas, alongside the availability of coal, as the two essential precursors of the Industrial Revolution, which in turn unleashed further waves of global environmental changes. Geologically, this boundary also marks Earth's last globally synchronous cool moment before the onset of the long-term global warmth of the Anthropocene."

The authors also considered the merits of dating the Anthropocene to 1964, which saw a peak in radioactive fallout following nuclear weapons testing. This marker is seen in many geological deposits, and by the 1960s human impact on the Earth was large. However, the researchers note that while nuclear war could dramatically alter Earth, so far it has not. While the fallout from nuclear bomb tests is a very good marker, the testing of nuclear weapons has not been - in geological terms - an Earth-changing event.

The beginning of the Industrial Revolution, in the late 18th century, has most commonly been suggested as the start of the Anthropocene. This linked a clear turning point in human history, and the rise of atmospheric carbon dioxide from fossil fuel use is a long-term global environmental change of critical importance. However, the researchers did not find a golden spike at that time because most effects were local, while the global exponential rise in carbon dioxide was too smooth an increase to form a precisely dated marker [(2)]. The authors' new paper ends by highlighting some implications of formally defining the Anthropocene.

Co-author, geologist Professor Mark Maslin (UCL Geography) said: "A more wide-spread recognition that human actions are driving far-reaching changes to the life-supporting infrastructure of Earth will have implications for our philosophical, social, economic and political views of our environment. But we should not despair, because the power that humans wield is unlike any other force of nature, it is reflexive and therefore can be used, withdrawn or modified. The first stage of solving our damaging relationship with our environment is recognising it."

An official decision on whether to formally recognise the Anthropocene, including when it began, will be initiated by a recommendation of the Anthropocene Working Group of the Subcommission of Quaternary Stratigraphy, due in 2016 [(3)].

1.) The temporary drop in CO2 is between 7 and 10 parts per million, began around 1570, with a minimum value at 1610, rising afterwards, documented in two high-resolution Antarctic ice core records. This is the most prominent feature of the pre-industrial atmospheric CO2 record over the last 2,000 years.

2.) The authors emphasise that a golden spike is needed (technically known as a Global Stratotype Section and Point, GSSP). The alternative, usually reserved for epochs older than 541 million years, is for a committee to agree a date, called a Global Standard Stratigraphic Age (GSSA). The GSSA approach is fraught with difficulty as any date chosen would be open to challenge as being arbitrary.

3.) Formally ratifying a new Anthropocene Epoch would first require a positive recommendation from the Anthropocene Working Group of the Subcommission of Quaternary Stratigraphy, followed by a supermajority vote of the International Commission on Stratigraphy, and finally ratification by the International Union of Geological Sciences. Details about the Anthropocene Working Group can be found here: http://quaternary.stratigraphy.org/workinggroups/anthropocene/

5.) The paper 'Defining the Anthropocene' appears in the 12 March edition of Nature, embargoed until 18.00 UK time 11 March. doi:10.1038/nature14258

http://www.eurekalert.org/pub_releases/2015-03/uoc-so031015.php

Saharan 'carpet of tools' is earliest known man-made landscape

It is the equivalent of more than one Great Pyramid of Giza per square kilometre of Africa

A new intensive survey of the Messak Settafet escarpment, a massive outcrop of sandstone in the middle of the Saharan desert, has shown that stone tools occur "ubiquitously" across the entire landscape: averaging 75 artefacts per square metre, or 75 million per square kilometre.

Researchers say the vast 'carpet' of stone-age tools - extracted from and discarded onto the escarpment over hundreds of thousands of years - is the earliest known example of an entire landscape being modified by hominins: the group of creatures that include us and our ancestral species.

The Messak Settafet runs a total length of 350 km, with an average width of 60 km. Parts of the landscape are 'anthropogenic', or man-made, through build-up of tools over hundreds of thousands of years.

The research team have used this and other studies to attempt to estimate the volume of stone tools discarded over the last one million years of human evolution on the African continent alone. They say that it is the equivalent of more than one Great Pyramid of Giza per square kilometre of the entire continent (2.1 x 1014 cubic metres of rock).

"The Messak sandstone, now in the middle of the vast sand seas of Libya, would have been a high quality rock for hominins to fracture - the landscape is in effect a carpet of stone tools, most probably made in the Middle and Upper Pleistocene," said Dr Robert Foley, from the Leverhulme Centre for Evolutionary Studies at the University of Cambridge, who conducted the research with colleague Dr Marta Mirazón Lahr.

"The term 'anthropocene' is now used to denote the point at which humans began to have a significant effect on the environment," said Mirazón Lahr. "The critical time may well be the beginning of the industrial revolution about 200 years ago. Some talk of an 'early anthropocene' about 10,000 years ago when forests began being cleared for agriculture.

This is a Levallois core, a distinctive type of Middle Stone Age stone tool, recovered on the surface of the Messak. **Credit: Foley/Mirazón Lahr**

"Making stone tools, however, dates back more than two million years, and little research has been done on the impact of this activity. The Messak Settafet is the earliest demonstrated example of the scars of human activity across an entire landscape; the effects of our technology on the environment may be considerably older than previously thought," Mirazón Lahr said. The study is published today in the journal PLOS ONE.

The survey, conducted in 2011, involved randomly selecting plots of one metre squared across the parts of the plateau surface. In each square, the researchers sifted through all the stones to identify the number that showed evidence of modification through hominin activity - evidence such as a 'bulb of percussion': a bulge or curved dent on the surface of a stone tool produced by the angular blows of hominin percussion. The average number of artefacts across all sample squares was 75.

At the simple end, large flakes of stone would have been opportunistically hacked from boulders to be used for cutting or as weapons. At the more sophisticated level, researchers found evidence that specific tools had been used to wedge into the stone in order split it.

"It is clear from the scale of activity how important stone tools were, and shows that African hominins were strongly technologically dependent," said Foley. "Landscapes such as these must have been magnets for hominin populations, either for 'stone foraging trips' or residential occupation."

The researchers say that if - as seems likely - the success of Stone Age communities depended significantly on tool technology, there would be enormous advantage to knowing, remembering and indeed controlling access to areas with a "super-abundance" of raw materials, such as the Messak Settafet.

"Hominins may well have become tethered to these areas, unable to stray too far if survival depended on access to the raw materials for tools, and forced to make other adaptations subservient to that need," said Mirazón Lahr.

One way that the environmental impact of hominin tool excavation may have been positive for later humans is through the clusters of small quarrying pits dotted across the landscape (ranging up to 2 metres in diameter, and 50 centimetres in depth).

These pits would have retained moisture - with surface water still visible today after rains - and the small pools would have attracted game. In many of these pits, the team found 'trapping stones': large stones used for traps and ties for game and/or cattle during the last 10,000 years.

By combining their data with previous extensive surveys carried out across Africa, the researchers attempted to estimate roughly how much stone had been used as tools and discarded during human evolution.

Although stone tool manufacture dates back at least 2.5 million years, the researchers limited the estimate to one million years. Based on their and others research, they standardised population density (based on extant hunter-gatherers), tool volume, the number of tools used by one person in a year and the amount of resulting debris per tool.

They estimate an average density of between 0.5 and 5 million stone artefacts per square kilometre of Africa. When converted into an estimate of volume, this is the equivalent of between 42 to 84 million Great Pyramids of Giza.

