http://www.medscape.com/viewarticle/849114

Is Being Sick an Excuse to Miss Work?

Should an ailing physician come to work or stay home

Brandon Cohen August 07, 2015

How great are the pressures to attend one's patients? Does the decision to get out of bed depend on the type or severity of the illness? Are patients better served by the sick doctor coming in or staying away?

These questions were discussed by healthcare professionals during a recent discussion accompanying a reader poll on Medscape. Overwhelmingly, the answer to the question was to suck it up and come in to work. A full 90% of respondents to the poll claimed to have come to work sick at least once in the past year, and the comments fleshed out the statistics with some grisly details.

A primary care physician in solo practice laid it out clearly for doctors in her situation:

If I don't work then the doors are closed. I don't earn sick time or vacation time. I get paid what is left over at the end of the day. There is no one to cover for me as I am the only provider in the office . . . If I call in sick then all appointments get canceled and moved to a new day or patients go to urgent care. But I still have to pay for overhead (building and staff) so I get doubly hit if I take a sick day.

For an anesthesiologist, the problem was not one of isolation but of interconnectivity:

[I work at a] community hospital. If I call in sick, at best, the operating room will be thrown into disarray and significantly delayed while a colleague on a day off is dragged in from home, or clinic is canceled to free someone up, or the person on call the night before is begged to soldier on. Worse case, the whole list gets cancelled. When the patients who have planned their lives around this day are told they will have to be rebooked, what do you imagine their response is?

An ophthalmologist pulled back to find a bit of philosophical distance:

We are trained to see ourselves as indispensable, and we also see ourselves as above the law, including the laws of nature! Our bugs are just as contagious as other people's bugs—we don't have a special shield around us that protects others from us when we are contagious. Still, we nearly all go to work when sick, as we feel there will be no one to care for our patients if we do not; and that is true.

A critical care physician raised the prospect of punishment for missing a day:

As a resident, that is the doctor with the most direct contact with the sickest patients, I could never call out sick unless I wanted to get punished by my seniors or shamed by my co-residents. I went to work with fevers of 104. I went to work with vomiting, with productive cough, even with pink eye . . . This is the reality.

Another healthcare provider underscored the danger posed to patients by sick healthcare professionals:

It disturbs me what our patients are being exposed to. We have a policy that if you have fever, vomiting, or diarrhea, do not come in to work as you are infectious. We have dealt with norovirus outbreaks in patients and staff from multiple units at the same time due to ill staff and physicians working . . . Patients, especially newborns, do not need to have this exposure to infectious agents . . . This truly shows that healthcare is not near having the culture of safety that patients and families, insurance companies, and the government expect us to have.

A rural pediatrician claimed that the situation in less populated areas was even more extreme than that of big-city doctors:

If I tried to stay home, sick people would actually come to my house or the hospital would send a truck out to get me for a C-section. Absolute truth!

But there were some doctors who seemed to manage to forge a little recovery time. A primary care physician found a bit of time off, but it just wasn't enough:

This year I had carpal tunnel release surgery, and . . . I did take one week off with a medical certificate; however, I had to take another two days off due to infection and I was placed on no-pay leave! I have over 200 hours of sick leave! It's sad as doctors that we cannot take our sick leave when we need it!

An internist, though, seemed to have things under control to an enviable degree:

"I do stay out of work when I have a fever. I do work when I have mild colds controllable with decongestants and antitussives."

But the final word goes to an anesthesiologist who summed up the prevailing attitude succinctly:

"Sick days pertain to everyone but those of us in the health profession."

http://www.eurekalert.org/pub_releases/2015-08/icfr-sms080515.php

Scientists measure slow death of the Universe

The Universe is only half what it was 2 billion years ago and fading - it is slowly dying

An international team of astronomers studying 200,000 galaxies has measured the energy generated within a large portion of space more precisely than ever before, discovering that it's only half what it was 2 billion years ago and fading - the Universe is slowly dying.

Researchers from the International Centre for Radio Astronomy Research (ICRAR) in Western Australia used seven of the world's most powerful telescopes to observe galaxies at 21 different wavelengths from the far ultraviolet to the far infrared. Initial observations were conducted using the Anglo-Australian Telescope in New South Wales and supporting observations were made by two orbiting space telescopes operated by NASA and another belonging to the European Space Agency.

The research is part of the Galaxy and Mass Assembly (GAMA) project, the largest multi-wavelength survey ever put together. "We used as many space and

ground-based telescopes we could get our hands on, to measure the energy output of over 200,000 galaxies across as broad a wavelength range as possible," says ICRAR Professor Simon Driver, who presented the findings at the International Astronomical Union's General Assembly in Honolulu.

The survey data, released to astronomers around the world, includes 200,000 galaxies each measured at 21 wavelengths from the ultraviolet to the far infrared and will help scientists better understand how different types of galaxies form.

Professor Driver, who heads up the GAMA team, says the study set out to map and model all of the energy generated within a set volume of space.

All energy in the Universe was created in the Big Bang with some portion locked up as mass. Stars shine by converting this mass into energy as described by Einstein's famous equation $E=MC^2$.

"While most of the energy sloshing around was created in the aftermath of the Big Bang, additional energy is constantly being released by stars as they fuse elements like hydrogen and helium together," Professor Driver says.

"This newly released energy is either absorbed by dust as it travels through the host galaxy, or escapes into intergalactic space and travels until it hits something such as another star, planet, or very occasionally a telescope mirror."

The fact that the Universe is slowly fading has been known since the late 1990s but this work shows that it's happening across all wavelengths from the ultraviolet to the infrared, representing the most comprehensive assessment of the energy output of the nearby Universe.

"The Universe is fated to decline from here on in, like an old age that lasts forever. The Universe has basically plonked itself down on the sofa, pulled up a blanket and is about to nod off for an eternal doze," Professor Driver says.

The team of researchers hope to expand the work to map energy production over the entire history of the Universe. To do this, they will use a swathe of new facilities including the world's largest radio telescope, the Square Kilometre Array, due to be built in Australia and South Africa in the next decade.

Professor Driver will present this work at the General Assembly of the International Astronomical Union in Honolulu on Monday, August 10.

The Galaxy and Mass Assembly Survey, or GAMA, is a collaboration involving nearly 100 scientists from more than 30 universities located in Australia, Europe and the United States.

ICRAR is a joint venture between Curtin University and The University of Western Australia with support and funding from the State Government of Western Australia.

'Galaxy And Mass Assembly (GAMA): Panchromatic Data Release (far-UV--far-IR) and the low-z energy budget' submitted to the Monthly Notices of the Royal Astronomical Society. Available at http://www.simondriver.org/mwavev02.pdf

Imagery and a galaxy 'fly-through' are available at high resolution from: http://www.icrar.org/universeisdying

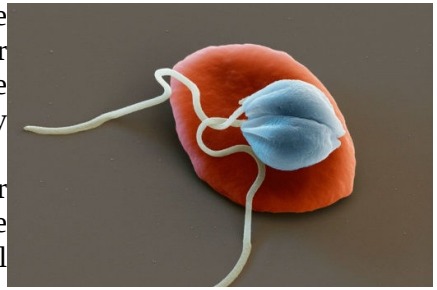
http://bit.ly/1N7pdTk

Russian doll disease is a virus inside a parasite inside a fly

It's a Russian doll of a tropical disease.

Leishmaniasis, a disease that infects 12 million people worldwide, is passed to humans by sandflies infected with the Leishmania parasite. Now it seems that in some species of the parasite, a virus hiding inside is silently helping it subvert treatment.

Leishmaniasis is a common problem in Latin America, South Asia and parts of Africa. Depending on the form the disease takes and the species of parasite, it either attacks the skin, mucous linings of the nose and mouth, or the internal organs. It's not easy to treat.



Red blood cell, complete with Leishmania parasite **Eye of Science/SPL**

"Treatment failure is a major challenge for doctors and researchers, says Jean-Claude Dujardin from the Institute of Tropical Medicine in Antwerp, Belgium.

Depending on the drug and the region, treatment failure rates vary, says Dujardin. In Latin America, for example, two out of five people relapse after treatment, but this can rise to 70 per cent in parts of South Asia where another species of Leishmania circulates. The most obvious explanation is that the parasite has become resistant or that people aren't taking the drugs properly.

Infected parasite

But in Latin America at least, it looks like there's an alternative explanation. A virus that infects the parasite is known to make the disease more severe in mice. It now seems the same applies in people.