Researchers say this would be the equivalent of finding between 1.3 and 2.7 Great Pyramids per square kilometre throughout Africa.

http://bit.ly/1NT74re

Neandertals Turned Eagle Talons into Jewelry 130,000 Years Ago

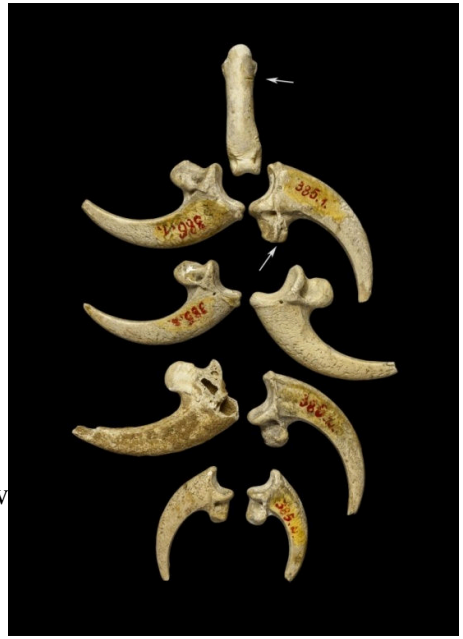
Talons were part of a single piece of jewelry, possibly a necklace

By Kate Wong

As longtime readers may have noticed, I have an abiding interest in Neandertals. To help me keep up with the latest scientific insights into these mysterious relatives of ours, I have a Google alert set for "Neandertal" (and the alternate spelling, "Neanderthal"). I'm always excited to see the email notification that a new story about our closest relative is available for my reading pleasure. There's just one problem: nearly half the time, the story isn't about Neandertals at all. Rather the word appears as an invective hurled at whichever politician or other despised figure has attracted the writer's ire.

Neandertals are the Rodney Dangerfields of the human family - they don't get no respect. Despite mounting evidence that our prehistoric cousins hunted with great skill, made beautiful stone tools, showed compassion toward one another and buried their dead, among other advanced behaviors, the word Neandertal remains a widely used pejorative. Disdain toward Neandertals lingers even after the revelation several years ago that most people today carry their DNA, thanks to long-ago hook-ups between Neandertals and anatomically modern *Homo sapiens.*

Now a stunning new discovery underscores that it is time to welcome Neandertals in from the cold. Researchers have found markings on eagle talons from a well-known Neandertal site in Croatia that indicate Neandertals harvested the claws and wore them as jewelry. Such evidence attests to a capacity for symbolic thought, long considered a hallmark of modern humans. Davorka Radovčić of the Croatian Natural History Museum in Zagreb, David Frayer of the University of Kansas and their colleagues describe the find in a paper published March 11 in *PLOS ONE.*



This find is not the first to show Neandertals used raptor claws. Researchers have previously described isolated talons from several Neandertal sites in Europe. But the new discovery, from the site of Krapina in northern Croatia, includes eight talons from at least three white-tailed eagles. The cut marks and polished facets on the talons suggest human modification rather than, say, trampling by animals. The researchers suggest that the talons were part of a single piece of jewelry, possibly a necklace, tied together with string or sinew. What makes this discovery additionally important is that it predates by a long shot the arrival of anatomically modern *Homo sapiens* in Europe some 45,000 years ago.

Eagle talons from the site of Krapina in Croatia were harvested by Neandertals and worn as jewelry 130,000 years ago. **Image: Luka Mjeda, Zagreb**

Many previous finds suggestive of Neandertal symbolism date to the interval during which Neandertals and moderns overlapped in Europe, leaving open the possibility that Neandertals simply copied the newcomers or that modern items got mixed in with Neandertal remains. But the Krapina assemblage dates to around 130,000 years ago - tens of thousands of years before moderns reached Europe. If the Neandertals there were making jewelry, their endeavor cannot be

chalked up to modern influence. They must have conceived of this form of symbolic expression on their own.

Ultimately, such adornments feed into the million-dollar question of whether Neandertals had language, because both art and language stem from the ability to think symbolically. Archaeologists used to hold that symbolic thinking and other elements of so-called behavioral modernity emerged only within the past 50,000 years or so and in anatomically modern humans alone. But traces of symbolic behavior far older than that have emerged at early modern human sites in Africa. The fact that Neandertals decorated their bodies (and their cave homes) suggests that both Neandertals and moderns inherited this capacity for symbolic thinking - and, by extension, language - from an even older common ancestor.

For more on Neandertal cognition, check out my feature article in the February 2015 *Scientific American.*

http://www.eurekalert.org/pub_releases/2015-03/ind-rtc031115.php

Repairing the cerebral cortex: It can be done

A team has repaired the adult mouse cerebral cortex with a graft of cortical neurons derived from embryonic stem cells

A team led by Afsaneh Gaillard (Inserm Unit 1084, Experimental and Clinical Neurosciences Laboratory, University of Poitiers), in collaboration with the Institute of Interdisciplinary Research in Human and Molecular Biology (IRIBHM) in Brussels, has just taken an important step in the area of cell therapy: repairing the cerebral cortex of the adult mouse using a graft of cortical neurons derived from embryonic stem cells. These results have just been published in Neuron.

The cerebral cortex is one of the most complex structures in our brain. It is composed of about a hundred types of neurons organised into 6 layers and numerous distinct neuroanatomical and functional areas.

Brain injuries, whether caused by trauma or neurodegeneration, lead to cell death accompanied by considerable functional impairment. In order to overcome the limited ability of the neurons of the adult nervous system to regenerate spontaneously, cell replacement strategies employing embryonic tissue transplantation show attractive potential. A major challenge in repairing the brain is obtaining cortical neurons from the appropriate layer and area in order to restore the damaged cortical pathways in a specific manner.

The results obtained by Afsaneh Gaillard's team and that Pierre Vanderhaeghen at the Institute of Interdisciplinary Research in Human and Molecular Biology show, for the first time, using mice, that pluripotent stem cells differentiated into cortical neurons make it possible to reestablish damaged adult cortical circuits, both neuroanatomically and functionally.

These results also suggest that damaged circuits can be restored only by using neurons of the same type as the damaged area. This study constitutes an important step in the development of cell therapy as applied to the cerebral cortex.

This approach is still at the experimental stage (laboratory mice only). Much research will be needed before there is any clinical application in humans.

Nonetheless, for the researchers, "The success of our cell engineering experiments, which make it possible to produce nerve cells in a controlled and unlimited manner, and to transplant them, is a world first. These studies open up new approaches for repairing the damaged brain, particularly following stroke or brain trauma," they explain.

This project was funded by the French National Research Agency (ANR-09-MNPS-027-01).

"Area-Specific Reestablishment of Damaged Circuits in the Adult Cerebral Cortex by Cortical Neurons Derived from Mouse Embryonic Stem Cells"

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http://www.eurekalert.org/pub_releases/2015-03/acos-loa031215.php

Liver-sparing operation associated with higher survival rates in cancer patients

New Journal of the American College of Surgeons study shows a surgical approach focused on preserving liver tissue in patients undergoing a liver operation leads to lower mortality, fewer complications

CHICAGO - A surgical approach in which a surgeon removes less than a lobe of the liver in a patient undergoing an operation for liver cancer is associated with lower mortality and complication rates, according to new study results published online as an "article in press" in the Journal of the American College of Surgeons (JACS). The article will appear in print in the April issue of the Journal.

Historically, the most common surgical method of treatment for liver cancer was a major hepatectomy in which a lobe (hemi-liver) is removed in order to remove the tumor. The five-year survival rate of selected patients who undergo a complete resection is as high as 50 percent, yet many people aren't operated on because of

the high complication rate, blood loss, and liver dysfunction associated with a major hepatectomy.

However, over the last 20 years liver operations have become safer and more effective due to advances in surgical and anesthetic techniques and operating room devices; improvements in perioperative patient care; and a much wider availability of surgeons who are trained in liver surgery techniques.