"The parasite is already infected by the virus and it is this package that gets transferred to the sandfly," says Dujardin, part of an international collaboration that hunted down the virus in people infected with the *L. braziliensis* parasite in the Amazon basin of Bolivia and Peru. Of the people whose parasites were infected with the virus, 53 per cent of them had relapsed after drug treatment. Only 24 per cent of the people whose parasites were virus-free did so.

Similar results were seen in people infected with *L. guyanensis*, another parasite species common in the area. There was no link between treatment success and the parasite's resistance to the drugs the patient was given.

"You need to imagine the system like a Russian doll," says Dujardin. The parasite multiplies within the human host cell, and then the virus lurking within it wakes up and begins interacting with the host cell, he says.

"Leishmania alone, without the virus, is already known to subvert the immune response; it seems that the virus adds another layer of subversion, leading to treatment failure," says Dujardin.

In good company

In some ways it's not surprising that a virus can infect a parasite. It's often said that parasitism is the most common way of life – with more than half of all animal species on the planet living off another in some way.

But Kevin Lafferty, an ecologist at the University of California, Santa Barbara, says that although viruses are known to infect bacteria and parasites, instances of a virus infecting a parasite that in turn infects another host are not very common. "This is a fascinating piece of detective work with important implications for human health."

However, Jorge Alvar at the Drugs for Neglected Diseases Initiative in Switzerland, cautions that we still don't how the virus affects the evolution of the parasite, or how it ultimately impacts the patient.

But, in theory, the virus gives us an added drug target, he says. "In this case a patient could be treated with either anti-Leishmania drugs or anti-virals, or both.

Similar viruses have been found in other parasites, for example, in the diarrhoea-causing *Giardia* and *Cryptosporidium*, and in *Trichomonas vaginalis* that causes a sexually transmitted infection. Surveys of their prevalence could help us better understand the effect of viral infection of parasites and could play a role in how we treat these parasitic diseases, says Dujardin.

Journal reference: Journal of Infectious Diseases, DOI: 10.1093/infdis/jiv355 (L. braziliensis); DOI: 10.1093/infdis/jiv354 (L. guyanensis)

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Teenage Girls Have Led Language Innovation for Centuries

They've been on the cutting edge of the English language since at least the 1500s

By Helen Thompson

Criticizing teenage girls for the way they speak is nothing short of a time-honored tradition for adults who take issue with to everything from slang to vocal fry. But *Quartz*'s Gretchen McCulloch has a bone to pick with those critics. She argues that female teen linguists should be lauded for their longtime innovation — they've been shaking things up for centuries.

McCulloch argues that female teenagers are actually "language disruptors" — innovators who invent new words that make their way into the vernacular. "To use a modern metaphor, young women are the Uber of language," she writes.

William Shakespeare has long been seen as the poster boy for introducing new words into the English language, though some have questioned his celebrated language disruptor status. But young women may have been the true linguistic revolutionaries of Shakespeare's day. McCulloch notes that in the 2003 book *Historical Sociolinguistics*, University of Helsinki linguists Terttu Nevalainen and Helena Raumolin-Brunberg surveyed 6,000 letters from 1417 to 1681. They found that female letter-writers changed the way they wrote faster than male letter-writers, spearheading the adoption of new words and discarding words like "doth" and "maketh."

Women are consistently responsible for about 90 percent of linguistic changes today, writes McCulloch. Why do women lead the way with language? Linguists aren't really sure. Women may have greater social awareness, bigger social networks or even a neurobiological leg up. There are some clues to why men lag behind: A 2009 study estimated that when it comes to changing language patterns, men trail by about a generation.

That's largely due to adult male blowback against female stereotypes in speech (think vocal fry or uptalk) and the fact that, in the past, females have traditionally taken care of children, as Chi Luu wrote for *JSTOR Daily* in February. Thus, men learn from their mothers, and women tend to learn new lingo from other women.

Though Gretchen Wieners was never able to make "fetch" happen, it's clear that women have been revolutionizing language for a long time. Not bad for a group of kids that get lots of flak for adopting new lingo.

http://www.eurekalert.org/pub_releases/2015-08/mu-tfb080715.php

Trans fats, but not saturated fats, linked to greater risk of death and heart disease

Trans fats, but not saturated fats, linked to greater risk of death and heart disease

Hamilton, ON - A study led by researchers at McMaster University has found that that trans fats are associated with greater risk of death and coronary heart disease, but saturated fats are not associated with an increased risk of death, heart disease, stroke, or Type 2 diabetes.

The findings were published today by the British Medical Journal (BMJ). The lead author is Russell de Souza, an assistant professor in the Department of Clinical Epidemiology and Biostatistics with the Michael G. DeGroote School of Medicine.

"For years everyone has been advised to cut out fats. Trans fats have no health benefits and pose a significant risk for heart disease, but the case for saturated fat is less clear," said de Souza. "That said, we aren't advocating an increase of the allowance for saturated fats in dietary guidelines, as we don't see evidence that higher limits would be specifically beneficial to health."

Guidelines currently recommend that saturated fats are limited to less than 10 per cent, and trans fats to less than one per cent of energy, to reduce risk of heart disease and stroke.

Saturated fats come mainly from animal products, such as butter, cows' milk, meat, salmon and egg yolks, and some plant products such as chocolate and palm oils. Trans unsaturated fats (trans fats) are mainly produced industrially from plant oils (a process known as hydrogenation) for use in margarine, snack foods and packaged baked goods.

Contrary to prevailing dietary advice, a recent evidence review found no excess cardiovascular risk associated with intake of saturated fat. In contrast, research suggests that industrial trans fats may increase the risk of coronary heart disease.

To help clarify these controversies, de Souza and colleagues analysed the results of 50 observational studies assessing the association between saturated and/or trans fats and health outcomes in adults.

Study design and quality were taken into account to minimise bias, and the certainty of associations were assessed using a recognized scoring method developed at McMaster.

The team found no clear association between higher intake of saturated fats and death for any reason, coronary heart disease (CHD), cardiovascular disease (CVD), ischemic stroke or type 2 diabetes.

However, consumption of industrial trans fats was associated with a 34 per cent increase in death for any reason, a 28 per cent increased risk of CHD mortality, and a 21 per cent increase in the risk of CHD.

Inconsistencies in the studies analysed meant that the researchers could not confirm an association between trans fats and type 2 diabetes. And, they found no clear association between trans fats and ischemic stroke.

The researchers stress that their results are based on observational studies, so no definitive conclusions can be drawn about cause and effect. However, the authors write that their analysis "confirms the findings of five previous systematic reviews of saturated and trans fats and CHD."

De Souza, a registered dietitian, added that dietary guidelines for saturated and trans fatty acids "must carefully consider the effect of replacement foods.

"If we tell people to eat less saturated or trans fats, we need to offer a better choice. Unfortunately, in our review we were not able to find as much evidence as we would have liked for a best replacement choice, but ours and other studies suggest replacing foods high in these fats, such as high-fat or processed meats and donuts, with vegetable oils, nuts, and whole grains."

http://www.eurekalert.org/pub_releases/2015-08/osu-cfs080715.php

Could flu someday be prevented without a vaccine?

Scientists find way to boost virus-fighter in cells before infection is present

COLUMBUS, Ohio - Researchers have discovered a way to trigger a preventive response to a flu infection without any help from the usual players - the virus itself or interferon, a powerful infection fighter.

The finding, in both mouse and human cells, suggests that manipulating a natural process could someday be an alternative way to not just reduce the severity of the flu, but prevent infection altogether. "The flu vaccine needs to change every year because the virus is constantly mutating. What we're doing is targeting a more fundamental process that is not specific to any particular strain of the virus," said Jacob Yount, assistant professor of microbial infection and immunity at The Ohio State University and senior author of the study.

After showing in cells that altering the role of one protein can stop the virus in its tracks, Yount's lab has begun using experimental drugs to test this flu prevention strategy in mice. Any possibility for human use is still many years away, but the scientists' long-term goal is to develop a vaccine-independent method to prevent flu infections.

"If we were to have an outbreak of some pandemic influenza virus similar to what we experienced in 2009, I could envision using this technique to help people who are particularly vulnerable to infection," he said. "It would work best if used before an infection, because the strategy prevents cells from becoming infected in the first place." The research is published in the journal PLOS Pathogens.