When a patient has a single tumor, or tumors confined to one side of the liver, a surgical approach called hepatic parenchymal preservation is far better for the patient than the traditional approach of removing large sections of the liver. This preservation procedure involves removing less than a lobe of the liver without compromising principles of cancer surgery. It places less physical stress on the body, and gives patients a quicker recovery time and the option to have another operation if the cancer recurs.

"The majority of patients with metastatic colorectal cancer are never sent to a liver surgeon because of the impression that a liver operation is too dangerous and patient outcomes are poor," according to T. Peter Kingham, MD, FACS, lead study author and a surgeon at Memorial Sloan Kettering Cancer Center (MSKCC) in New York City. "But we've shown that it's possible to do safe liver resection, so patients should be considered for hepatic parenchymal preservation."

The aim of this retrospective study was to investigate the correlation between surgical methods, mortality, and complication rates over the last 19 years. Dr. Kingham and colleagues at MSK analyzed hospital records of all patients who underwent liver resection for a malignant diagnosis from 1993 to 2012 at their cancer center.

There were 3,875 patients who underwent 4,152 resections for cancer entered into the MSK database. The most common diagnosis was metastatic colorectal cancer.

The researchers divided the patients into three equal groups according to time period: early (1993 to 1999), middle (2000 to 2006), and late (2007 to 2012).

They then looked at what percentage of cases in each era were major versus minor hepatectomies (major resection was defined as removal of three or more segments of the liver), and compared outcomes in terms of surgical morbidity and mortality rates between the three time periods.

Over the study period, the 90-day mortality rate decreased from 5 percent to 1.6 percent. Overall complications dropped from 53 percent to 20 percent. The percentage of major hepatectomies decreased from 66 percent to 36 percent. The transfusion rate decreased from 51 percent to 21 percent, and liver dysfunction for all cases decreased from 3 percent to 1 percent.

One interesting finding was that the mortality risk for major hepatectomies remained the same in all three time periods, suggesting that the improved outcomes were related specifically to the increased use of parenchymal sparing resections. "This change in approach to resection appears to be largely responsible for the decrease in overall mortality, given that the mortality rate associated with major liver resections remained constant over the entire study period," Dr. Kingham said.

In addition, the researchers found that abdominal infections were the most common complication of liver surgical procedures. The study authors conclude that encouraging parenchymal preservation and preventing abdominal infections are critical for continued improvement of liver procedure outcomes.

"The biggest takeaway from our study is that parenchymal preservation should be applied to all patients undergoing liver operations for malignancies because the data show that the mortality rate and complication rate, the blood loss, the requirement for blood transfusions, time in the hospital, all of these things which we are all trying to improve on, are all less," Dr. Kingham said. "That is an important message because parenchymal preservation is not always done. While it may be technically easier to remove more liver in some cases, it is worth considering a technically more challenging approach to remove less liver. In the end, there is a real difference in a patient's mortality risk: the more segments of liver that you take out, the higher the risk to the patient." he said.

"We hope our study findings interest more physicians who advise patients with liver cancers to send their patient to be evaluated by a liver surgeon, particularly high-risk patients who previously may not have been considered for a liver operation at all," Dr. Kingham concluded.

Other study participants include Camilo Correa-Gallego, MD; Michael I D'Angelica, MD, FACS; Mithat Gonen, PhD; Ronald P DeMatteo, MD, FACS; Yuman Fong, MD, FACS; Peter J Allen, MD, FACS; Leslie H. Blumgart, MD, FACS; and William R Jarnagin, MD, FACS.

"FACS"designates that a surgeon is a Fellow of the American College of Surgeons.

Support for this study was provided by NIH/NCI Cancer Center Support Grant P30 CA008748.

Citation: Hepatic Parenchymal Preservation Surgery: Decreasing Morbidity and Mortality Rates in 4,152 Resections for Malignancy, Journal of the American College of Surgeons.
DOI: http://dx.doi.org/10.1016/j.jamcollsurg.2014.12.026.

http://www.eurekalert.org/pub_releases/2015-03/gi-phc030915.php

Preventing heart cells from turning to bone

Scientists have discovered why some heart tissue turns into bone, and they may have learned how to stop it

Researchers from the Gladstone Institutes have used human cells to discover how blood flow in the heart protects against the hardening of valves in cardiovascular disease. What's more, they've identified a potential way to correct this process

when it goes wrong by flipping the switch on just a handful of genes. These findings may have implications for related conditions, like hardening of the arteries, which causes heart attacks and stroke.

Calcific aortic valve disease (CAVD) is the third leading cause of heart disease, affecting nearly 1.5 million people and resulting in 100,000 heart valve replacement surgeries in the U.S. alone. In CAVD, which can develop with age, heart valves begin to produce calcium, causing them to harden like bone.

Scientists have long known that blood flow in the heart plays a role in the calcification of valves and arteries, but they did not understand how.

In a new study published in the journal Cell, Gladstone investigators reveal the chain of events that cause healthy valves to become bone-like. Senior author on the paper, Deepak Srivastava, MD, director of cardiovascular and stem cell research at Gladstone and a pediatric cardiologist at the University of California San Francisco (UCSF), had previously discovered that disruption of one of two copies of a master gene called NOTCH1 can cause valve birth defects and CAVD.

In the current study, the researchers report that NOTCH1 acts like a sensor on the endothelial cells--the cells that line the valve and vessels--detecting blood flow outside of the cell and transmitting information to a network of genes inside the cell. Activation of NOTCH1 by blood flow causes a domino effect, triggering numerous other genes in the network to turn on or off, resulting in suppression of inflammation and calcification. However, if this process is disrupted by a decrease in NOTCH1, the cells become confused and start to act like bone cells, laying down calcium and leading to a deadly hardening of the valve.

In a collaborative effort between the Gladstone laboratories of Benoit Bruneau, PhD, Katherine Pollard, PhD, and Dr. Srivastava, the scientists used stem cell technology to make large amounts of endothelial cells from patients with CAVD, comparing them to healthy cells and mapping their genetic and epigenetic changes as they developed into valve cells. The researchers used the power of gene sequencing and clever computational methods to uncover the "source code" for human endothelial cells and learn how that code is disturbed in human disease.

"By understanding the gene networks that get disrupted in CAVD, we can pinpoint what we need to fix and find new therapeutics to correct the disease process," says first author Christina Theodoris, an MD/PhD student at the Gladstone Institutes and UCSF.

Sifting through this mountain of data, the scientists found three key genes that were altered by the NOTCH1 mutation and also acted as master regulators, turning off the critical pathways that normally prevent inflammation and calcification. Remarkably, when the researchers manipulated the activity of these three genes, almost all of the other genes in the network were corrected, pointing to novel therapeutic targets for CAVD. The scientists are now screening for drugs that restore the gene network to its normal state.

"Identifying these master regulators is a big step in treating CAVD, not just in people with the NOTCH1 mutation, but also in other patients who experience calcification in their valves and arteries," says Dr. Srivastava. "Now that we know how calcification happens and what the key nodes are, we know what genes to look for that might be mutated in other related forms of cardiovascular disease."

Molong Li, Mark White, Lei Liu, and Daniel He also contributed to the research, and Katherine Pollard and Benoit Bruneau from the Gladstone Institutes were co-senior authors on the paper. Funding for the study was provided by the Bench to Bassinet Program of the National Heart, Lung, and Blood Institute (NHLBI), the NHLBI Progenitor Cell Biology Consortium, the LK Whittier Foundation, the William Younger Family Foundation, the Eugene Roddenberry Foundation, the Winslow family, the Lawrence J. and Florence A. De George Charitable Trust, the Sarnoff Cardiovascular Research Program, the California Institute for Regenerative Medicine, and the American Heart Association.

http://www.eurekalert.org/pub_releases/2015-03/hu-sto031215.php

Solving the obstetrical dilemma

Study shows wide hips do not mean less efficient locomotion

Among the facts so widely assumed that they are rarely, if ever studied, is the notion that wider hips make women less efficient when they walk and run.

For decades, this assumed relationship has been used to explain why women don't have wider hips, which would make childbirth easier and less dangerous. The argument, known as the "obstetrical dilemma," suggests that for millions of years female humans and their bipedal ancestors have faced an evolutionary trade-off in which selection for wider hips for childbirth has been countered by selection for narrower hips for efficient locomotion. A new study, however, shows that what was widely assumed to be fact is, in actuality, almost entirely incorrect.

A new study, conducted by researchers at Harvard in conjunction with colleagues at Boston University and Hunter College, found no connection between hip width and efficient locomotion, and suggests that scientists have long approached the problem in the wrong way. The study is described in a March 11 paper published in PLOS ONE.

"This idea, that pelvic width for birth and pelvic width for locomotion are connected, is deeply ingrained in this discipline," said Anna Warrener, first author of the study and a post-doctoral fellow working in the lab of Daniel Lieberman, the Edwin M. Lerner II Professor of Biological Sciences and Chair of the Department of Human Evolutionary Biology. "Everyone thinks they know this is true...but it's wrong, and it's wrong for two reasons.First, the way we had modeled the forces involved didn't make sense. Second, we found that you can't predict,

from the width of the pelvis, how much energy someone is using, so we've been looking at this biomechanical problem entirely wrong."

The study grew out of research Warrener conducted as part of her Ph.D at Washington Univertsity, St Louis, which she completed under the supervision of Herman Pontzer, now a professor of Anthropology at Hunter College, and himself a former Ph.D. student under Lieberman, and Eric Trinkaus. At the same time, Lieberman and Kristi Lewton, a former postdoctoral fellow in Lieberman's lab who is now at BU, were exploring the same problem. When the two teams discovered they'd been working on similar tracks, they decided to combine their efforts into a single study.

"This is an idea - that wider hips make you less efficient - that's been taught for 30 years," said Pontzer. "And I think Anna has shown very nicely, in collaboration with Kristi and Dan and I, that this just isn't true.

"Good science is about taking a critical look at things we take for granted," he continued. "So I think it's wonderful that what seemed to be settled science can be completely overturned by this really beautiful data. This is going to change the way we teach Anthropology 101 everywhere, and it's going to change the way we teach about human evolution and walking adaptations and the birth of babies. I think it's a great example of how new things can be uncovered when you really bother to look deeply at accepted ideas."

At the heart of why those earlier ideas were wrong, Warrener, Lieberman, Pontzer and Lewton discovered, were fundamental problems with the simple biomechanical models used to understand the forces acting on the hips.

"If we only had a pelvis and a femur, the old model might be correct," Lieberman said. "But we also have a shank, and an ankle, and a foot. And when you place your foot on the ground, forces don't just shoot straight up from the ground to your hip. By the time they arrive at your hip, they aren't acting on your body in this idealized way."

To understand what was really happening, the researchers turned to a biomechanical technique known as inverse dynamics. "Essentially, what we did was to measure the chain reaction of forces as they move through the body, starting at the foot and progressing up the leg to the hip," Warrener said. And as Warrener and Lieberman discovered, the old models simply didn't make sense.

Rotational movements at all joints, including the hip, are the product of forces generated by muscles or gravity, and a key biomechanical variable known as a moment arm, or lever arm.

In the case of the pelvis, two moment arms are of special importance. One is the moment arm from the center of the hip joint to the body's center of gravity. The other is the moment arm from the center of the hip joint to the abductor muscles along the side of the hip. These critical muscles stabilize the hip when only one foot is on the ground. The two moment arms act like the two sides of a see-saw.

According to basic rules of physics, the longer the moment arm is from the hip to the center of the pelvis, the more force the hip abductor muscles have to produce to stabilize the body, thus requiring more energy. As a result, it has long been assumed that people with wider hips - including, in theory, most women - need to spend more energy to walk and run.

When Warrener and her colleages began studying scans of volunteers with a variety of body shapes, however, they found that the evidence to support that theory lacking.

"What we found is that that the true moment arm measured during locomotion is uncorrelated with the assumed moment arm determined from the width of the pelvis," she said. "So you can have a wide pelvis and a small moment arm, or you can have a narrow pelvis and a very long moment arm. That means you can't predict anything about how hard those abductor muscles are working to counteract torque based on the width of the pelvis, and therefore you can't predict anything about how much energy they're using."

"The bottom line is that people with wider hips don't have higher costs for locomotion," Lieberman added. "In fact, if you look at old studies that compared how efficient men and women are, they have always showed no difference. We have long had plenty of data to disprove the idea that men are more efficient than women at walking and running - but now we know why it's wrong."

If wider hips don't equate with less efficient walking or running, it begs two questions - why has the incorrect assumption persisted for so long, and why don't all women have the widest hips possible to allow for easier childbirth?

For the first, at least, the answer may have much to do with long-held cultural biases.

Until recently, Lieberman said, portrayals of hunter-gatherer societies imagined that men - who were responsible for hunting - were far more active than women. More recent studies, however, show this is untrue.

"For most of evolutionary history, women have done a great deal of work," he said. "Hunter-gatherer women walk, on average, nine kilometers a day, so it makes sense that they would be just as efficient as men, because women have to work just as hard as men. In addition, women are metabolically responsible not just for themselves but also for their infants. "They have to pay the metabolic costs of gestation and nursing, and they have to feed dependent offspring, so they almost always need to save energy," Lieberman continued. "Women are under very strong selection to be efficient. So you'd predict they would also be efficient at walking as well, and that's exactly what we found."

While they don't have an answer for why all women don't have the widest possible hips, one hypothesis advanced by Warrener and colleagues suggests that the problem may be that the modern world is drastically different from any environment in human history.

"One idea my lab studies is the idea of mismatch," Lieberman said. "Our bodies are not always very well adapted for the novel environments in which we now live. One novel problem is too much energy. Women, including pregnant women, now have access to a lot more energy than they used to, and they have to work less. So we've gone from women being on the margin of just having enough energy, to suddenly having more energy than necessary. One result may be that babies have recently started to get too big to fit through their mother's birth canals."

Going forward, Warrener said, researchers need additional data before they can fully understand how the modern environment has changed birth outcomes.

"The take home message is that until recently, the maternal pelvis was well adapted for both its locomotor function and for giving birth," she said. "Natural selection demands that reproduction work. But the fact that both the development of the pelvis and a baby's size are strongly influenced by external environmental factors that have been changing rapidly in the last 10,000 years means that our current levels of birth difficulty aren't a good measure of what was happening in the past. What we really need is better data on birth outcomes and infant size in hunter-gatherer populations whose lifestyles are probably a better reflection of the conditions we evolved to deal with. That's a dissertation for someone else."

http://www.bbc.com/news/health-31869055

Meningitis vaccine plan after steep rise in new strain

Teenagers will soon be vaccinated against deadly meningitis W after a steep rise in the number of cases, Public Health England has announced.

James Gallagher By James Gallagher Health editor, BBC News website

There were 22 confirmed cases in 2009, 117 last year and experts predict even more cases in the future. Meningitis W also has a higher-than-usual death rate.

The government's Joint Committee on Vaccination and Immunisation called for 14 to 18-year-olds to be vaccinated "as soon as possible".

There are six different kinds of meningococcal infection which lead to meningitis known as A, B, C, W, X and Y. MenW was rare but a new strain of the bacterium is causing severe disease in teenagers and young adults.