The method involves raising the level of a protein that is known to be effective against all strains of influenza ever tested. The trick for infection prevention, however, is boosting that protein's level in cells before the virus shows up. Doing that, the scientists discovered in this study, involves suppressing the function of another protein.

The protein effective against influenza is called IFITM3, (pronounced I-fit-M-3, for interferon-induced transmembrane protein 3). Under natural conditions, IFITM3 is produced in large quantities only after the flu virus is present, so it can reduce the severity of infection. But the way it targets the virus - by trapping it and disabling its ability to make copies of itself - means that increasing the protein level before the flu ever arrives would prevent infection from occurring.

Enough IFITM3 is produced in all cells to maintain a small but steady presence, but it has a short lifespan. If a cell doesn't see a need for its virus-fighting function, the protein is degraded. However, when flu virus does invade a cell, the cell cranks up production of interferon, which prompts increased production of IFITM3.

Interferon has another role, as well: telling an enzyme that degrades IFITM3 to hold off on that job so the IFITM3 level can stay high and fend off an influenza attack. This enzyme, also a protein, proved to be the silver bullet in Yount's work on flu prevention.

The enzyme is called NEDD4 (pronounced Ned-4), and it degrades IFITM3 by attaching a small chain of molecules to it - a common process of protein clearing called ubiquitination. In a series of experiments in mouse and human lung cells, Yount and colleagues showed that inhibiting NEDD4 from doing this job led to an accumulation of IFITM3 in the cells and greater resistance to infection by flu viruses.

IFITM3 is known to be important to humans because previous research has shown that it is the only identified protein containing a frequent genetic mutation linked to severe flu infections. Mice - and their cells - are effective models for this research because mice lacking the same IFITM3 protein are highly susceptible to flu infections.

Being able to stimulate this response is important for many reasons, not the least of which is keeping interferon out of the process. Interferon's infection-fighting power is accompanied by severe side effects - most commonly associated with its former use as a treatment for Hepatitis C - that include, not surprisingly, flu-like symptoms. "We figured out a way to induce just this single interferon response - the most important thing interferon does for flu," Yount said. "That was a huge finding - that you don't need an infection or interferon to increase the level of IFITM3. The steady-state level of the protein is enough to inhibit the virus if you get rid of NEDD4."

Exactly how - and when - to get rid of NEDD4 remains an open question. Without this enzyme, embryonic mice cannot survive to birth, indicating it is important to fetal development. But later in life, lacking NEDD4 might not pose any health problems - which is why Yount is currently testing the effects of suppressing NEDD4 on adult mice.

This work was supported by grants from the National Institute for Allergy and Infectious Diseases. Yount completed the research with co-authors Nicholas Chesarino and Temet McMichael, both Ohio State graduate students.

http://www.eurekalert.org/pub_releases/2015-08/qmuo-nsc081115.php

New study confirms listening to music during surgery reduces pain and anxiety

Listening to music before, during and after surgery reduces people's pain, anxiety and need for painkillers

Scientists have proved that listening to music before, during and after surgery reduces people's pain, anxiety and need for painkillers - according to the most comprehensive review of available evidence so far, published today in The Lancet. Led by Queen Mary University of London, the study team analysed the results of 73 randomised controlled trials looking at the impact of music on postoperative recovery, compared with standard care or other non-medical interventions such as massage.

The systematic review involved nearly 7,000 patients in total and the findings confirmed, for the first time, the link between music in the operating theatre and a significant reduction in postoperative pain, postoperative anxiety and the need for postoperative pain relief medication.

Researchers analysed data on adult patients undergoing a variety of surgical procedures, with or without anaesthesia, to any part of the body. The only exclusions were surgery on the central nervous system, head and neck (because of potential hearing impairment).

Choice of music, timing and duration varied in all the studies analysed, and evidence showed these factors made little difference to the outcome. Music was effective even when patients were under general anaesthetic.

Dr Catherine Meads, who led the study at Queen Mary University of London but is now based at Brunel University London, comments: "Currently music is not used routinely during surgery to help patients in their postoperative recovery. The lack of uptake is often down to the scepticism of professionals as to whether it genuinely works, and of course issues of budget and the integration into daily practice. We hope this study will now shift misperceptions and highlight the positive impact music can have."

Dr Martin Hirsch, Co-Study Author at Queen Mary University of London and Barts Health NHS Trust, comments: "We have known since the time of Florence Nightingale that listening to music has a positive impact on patients during surgery, by making them feel calmer and reducing pain. However, it's taken pulling together all the small studies on this subject into one robust meta-analysis to really prove it works."

Most people undergo a surgical procedure at some point in their lives. Around 4.6 million hospital admissions lead to surgical care in England, and over 51 million operations are performed annually in the USA. Feelings of pain and anxiety before and after, as well as a need for ongoing pain relief are very common. Music is one of the easiest, safest, cheapest and least invasive interventions that healthcare workers can deliver, and at great benefit to patients.

The researchers now hope to get advice on preparing for surgery into hospitals, so patients know to take their smart phones or iPods etc with them and listen to it before, during and after the procedure, as directed by hospital staff.

Jenny Hole, Co-Author and Medical Student at Queen Mary University of London, Barts and The London School of Medicine and Dentistry, comments: "There is now sufficient evidence to demonstrate music should be available to all patients undergoing surgery. Patients should be able to choose the type of music, and timing and delivery may be adapted to different settings depending on the medical requirements and teams involved."

The team are following up this research with a pilot scheme of introducing music into operative settings at The Royal London Hospital. The two areas piloted will be women having Caesarean sections and women having hysteroscopy. Patients will submit their music playlist on a device of their choice, and this will be connected to a pillow with inbuilt loudspeakers. The researchers will then analyse the effectiveness of rolling this out in practice, and will deepen their understanding of why some evidence-based innovations might be difficult to put into practice.

http://www.eurekalert.org/pub_releases/2015-08/cwru-nca081215.php

New contrast agent spotlights tiny tumors and micrometastases

Considered a step toward earlier detection and treatment

Researchers at Case Western Reserve University have developed a magnetic resonance imaging (MRI) contrast agent that detects much smaller aggressive breast cancer tumors and micrometastases than current agents can identify.

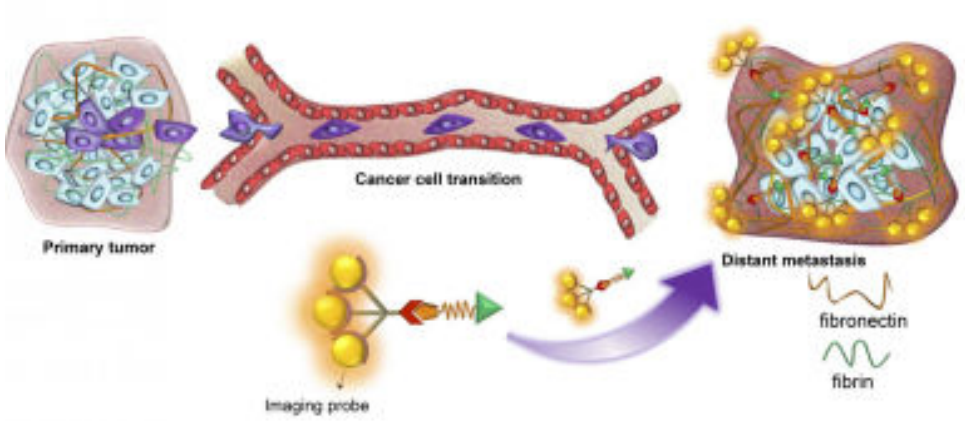
"Currently, there is no imaging technology in clinical use that can detect tumors or metastases smaller than 2 millimeters in diameter," said Zheng-Rong Lu, professor of biomedical engineering and leader of the research. "This can detect them as small as 300 microns--a few hundred cells." Metastasis is the most common cause of breast cancer deaths. Scientists believe early detection and treatment of primary and metastatic tumors increases the chances of survival.

The research is published in today's Nature Communications. Lu spent a decade developing and testing imaging agents. He worked with Case Western Reserve University research associate Dr. Zhuxian Zhou, PhD students Mohammed Qutaish, Zheng Han, Rebecca Schur and Yiqiao Liu and fellow biomedical engineering professor David Wilson.

The key to earlier detection is a small peptide gadolinium-based MRI contrast agent that binds to molecular markers, called fibrin-fibronectin complexes. The complexes are expressed in high-risk primary tumors and metastases.