Prof Andrew Pollard, chairman of the Joint Committee on Vaccination and Immunisation, said: "We have seen an increase in MenW cases this winter caused by a highly aggressive strain of the bug. "We reviewed the outbreak in detail at JCVI and concluded that this increase was likely to continue in future years unless action is taken. "We have therefore advised the Department of Health to implement a vaccination programme for teenagers as soon as possible which we believe will have a substantial impact on the disease and protect the public's health." The recommendations have been accepted by the government.

Dr Shamez Ladhani, from Public Health England, said: "We will now work with the government and NHS England to roll out a vaccination programme. "It's crucial that we all remain alert to the signs and symptoms of the disease and seek urgent medical attention if there is any concern." He said doctors were also being urged to keep an eye out for symptoms in all age groups.

Chris Head, the chief executive of the Meningitis Research Foundation, said: "We applaud the quick action by the government to protect 14 to 18 year-olds. "However, it will take more than a year for this protection to filter through to toddlers and infants, and in the meantime under-fives will still be dying and disabled as a result of MenW.

"But the Bexsero vaccine, mainly regarded as a meningococcal B (MenB) vaccine, also provides protection against MenW and would provide more immediate protection for babies and toddlers. "This weighs even further in favour of Bexsero being introduced into the routine schedule as quickly as possible."

The JCVI has also recommended introducing a MenB vaccine, but this has not yet come into force.

Meningitis

Meningitis is an infection of the meninges - the membrane that surrounds the brain and spinal cord
Meningococcal bacteria are common and carried harmlessly in the nose or throat by about one in 10 people
They are passed on through close contact
Symptoms include a high fever with cold hands and feet, agitation, confusion, vomiting and headaches
Parents and patients should not wait for a rash to develop before seeking medical help

http://www.medscape.com/viewarticle/841191?src=rss

Making the New CV Risk Calculator Work for Clinicians and Patients

Risk estimator for cardiovascular disease endorsed by American College of Cardiology and American Heart Association has stirred some controversy

Charles P. Vega, MD, Michael J. Blaha, MD, MPH

Charles P. Vega, MD: Hello. Welcome to Top Issues in Preventive Cardiology for Primary Care. I'm Dr Charles Vega, clinical professor of family medicine here at the University of California, Irvine.

I'm joined today by Dr Michael Blaha, director for clinical research at the Ciccarone Center for the Prevention of Heart Disease at Johns Hopkins University. Welcome, Mike.

Michael J. Blaha, MD, MPH: Thanks, Chuck. Glad to be here to discuss cardiology with you.

Dr Vega: The new risk estimator,[1] which isn't so new anymore, has stirred something of a controversy. It's a risk estimator for cardiovascular disease that is endorsed by the American College of Cardiology and the American Heart Association.

To me in primary care, one of the benefits is that it does provide a nice way to stratify people's risk. It's very user-friendly and easy to employ. But at the same time, it has drawbacks. I'm concerned about overestimation of risk, in that it may put broad groups of people into high-risk categories that don't necessarily need to be there. Also, it's limited in terms of its application to different races and ethnic groups: There is a choice for white/Caucasian or African-American but no other categories beyond that in the calculator.

You've done some deep diving into the value and the relative problems with the calculator. What do you think?

Dr Blaha: Great question. The new risk estimator is an advance over the previous Framingham Risk Assessment Tool[2] in two specific ways. Number one, stroke is included as an outcome. Number two, as you mentioned, the African-American race is now recognized as a separate variable in the calculator.

But right off the bat, there have been concerns about some estimation issues with the new calculator—specifically overestimation of certain modern-day populations, such as those with a high socioeconomic status. There seems to be a tendency for the calculator to overestimate the risk for those populations.

Dr Vega: Do you think that's due to the fact that the majority of the research upon which the risk estimator was based was performed among those populations, and that's where that bias comes from?

Dr Blaha: It could be multiple factors. One of the things we've noticed is that populations that are more modern have risk factor distributions that look more like people you would treat in clinic today[3] and a little less like the people, for example, who were in the Framingham study on which the older calculator[2] was based. You notice that in the populations today, risk is a little lower than it was in prior generations, maybe influencing the accuracy of the new risk estimator somewhat.

Dr Vega: The estimator is usually applied on two occasions: One is when we think about lipid therapy; the second is when we think about aspirin therapy. Let's start with lipids. Is the risk estimator, in your opinion, valuable for those patients who have potential lipid abnormalities and a consequently higher cardiovascular risk? Or are there really some things that hold it back in that regard?

Dr Blaha: Great question. I think the bottom line here is that the new risk estimator is a great place to start the risk conversation with patients, but it's not the ending point. In fact, the guidelines for using the estimator[4] made a special note of a newly conceived "clinician-patient discussion."

A discussion with our patient should follow any application of the new risk estimator, such that we sit down with a patient and say, "Your 10-year risk is this number." We have to follow that with a discussion about how accurate that might be and about the risks and benefits of therapy.

In some cases, we're going to decide that additional testing is still needed to stratify risk. And in some cases, we're going to make decisions based upon patient preferences, even when we reach the threshold for therapy, which is a 7.5% 10-year risk, according to the new guidelines.[5]

Dr Vega: That's a great point. One thing we tend to forget is that guidelines are just guidelines. Just because somebody squeaks over and has a 7.8% 10-year risk of developing cardiovascular disease—particularly, say, if they tried two statins a year ago and they failed to respond adequately both times because of side effects or some other problem, or they just really don't want to take drugs—that can be a nice time to initiate a discussion about how to ameliorate other risk factors. It's a chance for doing some motivational interviewing with the patient regarding lifestyle factors.

Maybe statins aren't the answer for everything. Although statins certainly are highly effective, the guidelines don't say that just because the patient does meet one of the risk categories, they absolutely have to be on a statin.

Dr Blaha: Absolutely true. The guidelines say as clearly as possible that statins work. They work in just about everyone, but you have to be a high enough risk to really benefit.

One of the drawbacks of the risk estimator is that a patient can reach that threshold for qualifying for a statin based on age alone, even without other risk factors—in particular, patients who are older than 60-65 years. That's where we most closely consider the clinician-patient discussion. Sometimes we order a coronary calcium CT scan to get a calcium score—a measurement of calcium deposits in the coronary arteries. If it's zero, we say, "Lifestyle is the way to go for you at this time."

Dr Vega: I think that is great for young patients and, in my practice, for so many patients who have hypertension and diabetes. Diabetes, in particular, automatically puts them on a statin. Almost everybody qualifies for a moderate- or a high-intensity statin. Is that what you're doing in your practice?

Dr Blaha: Yes. That's where the clinical trial evidence lies. I start a moderate- to high-intensity statin in most patients. The idea here is, rather than start low and titrate, start at a dose that's proven to work, and you can down-titrate if there are

side effects. But get to the dose they use in the clinical trials, and you're going to see the benefit that we saw in the trials.

Dr Vega: Are you cheating and looking back at the previous guidelines[6] and following your patients' lipid values over time to try to get to targets, say 70-100 mg/dL? The new guidelines state that the main reason to check lipids on treatment is to check adherence to therapy. What do you think?

Dr Blaha: It's a great question. I still check lipids in my patients. As you said, current guidelines do endorse checking lipid levels primarily for adherence. If your patient's cholesterol isn't coming down on a statin, the most likely reason is that he's not taking his statin.

In my highest-risk patients—particularly those with high coronary calcium scores or for those who have coronary heart disease and require secondary prevention—I do still check on-treatment lipids to try to get to a goal. I agree with the new guidelines that there's no specific evidence that a low-density lipoprotein cholesterol (LDL-C) of 60 is better than 65 or 65 is better than 70. But we do know that the lower the better, on proven therapy. I use statins and sometimes, for my highest-risk patients, I add ezetimibe, based on the IMPROVE-IT study,[7] to get down to an LDL number that I think is very low.

Dr Vega: I think it's reasonable to follow lipids, particularly for those higher-risk patients. Nearly half of adults per the new risk estimator are recommended to take a statin. For the patients who are on the low-intensity statins, I don't think it's necessary to follow the lipid values assiduously. As long as they're on that low-intensity statin, they're probably going to be okay in terms of overall risk.

Dr Blaha: In primary prevention, in my average-risk patient who I think will benefit from a statin, I do not follow on-treatment lipids as much. I agree with you—I target the highest-risk patients. That's where you're going to get the most bang for your buck. And sometimes, I will, of course, look at both LDL and non-high-density lipoprotein cholesterol, as well as sometimes apolipoprotein B for on-treatment risk stratification.

Dr Vega: Speaking of coronary calcium scores, what do you think of using high-sensitivity C-reactive protein levels to improve risk stratification for patients whose calcium scores are borderline?

Dr Blaha: I do endorse those tests as part of the clinician-patient risk discussion, particularly the coronary artery calcium score; that's right.

Dr Vega: I want to pivot quickly to aspirin therapy. Another valuable way to use the risk estimator is in deciding on use of aspirin therapy.

I've been surprised in my own practice at how many patients come to me who are taking aspirin and who should not be on it, based on risk assessment using the risk estimator. I tend to think that patients with 6% and higher risk over a 10-year period certainly may be considered for aspirin. A lot of patients don't reach that mark.

There's new research[8] that suggests that about 10% or more of patients who are taking primary aspirin therapy don't need it.Also, there's a new study from Japan[9] that concluded that aspirin was really ineffective in reducing mortality outcomes among high-risk, potential cardiovascular patients.

What's your take on aspirin as primary prevention therapy at this point?

Dr Blaha: Aspirin has taken some hits, as you noted. The recent trials haven't been particularly impressive, from the multiple Japanese studies to other studies in high-risk patients. We just don't see the benefit that we thought we would see. Some of those early data came from the pre-statin era in times when event rates were high.

In general, I'm not giving aspirin to all of my patients. There are some patients who are clearly too low-risk, and we're going to do more harm than benefit with aspirin use in those patients. We have to think wisely.

There are no data using the new risk estimator, but certainly, if your risk is above 10% with the new risk estimator, you're probably in a group that would benefit from aspirin. For patients with a coronary calcium score above 100, good research[10] suggests that you're going to get a net benefit from aspirin. But if my patient has a coronary calcium score of zero, for example, he's probably going to get a net harm. I won't prescribe aspirin for such patients. In fact, I'll take people off aspirin, even, if I think that they will not benefit based on their low risk.

Dr Vega: That's an excellent point. To summarize, we know that the risk estimator has some limitations. It may be that it's spreading recommendations for therapy too broadly now. But it does have some important innovations, and it is based on sound evidence.

In primary care, it is easy to use the estimator. For patients who are straightforward or who need secondary prevention because of coronary heart disease, and for those who have the big three—diabetes, hypertension, hyperlipidemia—and particularly if they are older, treatment can be a little bit more straightforward. But use the risk estimator for your patients where there's more of a question or you have somebody who's more on the fence. I find it's tremendously helpful to guide therapy that way.

Finally, it is just a guide for therapy. It's to start a conversation. It helps you look at the patient's cardiovascular risk a little bit more critically, but it's not the be-all and end-all: That's decided between you and your patient on an individual basis.

Dr Blaha: I agree. Let me put in a plug for the new risk estimator app from the American College of Cardiology. You have to get this for your phones. The app is

available on both iTunes (iPhones, iPads) and Google Play (Galaxy, Nexus, other Android devices). It's so easy to plug in the data and get the risk estimate.

Once again, I wish also to put a plug in for the patient-clinician risk discussion, which should follow any calculation of risk. We know that a calculated risk is just a calculated probability that may or may not apply directly to your patient. Start with the risk estimator—use the app—then have that discussion with patients and decide if the therapy is the right thing for them.

Dr Vega: My phone is terrible, and I'm terrible at using it. Yet I still use that app on a very regular basis in clinic. It's incredibly helpful.

Thank you very much.

Thank you all for listening. Please add your comments by clicking on the comment link below.

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http://www.bbc.com/news/health-31876219

South Africans perform first 'successful' penis transplant

The world's first successful penis transplant has been reported by a surgical team in South Africa.

James Gallagher By James Gallagher Health editor, BBC News website

The 21-year-old recipient, whose identify is being protected, lost his penis in a botched circumcision. Doctors in Cape Town said the operation was a success and the patient was happy and healthy. The team said there was extensive discussion about whether the operation, which is not life-saving in the same way as a heart transplant, was ethical. There have been attempts before, including one in China. Accounts suggested the operation went fine, but the penis was later rejected.

Penis replacement

The man was 18 and already sexually active when he had the circumcision. The procedure is part of the transition from boyhood to adulthood in parts of South Africa. Man from Xhosa tribe These boys are undergoing a circumcision ceremony in South Africa The boy was left with just 1cm of his original penis. Doctors say South Africa has some of the greatest need for penis transplants anywhere in the world. Dozens, although some say hundreds, of boys are maimed or die each year during traditional initiation ceremonies.

Long

Surgeons at Stellenbosch University and Tygerberg Hospital performed a nine-hour operation to attach a donated penis. One of the surgeons, Andre Van der Merwe, who normally performs kidney transplants, told the BBC News website: "This is definitely much more difficult, the blood vessels are 1.5 mm wide. In the kidney it can be 1 cm." The team used some of the techniques that had been developed to perform the first face transplants in order to connect the tiny blood vessels and nerves. The operation took place on 11 December last year. Three months later doctors say the recovery has been rapid. Full sensation has not

returned and doctors suggest this could take two years. However, the man is able to pass urine, have an erection, orgasm and ejaculate.

Preparation

The procedure required a lot of preparation. The team needed to be sure the patient was aware of the risks of a life-time of immunosuppressant drugs.

Also some patients cannot cope with a transplant if they fail to recognise it as part of their body. "Psychologically, we knew it would have a massive effect on the ego," said Dr Van der Merwe. It took "a hell of a lot of time" to get ethical approval, he added.

One of the concerns is a heart transplant balances the risk of the operation against a certain death, but a penis transplant would not extend life span. Dr Van der Merwe told the BBC: "You may say it doesn't save their life, but many of these young men when they have penile amputations are ostracised, stigmatised and take their own life. "If you don't have a penis you are essentially dead, if you give a penis back you can bring them back to life." Further attempts on other patients are expected to take place in three months time.

http://bit.ly/1BHPIs1

CO2 Pollution Stops Swelling Even as Global Economy Grows

Thanks to China, for the first time in 40 years, CO2 emissions failed to grow along with the global economy

March 13, 2015 |By Bobby Magill and Climate Central

Solar, wind and other renewables are making such a big difference in greenhouse gas emissions worldwide that global emissions from the energy sector flatlined during a time of economic growth for the first time in 40 years.

The International Energy Agency announced Friday that energy-related CO2 emissions last year were unchanged from the year before, totaling 32.3 billion metric tons of CO2 in both 2013 and 2014. It shows that efforts to reduce emissions to combat climate change may be more effective than previously thought.

“This is both a very welcome surprise and a significant one,” IEA Chief Economist and incoming IEA Executive Director Fatih Birol said in a statement. “It provides much-needed momentum to negotiators preparing to forge a global climate deal in Paris in December. For the first time, greenhouse gas emissions are decoupling from economic growth.”