The small peptide is a chain of five amino acids. Called CERKA for short, the peptide doesn't attach to healthy tissues. But in metastatic tumors and aggressive primary tumors--especially those preparing to metastasize--more fibronectin is expressed and more image contrast generated, the researchers found.

"We not only detect the tumor, but detect it's aggressiveness," Lu said.



For earlier detection of metastases, Case Western Reserve University researchers developed a magnetic resonance imaging contrast agent that includes a probe that binds to fibrin-fibronectin complexes found in aggressive breast cancers. Fibronectin is expressed by high-risk primary and metastatic tumors, distinguishing them from normal tissue. **Zheng-Rong Lu**

The engineers tested the agent on mice bearing breast cancer metastases. Signals generated during a molecular MRI showed the agent was effective at delineating primary tumors and micrometastases in the lung, liver, lymph node, adrenal gland, bone and brain as small as 300 micrometers. The agent increased the signal output from metastases by 77 percent to 122 percent. The engineers confirmed the findings using Wilson's high-resolution fluorescence cryo-imaging system, which is sensitive enough to identify single cancer cells, but unusable on human patients. Lu and his colleagues plan to pursue tests proving the agent is safe and hope to begin clinical trials within three years. A biodistribution test previously done showed the agent clears the body in eight hours, about the same time as current clinical contrast agents. The researchers are also working to make the agent more tumor-specific, starting with tweaking the technology to detect prostate cancer.

http://www.eurekalert.org/pub_releases/2015-08/acs-anc081215.php

A new CSI tool could pinpoint when fingerprints were left behind

Real-life technique could outperform even fictional sleuths' crime-busting tools

The crime scene investigators on TV's popular CSI: Crime Scene Investigation series seem able to solve any mystery thanks to a little science and a lot of artistic license. But now there is a real-life technique that could outperform even fictional

sleuths' crime-busting tools. Scientists report in ACS' journal Analytical Chemistry a way to tell how old fingerprints are. This could help investigators determine which sets are relevant and which ones were left long ago.

Law enforcement officials have long relied on fingerprints left behind by criminals to help solve cases. In addition to patterns of whorls, loops and arches specific to individuals, prints can also yield clues as to the owners' age and gender, as well as materials -- such as explosives or make-up -- that they may have touched. But determining just how long these residues have been at a crime scene is one aspect that has remained a challenge. The ability to date fingerprints would allow police to more easily rule certain suspects in or out of their investigations. Shin Muramoto and colleagues wanted to find a way to meet that need.

The researchers studied various molecules in fingerprints and found that a substance called palmitic acid migrates away from print ridges at a predictable rate. Based on this diffusion, the scientists could estimate how old a fingerprint was. Their findings apply to prints up to four days old, but they plan to expand that window to 10 days.

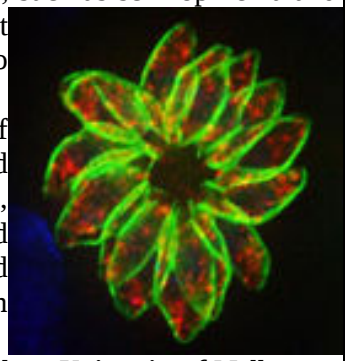
*A new ACS video explains the new method. Click **here** to watch.*

http://www.eurekalert.org/pub_releases/2015-08/uom-tpq081215.php

Toxoplasma parasite's greedy appetite may be its downfall

Toxoplasma gondii is estimated to chronically infect nearly one-third of the world's population, causing the condition Toxoplasmosis.

It is most commonly associated with handling cat feaces and is a particular threat to pregnant women and immune-compromised individuals, such as HIV/AIDS patients It may even be implicated in mental illnesses, such as schizophrenia and depression. Toxoplasma has an unusual ability infect any warm-blooded animal cell, from immune cells to brain and muscle cells.



This is the Toxoplasma gondii parasite up close. University of Melbourne

A study led by researchers at the University of Melbourne's Bio21 Molecular Science and Biotechnology Institute has shown, for the first time, the extraordinary capacity of Toxoplasma to infect and grow within these cells, is due to its very broad culinary tastes. The research was published today in the journal Cell Host and Microbe.

Scavenging nutrients, such as glucose, from the host cell is one of the biggest challenges that microbial pathogens face. Lead author Martin Blume and colleagues demonstrated that Toxoplasma is able to steal and utilise a range of energy-rich nutrients from the host cell, allowing it to adapt to different host cell niches.

Professor Malcolm McConville, senior author and Director, Bio21 Institute, at the Department of Biochemistry and Molecular Biology said that unlike other pathogens that tend to only use one nutrient at a time, Toxoplasma gondii, can use multiple nutrients at the same time. "This may give these parasites enormous flexibility as well as the ability to grow in a range of different host cell types," he said. "Being adaptable is good, but it comes at the cost of having to make all of the enzymes need to metabolise these nutrients all of the time, an apparently wasteful exercise."

However, the researchers have shown that Toxoplasma repurposes some of these enzymes, so that they improve nutrient metabolism, regardless of the nutrient being used. Toxoplasma has managed to tweak its metabolism in a way that allows it to be both more adaptable and more efficient, allowing it to colonize a new animal or human host and grow very rapidly.

But its survival advantage may also turn out to be its Achilles' heel. At least one of the enzymes that is switched on all of the time, TgFBP2, is also needed when parasites are using nutrients that are not normally metabolised by the enzyme.

When the function of TgFBP2 is blocked, Toxoplasma is no longer infective.

This new insight makes it possible to develop drugs that specifically target and block TgFBP2 and prevent acute Toxoplasma infection.

http://www.eurekalert.org/pub_releases/2015-08/mc-mcs081315.php

Mayo Clinic-led study validates tool for pt. reporting side effects in cancer clinical trials

PRO-CTCAE was accurate, reliable and responsive, compared to other, established patient-reported and clinical measures

PHOENIX -- A multicenter study involving Mayo Clinic researchers has found that the National Cancer Institute's Patient Reported Outcomes version of the Common Terminology Criteria for Adverse Events (PRO-CTCAE), was accurate, reliable and responsive, compared to other, established patient-reported and clinical measures.

The study is published today in the journal JAMA Oncology.

"In most cancer clinical trials, information on side effects is collected by providers who have limited time with their patients and current patient questionnaires are limited in scope and depth," says the study's lead author Amylou Dueck, Ph.D., a biostatistician on Mayo Clinic's Arizona campus.

PRO-CTCAE is a library of items for patients to directly report on the level of each of their symptoms, to enhance the reporting of side effects in cancer clinical

trials which is normally based on information from providers. The study itself is unprecedented as more than 100 distinct questions about symptomatic adverse events were validated simultaneously."

Researchers recruited more than 1,000 patients from nine clinical practices across the U.S., including seven cancer centers. These patients reflected the geographic, ethnic, racial and economic diversity in cancer clinical trials. Patients in the study also had a wide range of cancer types.

Patients were asked to fill out the PRO-CTCAE questionnaire before appointments. Researchers then compared the patient reports against other established measures of symptoms, including case and quality of life reports, and prescription information.

Researchers were able to validate 119 of 124 PRO-CTCAE questions against established measurement tools. The five questions that were not validated could not be evaluated due to underrepresentation in the study population.

"This is a landmark study demonstrating that meaningful information about adverse events can be elicited from patients themselves, which is a major step for advancing the patient-centeredness of clinical trials," says the study's senior author, Ethan Basch, M.D., of Memorial Sloan Kettering Cancer Center and the Lineberger Cancer Center of the University of North Carolina.

PRO-CTCAE is now embedded in a number of clinical trials underway.

The study was funded by contracts from the National Cancer Institute.

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http://www.eurekalert.org/pub_releases/2015-08/cp-ldr080615.php

Low-fat diet results in more fat loss than low-carb diet in humans

A study from the US National Institutes of Health presents some of the most precise human data yet on whether cutting carbs or fat has the most benefits for losing body fat.

In a paper published August 13 in Cell Metabolism, the researchers show how, contrary to popular claims, restricting dietary fat can lead to greater body fat loss than carb restriction, even though a low-carb diet reduces insulin and increases fat burning.

Since 2003, Kevin Hall, PhD--a physicist turned metabolism researcher at the National Institute of Diabetes and Digestive and Kidney Diseases--has been using data from dozens of controlled feeding studies conducted over decades of nutrition research to build mathematical models of how different nutrients affect human metabolism and body weight.

He noticed that despite claims about carbohydrate versus fat restriction for weight loss, nobody had ever measured what would happen if carbs were selectively cut from the diet while fat remained at a baseline or vice versa. His model simulations showed that only the carb-restricted diet would lead to changes in the amount of fat burned by the body, whereas the reduced-fat diet would lead to greater overall body fat loss, but he needed the human data to back it up.

"A lot of people have very strong opinions about what matters for weight loss, and the physiological data upon which those beliefs are based are sometimes lacking," Hall says. "I wanted to rigorously test the theory that carbohydrate restriction is particularly effective for losing body fat since this idea has been influencing many people's decisions about their diets."

Studying the effects of diet on weight loss is often confounded by the difficulty in measuring what people actually eat--participants may not adhere to meal plans, misjudge amounts, or are not truthful in follow-up surveys. To counter this, Hall and colleagues confined 19 consenting adults with obesity to a metabolic ward for a pair of 2-week periods, over the course of which every morsel of food eaten was closely monitored and controlled.

To keep the variables simple, the two observation periods were like two sides of a balance scale: during the first period, 30% of baseline calories were cut through carb restriction alone, while fat intake remained the same. During the second period the conditions were reversed. Each day, the researchers measured how much fat each participant ate and burned and used this information to calculate the rate of body fat loss.

At the end of the two dieting periods, the mathematical model proved to be correct. Body fat lost with dietary fat restriction was greater compared with

carbohydrate restriction, even though more fat was burned with the low-carb diet. However, over prolonged periods the model predicted that the body acts to minimize body fat differences between diets that are equal in calories but varying widely in their ratio of carbohydrate to fat.

"There is one set of beliefs that says all calories are exactly equal when it comes to body fat loss and there's another that says carbohydrate calories are particularly fattening, so cutting those should lead to more fat loss," Hall says. "Our results showed that, actually, not all calories are created equal when it comes to body fat loss, but over the long term, it's pretty close."

Hall does caution against making sweeping conclusions about how to diet from this study. The study's purpose was to explore the physiology of how equal calorie reductions of fat versus carbs affect the human body. The research is limited by its sample size; only 19 people could be enrolled due to the expense of such research and the restrictiveness of the carefully controlled protocol. However, this study clearly reaches statistical significance. In addition,, the menu that the participants followed does not emulate normal dieting and does not account for what diet would be easier to eat over extended periods.

"We are trying to do very careful studies in humans to better understand the underlying physiology that will one day be able to help generate better recommendations about day-to-day dieting," Hall says. "But there is currently a gap between our understanding of the physiology and our ability to make effective diet recommendations for lasting weight loss."

Hall recommends that for now, the best diet is the one that you can stick to. His lab will next investigate how reduced-carbohydrate and reduced-fat diets affect the brain's reward circuitry, as well as its response to food stimuli. He hopes these results might inform why people respond differently to different diets.

This work was supported by the Intramural Research Program of the National Institutes of Health and the National Institute of Diabetes and Digestive and Kidney Diseases.

Cell Metabolism, Hall et al.: "Calorie for calorie, dietary fat restriction results in more body fat loss than carbohydrate restriction in people with obesity"

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http://www.eurekalert.org/pub_releases/2015-08/uoc--ndc081015.php

Newly discovered cells regenerate liver tissue without forming tumors

Hybrid hepatocytes proliferate and replenish liver mass after chronic liver injuries in mice

The mechanisms that allow the liver to repair and regenerate itself have long been a matter of debate. Now researchers at University of California, San Diego School of Medicine have discovered a population of liver cells that are better at regenerating liver tissue than ordinary liver cells, or hepatocytes. The study, published August 13 in Cell, is the first to identify these so-called "hybrid hepatocytes," and show that they are able to regenerate liver tissue without giving rise to cancer. While most of the work described in the study was done in mouse models, the researchers also found similar cells in human livers.

Of all major organs, the liver has the highest capacity to regenerate -- that's why many liver diseases, including cirrhosis and hepatitis, can often be cured by transplanting a piece of liver from a healthy donor. The liver's regenerative properties were previously credited to a population of adult stem cells known as oval cells. But recent studies concluded that oval cells don't give rise to hepatocytes; instead, they develop into bile duct cells. These findings prompted researchers to begin looking elsewhere for the source of new hepatocytes in liver regeneration.

In this latest study, led by Michael Karin, PhD, Distinguished Professor of Pharmacology and Pathology, researchers traced the cells responsible for replenishing hepatocytes following chronic liver injury induced by exposure to carbon tetrachloride, a common environmental toxin. That's when they found a unique population of hepatocytes located in one specific area of the liver, called the portal triad. These special hepatocytes, the researchers found, undergo extensive proliferation and replenish liver mass after chronic liver injuries. Since the cells are similar to normal hepatocytes, but express low levels of bile duct cell-specific genes, the researchers called them "hybrid hepatocytes."

Meanwhile, many other research labs around the world are working on ways to use induced pluripotent stem cells (iPSCs) to repopulate diseased livers and prevent liver failure.

"Although hybrid hepatocytes are not stem cells, thus far they seem to be the most effective in rescuing a diseased liver from complete failure," said Joan Font-Burgada, PhD, postdoctoral researcher in Karin's lab and first author of the study.

While iPSCs hold a lot of promise for regenerative medicine, it can be difficult to ensure that they stop proliferating when their therapeutic job is done. As a result, iPSCs carry a high risk of giving rise to tumors. To test the safety of hybrid hepatocytes, Karin's team examined three different mouse models of liver cancer. They found no signs of hybrid hepatocytes in any of the tumors, leading the researchers to conclude that these cells don't contribute to liver cancer caused by obesity-induced hepatitis or chemical carcinogens.

"Hybrid hepatocytes represent not only the most effective way to repair a diseased liver, but also the safest way to prevent fatal liver failure by cell transplantation," Karin said.

Co-authors of this study also include Shabnam Shalapour, Atsushi Umemura, Koji Taniguchi, Mark A. Valasek, Maike Sander, and Hannah Carter, UC San Diego; Suvasini Ramaswamy, and Inder M. Verma, Salk Institute for Biological Studies; Brian Hsueh, Karl Deisseroth, and Li Ye, Howard Hughes Medical Institute and Stanford University; David Rossell, University of Warwick; Hayato Nakagawa, UC San Diego and University of Tokyo; and Janel L. Kopp, UC San Diego and University of British Columbia.

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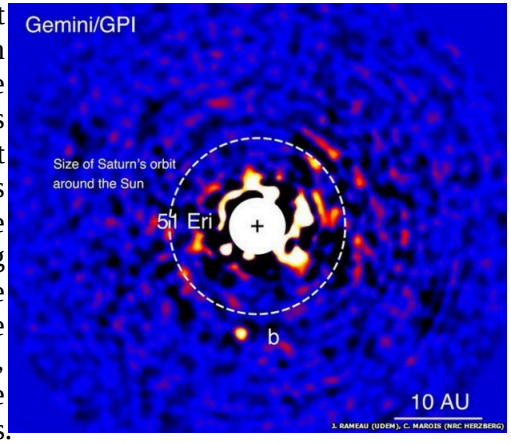
http://www.bbc.com/news/science-environment-33922503

Young 'alien Jupiter' planet discovered

A planet 100 light-years away resembles an infant version of Jupiter, astronomers say.

The new world, known as 51 Eridani b, is only 20 million years old - a toddler by astronomical standards. The alien world could yield clues to the formation of our Solar System, which has an unusual lay-out. The find was made by the Gemini Planet Imager (GPI), which looks for faint, young planets orbiting bright, relatively nearby stars.

The new world shows the strongest methane signature ever detected on an alien planet. Previous Jupiter-like exoplanets have shown only faint traces of methane, making them very different from the heavy methane atmospheres of gas giants in our Solar System. The astronomers also detected water, using GPI's spectrometer instrument. These findings indicate that it might be similar to planets in our Solar System, yielding additional clues to the formation of giant, astronomical bodies.



The GPI detects alien planets through a process of direct imaging

The vast majority of alien solar systems that have been discovered are very different from our own, with massive planets - so-called "hot Jupiters" - orbiting close to their stars. This is partly because such systems are easier to detect with the techniques currently used to search for planets orbiting distant stars.