Following an announcement earlier this week that China’s CO2 emissions fell 2 percent in 2014, the IEA is crediting 2014’s progress to China using more solar, wind and hydropower while burning less coal. Western Europe’s focus on sustainable growth, energy efficiency and renewables has shown that emissions from energy consumption can fall even as economies grow globally, according to the IEA.

Global CO2 emissions stalled or fell in the early 1980s, 1992 and 2009, each time correlating with a faltering global economy. In 2014, the economy grew 3 percent worldwide. In the U.S., energy-related CO2 emissions fell during seven of the past 23 years, most notably during the recession of 2009, U.S. Energy Information Administration data show. Emissions in 2013 — the most recent year for which U.S. data is available — were higher than they were in the previous year, but 10 percent lower than they were in 2005. At the same time, the carbon intensity of the U.S. economy — CO2 emissions per dollar of GDP — has been trending downward over the past 25 years, according to the administration.

The IEA will release a more detailed analysis of global energy-related CO2 emissions in a special energy and climate report to be released in June.

“The latest data on emissions are indeed encouraging, but this is no time for complacency and certainly not the time to use this positive news as an excuse to stall further action,” IEA Executive Director Maria van der Hoeven said in a statement.

http://ajw.asahi.com/article/behind_news/social_affairs/AJ201503120081

Number of suicides drops by 6.8% to 25,427 in 2014

The number of suicides in Japan fell for the fifth consecutive year in 2014, as deaths related to livelihood and economic problems sharply declined, according to a government survey released on March 12.

By TAKURO YAGI

Last year, 25,427 people committed suicide, a decrease of 1,856, or 6.8 percent, from 2013 and the third straight year for the total to drop below 30,000, according to the survey compiled by the Cabinet Office and National Police Agency. The survey also looked into suicide notes and accounts by bereaved family members to determine the causes of suicides of 19,025 people. Some people had more than one reason for killing themselves. It found that the number of people who committed suicide because of “economic and livelihood issues,” including debts and unemployment, plummeted by 492, or 10.6 percent, from the previous year to 4,144.

The number of suicides related to “family problems,” such as pessimism about future prospects, fell by 286 people to 3,644, down 7.3 percent from 2013.

The leading cause of suicides last year was “health issues,” accounting for 12,920 deaths, down 760, or 5.6 percent, from 2013.

The number of suicides caused by “problems related to school” was 372 in 2014, a year-on-year decline of 0.8 percent. Of them, 131 deaths were over concerns about their academic futures, while poor grades led to 120 suicides, the survey

showed. Forty-two people killed themselves because of friction with schoolmates, while 24 suicides were caused by stress over school entrance exams. Nine deaths were over relationships with teachers and three suicides were caused by bullying, according to the survey.

Twenty-two people in the Tohoku region are believed to have committed suicide last year over problems related to the Great East Japan Earthquake and tsunami, which triggered the accident at the Fukushima No. 1 nuclear power plant four years ago. Of them, 15 suicides were reported in Fukushima Prefecture, a decrease of eight from 2013. Miyagi prefecture had four suicides, down by six. Three people in Iwate Prefecture killed themselves, compared with four in 2013.

http://bbc.in/1EPLq4w

Study: Ultrasound Might Be New Weapon Against Alzheimer's

Ultrasound Might Be New Weapon Against Alzheimer's

LONDON - Scientists believe they may have found a new weapon in the fight against Alzheimer's disease - not in the form of a drug but in focused beams of ultrasound. While the approach has only been tested in mice, researchers said on Wednesday it proved surprisingly good at clearing tangles of plaques linked to Alzheimer's in the animals' brains and improving their memory, as measured by tests such as navigating a maze.

In the past, high-energy ultrasound has been combined with injected microbubbles, which vibrate in response to sound waves, to get drugs across the so-called blood brain barrier. But the new research, published in the journal Science Translational Medicine, is the first demonstration that ultrasound alone might have a beneficial effect in the memory-robbing condition.

"Our research was very exploratory and we really didn't expect to see such a massive effect," Juergen Goetz of the University of Queensland in Brisbane, one of study authors, told Reuters. "I'm really excited by this."

After several weeks of treating mice that had been genetically altered to produce amyloid plaques, the scientists found the ultrasound almost completely cleared the plaques in 75 percent of the animals, without apparent damage to brain tissue.

While there is still some debate as to whether plaques are a cause or a symptom of Alzheimer's, the experiment found that the treated mice had improved memory, as measured by three different tests, compared with untreated ones.

The technique works by stimulating microglial cells, which form part of the brain's immune system, to engulf and absorb the plaques. Goetz stressed that his research, which used an ultrasound machine from Philips, was at a very early stage and it would be several years before it could be tested in people.

Several hurdles must be overcome first, including long-term checks for side effects in animals and much more research into whether the approach will work with thicker skulls and larger brains. The next step is to treat sheep, with data from that experiment expected later this year.

Ultrasound devices capable of penetrating the human brain are already being tested for other conditions, with Israeli company InSightec pioneering it for tremors and chronic pain.

Dementia, of which Alzheimer's is the most common form, affects close to 50 million people worldwide and that number is set to reach 135 million by 2050, according to Alzheimer's Disease International, a non-profit campaign group.

http://www.eurekalert.org/pub_releases/2015-03/tjnj-fas031215.php

Folic acid supplementation among adults with hypertension reduces risk of stroke

Combined use of enalapril and folic acid significantly reduced the risk of first stroke

In a study that included more than 20,000 adults in China with high blood pressure but without a history of stroke or heart attack, the combined use of the hypertension medication enalapril and folic acid, compared with enalapril alone, significantly reduced the risk of first stroke, according to a study appearing in JAMA. The study is being released to coincide with its presentation at the American College of Cardiology Annual Scientific Session.

Stroke is the leading cause of death in China and second leading cause of death in the world. Primary prevention (prevention prior to a first episode) is particularly important because about 77 percent of strokes are first events. Uncertainty remains regarding the efficacy of folic acid therapy for primary prevention of stroke because of limited and inconsistent data, according to background information in the article.

Yong Huo, M.D., of Peking University First Hospital, Beijing, China, and colleagues had 20,702 adults with hypertension without history of stroke or heart attack randomly assigned to receive daily treatment with a single-pill combination containing enalapril (10 mg) and folic acid (0.8 mg; n = 10,348), or a tablet containing enalapril alone (10 mg; n = 10,354). The trial was conducted from May 2008 to August 2013 in 32 communities in Jiangsu and Anhui provinces in China. Participants were tested for variations in the MTHFR C677T gene (CC, CT, and TT genotypes) that may affect folate levels.

During a median treatment duration of 4.5 years, first stroke occurred in 282 participants (2.7 percent) in the enalapril-folic acid group compared with 355 participants (3.4 percent) in the enalapril group, representing an absolute risk reduction of 0.7 percent and a relative risk reduction of 21 percent. Analyses also showed significant reductions among participants in the enalapril-folic acid group

in the risk of ischemic stroke (2.2 percent vs 2.8 percent) and composite cardiovascular events (cardiovascular death, heart attack and stroke) (3.1 percent vs 3.9 percent).

There was no significant difference between groups in the risk of hemorrhagic stroke, heart attack, or all-cause death, or in the frequencies of adverse events.

The authors write that this trial (China Stroke Primary Prevention Trial; CSPPT), with data on individual baseline folate levels and MTHFR genotypes, has provided convincing evidence that baseline folate level is an important determinant of efficacy of folic acid therapy in stroke prevention. "The CSPPT is the first large-scale randomized trial to test the hypothesis using individual measures of baseline folate levels. In this population without folic acid fortification, we observed considerable individual variation in plasma folate levels and clearly showed that the beneficial effect appeared to be more pronounced in participants with lower folate levels."