"Previous search methods couldn't find systems like our own, with small, rocky worlds close to their star and large, gas giants at large distances like Jupiter and Saturn," said co-author James Larkin, from the University of California, Los Angeles (UCLA). "The search for large planets at large separations from their star is exactly the goal of GPI. These solar systems are likely much more similar to our own." Studying such worlds should reveal how common our Solar System architecture truly is.

A tale of two theories

Astronomers believe the gas giants in our Solar System formed slowly - by building up a large core over a few million years and then pulling in a huge amount of hydrogen and other gases to form an atmosphere. This is known as a "cold-start".

But the Jupiter-like exoplanets that have been discovered so far are much hotter than models have predicted. This hints that they could have formed quickly - as gas collapses to make a scorching planet in what is known as a "hot-start".

The core build-up process can also form rocky planets like the Earth. But the fast collapse process might only make giant gas planets. The planets in our Solar System are 4.5 billion years old, but at just 20 million years old, 51 Eridani b might be young enough to reveal clues about how it was created.

"This planet really could have formed the same way Jupiter did; the whole solar system could be a lot like ours," said co-author Bruce Macintosh, from Stanford University's Kavli Institute.

The new gas giant is roughly twice the mass of Jupiter. Until now, the gas giant planets that have been directly detected have been much larger - five to 13 times Jupiter's mass. It orbits a little further from its parent star than Saturn does from the Sun and has a temperature of 430C (800F), hot enough to melt lead, but still rather cold compared with other alien gas giants, which reach temperatures above 540C (1,000F).

The Gemini Planet Imager is installed on the 8m Gemini South Telescope in Chile. It began science operations in 2014.

Other scientific instruments designed to detect exoplanets do so indirectly, by, for example, detecting the dip in starlight as a planet passes in front of its parent sun. GPI instead searches for light from the planet itself - referred to as direct imaging.

The astronomers use adaptive optics to sharpen the image of a star, and then block out the starlight. Any remaining incoming light is then analysed, with the brightest spots indicating a possible planet.

http://www.eurekalert.org/pub_releases/2015-08/pids-cct081115.php

Chickenpox continues to decline in US thanks to vaccination

Since the chickenpox vaccine became available in the U.S. in 1995, there has been a large reduction in chickenpox cases.

Hospitalizations and outpatient visits for chickenpox have continued their decline after a second dose of the vaccine was recommended to improve protection against the disease, according to a new study published in the Journal of the Pediatric Infectious Diseases Society. The findings also suggest that increasing vaccination coverage against the once common childhood illness helps protect those who are not immunized themselves.

Chickenpox, also known as varicella, is a highly contagious and sometimes serious disease caused by the varicella-zoster virus. In people who are not vaccinated, it typically causes a blister-like rash, itching, fatigue, and fever. Before the vaccine was available in the U.S. in 1995, about 4 million people would get chickenpox nationwide each year, according to the Centers for Disease Control and Prevention (CDC). Nearly 11,000 people were hospitalized annually, and 100 to 150 people died. A second dose of the vaccine was recommended in 2006.

In this latest study, CDC researchers Jessica Leung, MPH, and Rafael Harpaz, MD, MPH, drawing on national health care claims data from 1994 to 2012, found that there were 93 percent fewer hospitalizations for chickenpox in 2012 compared to the period before the vaccine was introduced. During the two-dose varicella vaccination period (2006-2012), hospitalizations declined 38 percent. Outpatient visits for the illness also dropped significantly. There were 84 percent fewer outpatient visits in 2012 versus the pre-vaccination period. During the two-dose varicella vaccination period (2006-2012), outpatient visits declined 60 percent.

"We found that, in our study, rates for varicella in the U.S. continued to decline as the varicella vaccine program has become fully implemented," said Leung, the study's co-author. "We saw significant declines in rates of varicella after the one-dose vaccine was recommended in 1995 in the U.S., and we're continuing to see additional declines in varicella after two doses were recommended in 2006."

The largest declines were among children and adolescents 1 to 19 years old, a population targeted for vaccination against chickenpox. But the researchers also saw substantial declines in outpatient visits and hospitalizations among infants younger than 12 months, for whom the vaccine is not recommended, and in adults, who are often not immunized, suggesting the possibility of herd immunity. "The surrounding population that can be vaccinated are not getting sick, and therefore the data suggest that these infants are also being protected," Leung said. "We're seeing that for adults as well."

The study also found a considerable rise--from 6 percent in 2003 to 17 percent in 2012--in the proportion of outpatient visits for chickenpox in which patients were tested for the disease. The authors noted that lab testing will become increasingly important for distinguishing chickenpox from other similar rash conditions as cases of chickenpox continue to decline and health care providers become less familiar with its clinical presentation, and the increasing proportion of chickenpox cases among people are who are vaccinated, which are typically mild and difficult to diagnose based on symptoms alone.

http://www.eurekalert.org/pub_releases/2015-08/uoe-hrf081315.php

Humans responsible for demise of gigantic ancient mammals

Early humans were the dominant cause of the extinction of a variety of species of giant beasts, new research has revealed

Early humans were the dominant cause of the extinction of a variety of species of giant beasts, new research has revealed.

Scientists at the universities of Exeter and Cambridge claim their research settles a prolonged debate over whether mankind or climate change was the dominant cause of the demise of massive creatures in the time of the sabretooth tiger, the woolly mammoth, the woolly rhino and the giant armadillo. Known collectively as megafauna, most of the largest mammals ever to roam the earth were wiped out over the last 80,000 years, and were all extinct by 10,000 years ago.

Lewis Bartlett, of the University of Exeter, led the research, which also involved the universities of Reading and Bristol and is published in the journal Ecography. He said cutting-edge statistical analysis had helped solve the mystery almost beyond dispute, concluding that man was the dominant force in wiping out the creatures, although climate change could also have played a lesser role.

The researchers ran thousands of scenarios which mapped the windows of time in which each species is known to have become extinct, and humans are known to have arrived on different continents or islands. This was compared against climate reconstructions for the last 90,000 years.

Examining different regions of the world across these scenarios, they found coincidences of human spread and species extinction which illustrate that man was the main agent causing the demise, with climate change exacerbating the number of extinctions. However, in certain regions of the world - mainly in Asia - they found patterns which patterns were broadly unaccounted for by either of these two drivers, and called for renewed focus on these neglected areas for further study.

Lewis Bartlett, a researcher from the University of Exeter's Centre for Ecology and Conservation, said: "As far as we are concerned, this research is the nail in the coffin of this 50-year debate - humans were the dominant cause of the extinction of megafauna. What we don't know is what it was about these early settlers that caused this demise. Were they killing them for food, was it early use of fire or were they driven out of their habitats? Our analysis doesn't differentiate, but we can say that it was caused by human activity more than by climate change. It debunks the myth of early humans living in harmony with nature."

Dr Andrea Manica, of Cambridge University, was lead supervisor on the paper. He said: "Whilst our models explain very well the timing and extent of extinctions for most of the world, mainland Asia remains a mystery. According to the fossil record, that region suffered very low rates of extinctions. Understanding why megafauna in mainland Asia is so resilient is the next big question."

http://www.bbc.com/news/uk-scotland-33892572

Charity calls for greater recognition of 'essential tremor' as a disability

A charity for people who have uncontrollable shaking is calling for the condition to be given greater recognition as a disability. *本態性振戦*

By Eleanor Bradford BBC Scotland Health Correspondent

The Scotttish Tremor Society [a deliberate misspelling] says shaking is often mistaken for Parkinson's. It is estimated that up to 6% of the population have "essential tremor" - a rhythmic trembling of the hands, head, legs, trunk and/or voice. It can appear at any age, and is four times as common as Parkinson's.

Essential tremor is a disorder of the nervous system, but is not always due to trauma. It can be hereditary or caused by a stroke - or it can simply begin for no apparent reason.

Six-year-old Greg McLelland was born with the condition but his mum, Stacey, says it wasn't properly diagnosed until he was aged five. "At first we thought it was epilepsy but then a year-and-a-half ago we got the proper diagnosis. It was actually a speech and language therapist who noticed the tremors."

Greg's shakes are worse at night. "We had a single bed for him but we had to get bed guards to stop him falling out with the night tremors. We've now got him a new double bed and, fingers crossed, he won't fall out of this one. "We don't know what the future holds for him. Now, his writing is very small and he doesn't write much. The school try to get him to do things without writing, or by using a tablet."