"We speculate that even in countries with folic acid fortification and widespread use of folic acid supplements such as in the United States and Canada, there may still be room to further reduce stroke incidence using more targeted folic acid therapy--in particular, among those with the TT genotype and low or moderate folate levels."

(doi:10.1001/jama.2015.2274; Available pre-embargo to the media at http://media.jamanetwork.com)

Editor's Note: Please see the article for additional information, including other authors, author contributions and affiliations, financial disclosures, funding and support, etc.

Editorial: Folate Supplements for Stroke Prevention

"The trial by Huo et al has important implications for stroke prevention worldwide," write Meir Stampfer, M.D., Dr.P.H., and Walter Willett, M.D., Dr.P.H., of the Harvard T. H. Chan School of Public Health and Channing Division of Network Medicine, Boston, in an accompanying editorial.

"Although the trial participants all had hypertension, there is little reason to doubt that the results would apply to normotensive persons, although the absolute effect would be smaller. It is possible to debate the ethics of whether a replication trial should be performed, especially because folic acid supplementation (or fortification) is safe and inexpensive, and carries other benefits. Large segments of the world's population, potentially billions of people, including those living in northern China, Bangladesh, and Scandinavia, have low levels of folate."

"Individuals with the TT genotype might particularly benefit, although it seems unlikely that genotyping for that purpose would be cost-effective. Also, some persons in the United States on the low end of the distribution of folate intake may benefit; effects in this subgroup would not have been detected in previous trials. Ideally, adequate folate levels would be achieved from food sources such as vegetables (especially dark green leafy vegetables), fruits and fruit juices, nuts, beans, and peas. However, for many populations, achieving adequate levels from diet alone is difficult because of expense or availability. This study seems to support fortification programs where feasible, and supplementation should be considered where fortification will take more time to implement."

(doi:10.1001/jama.2015.1961; Available pre-embargo to the media at http://media.jamanetwork.com)

Editor's Note: The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none were reported.

http://www.bbc.com/news/health-31869052

Pioneering surgery 'saves bowels' when removing polyps

Pioneering surgeons have developed a technique to preserve the bowels when removing pre-cancerous growths.

By James Gallagher Health editor, BBC News website

The rectum is prone to the growth of very large polyps. Removing them can cause so much damage it leaves the patient needing a stoma bag. The new method has been performed on 20 people and the largest polyp removed was 18cm. The team at London North West Healthcare NHS Trust said their method was "life changing" for patients.

A polyp is not necessarily a tumour. But the bigger they grow, the more likely they are to become cancerous. They are often removed to prevent them reaching a deadly stage , but larger polyps can be difficult to get rid of. Some are so large they take over the entire circumference of the rectum.

Three-pronged

Prof Brian Saunders, a gastroenterologist, and surgeon Janindra Warusavitarne developed a new technique at St Mark's hospital in London. A tube is passed through the anus into the rectum - the final resting point of faeces before they are passed out of the body. The tool, which allows combined laparoscopy and endoscopy surgical techniques, allows one doctor to pull the polyp away from the rectal wall while another doctor cuts it free.

Prof Saunders told the BBC: "What that does is minimise the amount of trauma to the rectal area. "The patient with the 18cm polyp couldn't get out of bed, he was pouring mucus out of the anus, losing sodium and potassium, which affected his blood pressure and he could not stand up. "Now he's absolutely fine, back doing his job and leading a full life. "For the patients who benefit, it is pretty life changing."

'Delighted'

George McAusland, 53, from south-east London, thought he had Irritable Bowel Syndrome (IBS) for more than a decade. "Eventually I had permanent diarrhoea and I would go up to six times per day and in the night as well," he said.

Mr McAusland eventually went to the doctor and a 7cm rectal polyp was discovered. It took a five-hour operation to remove the giant polyp, but his rectal function was preserved.

Mr McAusland says he had a lucky escape from a colostomy bag: "I cannot imagine how that must be, people put up with a lot of things but that would have been a game-changer. "If you do have a bag you're on drugs and medication - I'm so glad I don't have to - it's all good. "I'm delighted people are out there, it's not the glamorous end, and they're so dedicated and trying to make it better and better and this seems to be doing the trick."

It is not clear how many people would benefit. The technique would only be suitable for patients with very large polyps or the very early stages of cancer - not advanced cancer.

The team at St Mark's estimate that between 300 and 400 people might be suitable each year. "And with bowel cancer screening coming, it is likely to be increasing," added Prof Saunders.

It remains unclear why the rectum suffers from larger polyps than the rest of the colon. One idea is that the faeces rest there for longer, so there is more contact with potential carcinogens.

Shafi Ahmed, from the Royal College of Surgeons and a consultant general and colorectal surgeon, said: "The removal of rectal polyps has traditionally been performed through endoscopy, however the risk of complications with this technique is higher particularly for large polyps. "It is great to see St Mark's medical and surgical teams working together to discover and develop a new technique that brings benefit to patients. "We look forward to seeing further results in the future as this technique is still in its early phase but it's a promising sign of what's to come.

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http://www.eurekalert.org/pub_releases/2015-03/mc-orr031215.php

Oncologists reveal reasons for high cost of cancer drugs in the US, recommend solutions

Increasingly high prices for cancer drugs are affecting patient care in the U.S. and the American health care system overall, say the authors of a special article published online in the journal Mayo Clinic Proceedings.

ROCHESTER, Minn. - "Americans with cancer pay 50 percent to 100 percent more for the same patented drug than patients in other countries," says S. Vincent Rajkumar, M.D., of Mayo Clinic Cancer Center, who is one of the authors. "As oncologists we have a moral obligation to advocate for affordable cancer drugs for our patients."

Dr. Rajkumar and his colleague, Hagop Kantarjian, M.D., of MD Anderson Cancer Center, say the average price of cancer drugs for about a year of therapy increased from $5,000 to $10,000 before 2000 to more than $100,000 by 2012. Over nearly the same period the average household income in the U.S. decreased by about 8 percent.

In the paper, the authors rebut the major arguments the pharmaceutical industry uses to justify the high price of cancer drugs, namely, the expense of conducting research and drug development, the comparative benefits to patients, that market forces will settle prices to reasonable levels, and that price controls on cancer drugs will stifle innovation.

"One of the facts that people do not realize is that cancer drugs for the most part are not operating under a free market economy," says Dr. Rajkumar. "The fact that there are five approved drugs to treat an incurable cancer does not mean there is competition. Typically, the standard of care is that each drug is used sequentially or in combination, so that each new drug represents a monopoly with exclusivity granted by patent protection for many years."

Drs. Rajkumar and Kantarjian say other reasons for the high cost of cancer drugs include legislation that prevents Medicare from being able to negotiate drug prices and a lack of value- based pricing, which ties the cost of a drug to its relative effectiveness compared to other drugs.

The authors recommend a set of potential solutions to help control and reduce the high cost of cancer drugs in the U.S. Some of their recommendations are already in practice in other developed countries. Their recommendations include:

Allow Medicare to negotiate drug prices.

Develop cancer treatment pathways/guidelines that incorporate the cost and benefit of cancer drugs.

Allow the Food and Drug Administration or physician panels to recommend target prices based on a drug's magnitude of benefit (value-based pricing).

Eliminate "pay-for-delay" strategies in which a pharmaceutical company with a brand name drug shares profits on that drug with a generic drug manufacturer for the remainder of a patent period, effectively eliminating a patent challenge and competition.

Allow the importation of drugs from abroad for personal use.

Allow the Patient-Centered Outcomes Research Institute and other cancer advocacy groups to consider cost in their recommendations.

Create patient-driven grassroots movements and organizations to advocate effectively for the interests of patients with cancer to balance advocacy efforts of pharmaceutical companies, insurance companies, pharmacy outlets and hospitals.