Mary Ramsay was also born with essential tremor but was 48 before she got a definite diagnosis. "I was getting to the stage where I wouldn't go out, I wouldn't eat or drink in public, I wouldn't write. I withdrew. But, in 1992. I went onto the internet and found the National Tremor Foundation."

Mary now runs the Scotttish Tremor Society which campaigns for greater recognition of the condition. "There are three 't's. Two for Scottish and one for tremor," she said

"We have one lady whose mother was diagnosed with Parkinsons - I'm not sure how long ago - but she was put on medication for Parkinsons and it turns out it is essential tremor. So they have to wean her off the medication before they can start treating essential tremor." "Mary's given us more information than the paediatrician has," says Mrs McLelland. "That's shocking."

The Scotttish Tremor Society has launched a petition calling on medical professionals and the government to recognise that it is a disabling medical condition. The petition will be presented to the government in October.

Severe cases

"We are getting emails, phone calls, requests from America, Australia, New Zealand and a whole host of other countries. I basically can't keep up," said Mrs Ramsay.

Jamie Hepburn, the Scottish government's minister for sport, health improvement and mental health, said it anyone who experienced tremor symptoms should see their GP as soon as possible. He also welcomed efforts to raise awareness of the condition. "I understand that essential tremor can cause disruption to people's lives, particularly in more severe cases," he said.

"There are no specific treatments but it is possible to diminish the effects through appropriate medicines or other treatments in the most severe cases.

"Clinical advice, support, or appropriate referral to specialist services will be determined by GPs and based on an assessment of individual need. It is therefore essential that people who experience such symptoms seek advice from their GP as soon as possible."

http://bit.ly/1NLvYHJ

Why Coffee Makes Some People Poop

It's not the caffeine

By Helen Thompson

There’s nothing like a delicious cup of coffee in the morning — and for some, it triggers another morning routine involving a toilet. But why does a cup of joe make some people have to go? The latest installation of the American Chemical Society’s "Reactions" video series has answers.

Contrary to popular belief, coffee’s laxative nature doesn’t come from caffeine. Instead, acid in coffee can trigger a gut reaction in the stomach that prompts it to unload its contents into the intestines. The video notes that coffee also causes an

uptick in hormones that jumpstart the large intestine. Scientists still aren't sure exactly which specific coffee compounds are at play.

For better or for worse, coffee's laxative features only affect a fraction of the population. While everybody poops, only some people poop after drinking coffee.

http://www.bbc.com/news/science-environment-33690694

Could the smell of the sea help cool a warming planet?

Ah, the summertime sizzle of a shell-strewn beach, the bracing odour of the briny sea. There's nothing quite like it really.

Matt McGrath Environment correspondent

If you happen to be on a beautiful beach, do take a good, deep, invigorating sniff!

What does it remind you of? Amid the saltiness, a hint of sulphur perhaps? A slight edge of boiled cabbage? Or something even more unpleasant? Well, maybe that's just me...

Seaside odours are generally composed of dimethyl sulfide, a pongy gas produced by bacteria feasting on phytoplankton. In the atmosphere, it is changed chemically to sulphate, which in turn becomes the seeds of clouds.

Solid organic matter from large collections of phytoplankton blooms can also help with cloud formation. This blooming ocean can give rise to a specky scum, from which tiny bubbles get lofted into the air by the churn of the sea. Water vapour condenses around them, tiny droplets form and the fluffy billows of the sky emerge.

Gobsmacked

So what does this ocean-coloured scene have to do with a warming planet?

Well, researchers say that the type of clouds produced from sea gas and plankton particles, especially in the Southern Ocean, are not your common or garden cumulus.

Clouds reflect sunlight back into space depending on the size of the droplets and the amount of liquid suspended in them. The more liquid that is suspended in the cloud, the brighter and more reflective they are - swotty philosophers of the skies!

The experts have long understood that in winter, when seas are stormy and the spray is flying, there will be more of these types of droplets and thus more sun bounced back into space. In the balmy, calm of summer at sea they expected the clouds to be far less reflective. They were astonished to discover that, in the Southern Ocean, this was not the case at all.

In fact they concluded that the plankton particle effect was strongest in the warmer months - on average they found that ocean life doubled the number of droplets in summer. "The amount of sunlight that's reflected by those clouds in this region is about 125 watts per metre squared," said co-author Dr Susannah Burrows, from the US Department of Energy's Pacific Northwest National Laboratory.

"What we're finding is evidence for a change in that reflectivity of 10 watts per metre squared, that would be attributed to the phytoplankton - so about 8% of the reflection of sunlight on those clouds." "It is quite a bit!" she said.

Brightening the clouds

So can this new understanding of the role of sea smells and clouds make a difference to global warming?

Well, yes, say the researchers but not necessarily in the ways you might think.

The scientists are excited about the findings because for the first time it gives them a clue about the total number of aerosols that are up in the air over the Southern Ocean. But could this new understanding give a boost to ideas about geo-engineering our way out of warming hell?

In recent years a number of researchers have suggested that brightening the clouds could be a low-impact way of cooling the planet. Does this Southern Ocean research make this a more feasible prospect?

"In principle it is possible to strongly modify and brighten marine clouds by injecting particles into the marine atmosphere," says Dr Burrows. "But I think whether or not that's a good idea is really a political question that needs to be discussed within society."

Something to mull over while lying on the beach with the sea air in your nostrils.

http://www.eurekalert.org/pub_releases/2015-08/uol-mr081315.php

'Brainy' mice raise hope of better treatments for cognitive disorders

PDE4B-inhibited mice showed enhanced cognitive abilities

It sheds light on the molecular underpinnings of learning and memory and could form the basis for research into new treatments for age-related cognitive decline, cognitive disorders such as Alzheimer's disease and schizophrenia, and other conditions.

The researchers altered a gene in mice to inhibit the activity of an enzyme called phosphodiesterase-4B (PDE4B), which is present in many organs of the vertebrate body, including the brain.

In behavioural tests, the PDE4B-inhibited mice showed enhanced cognitive abilities. They tended to learn faster, remember events longer and solve complex exercises better than ordinary mice. For example, the "brainy mice" showed a better ability than ordinary mice to recognise another mouse that they had been introduced to the day before. They were also quicker at learning the location of a hidden escape platform in a test called the Morris water maze.

However, the PDE4B-inhibited mice also showed less recall of a fearful event after several days than ordinary mice.

The published findings are limited to mice and have not been tested in humans, but PDE4B is present in humans. The diminished memory of fear among mice with inhibited PDE4B could be of interest to researchers looking for treatments for pathological fear, typified by Post-Traumatic Stress Disorder (PTSD). The PDE4B-inhibited mice also showed less anxiety. They spent more time in open, brightly-lit spaces than ordinary mice, which preferred dark, enclosed spaces.

Ordinary mice are naturally fearful of cats, but the PDE4B-inhibited mice showed a decreased fear response to cat urine, suggesting that one effect of inhibiting PDE4B could be an increase in risk-taking behaviour.

So, while the PDE4B-inhibited mice excelled at solving complex exercises, their low levels of anxiety could be counterproductive for a wild mouse.

Dr Steve Clapcote, Lecturer in Pharmacology in the University of Leeds' School of Biomedical Sciences, led the study. He said: "Cognitive impairments are currently poorly treated, so I'm excited that our work using mice has identified phosphodiesterase-4B as a promising target for potential new treatments".

The researchers are now working on developing drugs that will specifically inhibit PDE4B. These drugs will be tested in animals to see whether any would be suitable for clinical trials in humans.

Dr Alexander McGirr, a psychiatrist in training at the University of British Columbia, who co-led the study, said: ""In the future, medicines targeting PDE4B may potentially improve the lives of individuals with neurocognitive disorders and life-impairing anxiety, and they may have a time-limited role after traumatic events."

Dr Laura Phipps of Alzheimer's Research UK, who were not involved in the study, said: "This study highlights a potentially important role for the PDE4B gene in learning and memory in mice, but further studies will be needed to know whether the findings could have implications for Alzheimer's disease or other dementias. We'd need to see how this gene could influence memory and thinking in people to get a better idea of whether it could hold potential as a target to treat Alzheimer's.

"There is currently a lack of effective treatments for dementia and understanding the effect of genes can be a key early step on the road to developing new drugs. With so many people affected by dementia, it is important that there is research into a wide array of treatment approaches to have the best chance of helping people sooner."

The study involved researchers from Leeds, Mount Sinai Hospital, University of British Columbia, the University of Toronto, the National Genetic Centre in Oman, the Centre for Addiction and Mental Health in Toronto, the University of Glasgow and Swansea University. The study was funded by the UK Medical Research Council.

The full paper: McGirr A, Lipina TV, Mun H-S, Georgiou J, Al-Amri AH, Ng E, Zhai D, Elliott C, Cameron RT, Mullins JGL, Liu F, Baillie GS, Clapcote SJ, Roder JC. (2015). 'Specific inhibition of phosphodiesterase-4B results in anxiolysis and facilitates memory acquisition.' is published in Neuropsychopharmacology

http://www.eurekalert.org/pub_releases/2015-08/uoct-his081415.php

Higher intelligence score means better physical performance

New research reveals a distinct association between male intelligence in early adulthood and their subsequent midlife physical performance.

The higher intelligence score, the better physical performance, the study reveals. The Center for Healthy Aging and the Department of Public Health, University of Copenhagen, are behind this new study.

We would all like to stay independent, as we get older. In order to succeed, we need to be in good physical shape. This includes being able to cope with everyday physical activities such as getting dressed and carrying our own shopping. Scientists employ a number of tests, e.g. handgrip strength, balance and chair-rise, when measuring physical performance.

Researchers at the Center for Healthy Aging and the Department of Public Health at the University of Copenhagen have studied the association between male intelligence in early adulthood and their subsequent physical performance, aged 48-56. The study comprised 2,848 Danish males born in 1953 and in 1959-61, and the results have just been published in the scientific Journal of Aging and Health.

Avoiding decrease in physical performance in old age

"Our study clearly shows that the higher intelligence score in early adulthood, the stronger the participants' back, legs and hands are in midlife. Their balance is also better. Former studies have taught us that the better the results of these midlife tests, the greater the chance of avoiding a decrease in physical performance in old age", says PhD student Rikke Hodal Meincke from the Center for Healthy Aging and the Department of Public Health.

With a 10-point increase in intelligence score, the results revealed a 0,5 kg increase in lower back force, 1 cm increase in jumping height - an expression of leg muscle power, 0.7 kg increase in hand-grip strength, 3.7% improved balance, and 1.1 more chair-rises in 30 seconds.

Easier to stay physically active throughout life

"A feasible explanation for this connection between male intelligence in early adulthood and their midlife physical performance could be that people with a higher intelligence score find it easier to understand and interpret health information and thus have a healthier lifestyle, they may, for instance, exercise

more regularly. Exercise can thus be viewed as a mechanism that explains the connection between intelligence and physical performance," Rikke Hodal Meincke elaborates.

She believes that the study's results are important for the future planning and targeting of initiatives that may help improve or maintain elderly peoples' physical performance. By way of example, this could include making it easier for everybody, regardless of abilities, to remain physically active throughout their lives. She does, however, stress that more studies are needed, in order to examine mechanisms that reveal exactly where to set in.

Previous research has shown that exercise, health status and socio-economics influence physical performance. Furthermore, childhood factors may also influence physical performance in later life.

The Nordea-fonden supports the research carried out by the Center for Healthy Aging.

http://www.eurekalert.org/pub_releases/2015-08/cioe-owp081415.php

On Wikipedia, politically controversial science topics vulnerable to information sabotage

When researching acid rain, evolution, and climate change -- cast a critical eye on source material

Millbrook, NY - Wikipedia reigns. It's the world's most popular online encyclopedia, the sixth most visited website in America, and a research source most U.S. students rely on. But, according to a paper published today in the journal PLOS ONE, Wikipedia entries on politically controversial scientific topics can be unreliable due to information sabotage.

Co-author Dr. Gene E. Likens is President Emeritus of the Cary Institute of Ecosystem Studies and a Distinguished Research Professor at the University of Connecticut, Storrs. Likens co-discovered acid rain in North America, and counts among his accolades a National Medal of Science, a Tyler Prize, and elected membership in the National Academy of Sciences. Since 2003, he has monitored Wikipedia's acid rain entry.

Likens explains, "In the scientific community, acid rain is not a controversial topic. Its mechanics have been well understood for decades. Yet, despite having 'semi-protected' status to prevent anonymous changes, Wikipedia's acid rain entry receives near-daily edits, some of which result in egregious errors and a distortion of consensus science."

In an effort to see how Wikipedia's acid rain entry compared to other scientific topics, Likens partnered with Dr. Adam M. Wilson, a geographer at the University of Buffalo. Together, they analyzed Wikipedia edit histories for three politically controversial scientific topics (acid rain, evolution, and global warming), and four non-controversial scientific topics (the standard model in physics, heliocentrism, general relativity, and continental drift).

Using nearly a decade of data, Likens and Wilson teased out daily edit rates, the mean size of edits (words added, deleted, or edited), and the mean number of page views per day. While the edit rate of the acid rain article was less than the edit rate of the evolution and global warming articles, it was significantly higher than the non-controversial topics. Across the board, politically controversial scientific topics were edited more heavily and viewed more often.

"Wikipedia's global warming entry sees 2-3 edits a day, with more than 100 words altered, while the standard model in physics has around 10 words changed every few weeks, " Wilson notes. "The high rate of change observed in politically controversial scientific topics makes it difficult for experts to monitor their accuracy and contribute time-consuming corrections."

Likens adds, "As society turns to Wikipedia for answers, students, educators, and citizens should understand its limitations when researching scientific topics that are politically charged. On entries subject to edit-wars, like acid rain, evolution, and global change, one can obtain - within seconds - diametrically different information on the same topic."

The authors note that as Wikipedia matures, there is evidence that the breadth of its scientific content is increasingly based on source material from established scientific journals. They also note that Wikipedia employs algorithms to help identify and correct blatantly malicious edits, such as profanity. But in their view, it remains to be seen how Wikipedia will manage the dynamic, changing content that typifies politically-charged science topics.

To help readers critically evaluate Wikipedia content, Likens and Wilson suggest identifying entries that are known to have significant controversy or edit wars. They also recommend quantifying the reputation of individual editors. In the meantime, users are urged to cast a critical eye on Wikipedia source material, which is found at the bottom of each entry.

http://www.eurekalert.org/pub_releases/2015-08/asfm-uet081315.php

Unlikely element turns up in enzyme; commercial renewable fuels might ultimately result

Tungsten appears in a novel enzyme in a hot spring-inhabiting bacterium

Washington, DC - Tungsten is exceptionally rare in biological systems. Thus, it came as a huge surprise to Michael Adams, PhD., and his collaborators when they discovered it in what appeared to be a novel enzyme in the hot spring-inhabiting bacterium, Caldicellulosiruptor bescii. The researchers hypothesized that this new tungstoenzyme plays a key role in C. bescii's primary metabolism, and its ability

to convert plant biomass to simple fermentable sugars. This discovery could ultimately lead to commercially viable conversion of cellulosic (woody) biomass to fuels and chemical feedstocks, which could substantially reduce greenhouse emissions.

The research is published 14 August in Applied and Environmental Microbiology, a journal of the American Society for Microbiology.

Cellulosic biomass' advantage as a feedstock for fuel and chemical production is that it need not compete with food production for land. Its big challenge is that cellulose is highly resistant to enzymatic degradation.

To date, most efforts to convert it to useful chemicals have involved energetically expensive pretreatment.

Avoiding pretreatment would boost commercial viability. To this end, the investigators, members of the Department of Energy's BioEnergy Science Center, have been focusing on Caldicellulosiruptor species (the name of the genus means "hot cellulose-breakers,"), which inhabit volcanic hot springs around the world.

While the putative novel tungstoenzyme Adams et al. discovered looked fairly promising, Adams, who is Distinguished Research Professor of Biochemistry & Molecular Biology at the University of Georgia, Athens is quick to assert that a likely sequence does not constitute proof of function.

In fact, "I would have predicted that the tungsten-processing system of C. bescii probably used molybdenum rather than tungsten," he said. (The two metals have similar properties, but molybdenum is frequently used by bacteria, most notably to break the bonds of atmospheric nitrogen, enabling biological nitrogen fixation.)

So the investigators engineered C. bescii to produce a known tungstoenzyme from another organism. "That enzyme was active, proving that C. bescii is capable of synthesizing tungstoenzymes," said Adams.

The investigators then grew C. bescii under a variety of conditions, including directly on cellulose and plant biomass, and found that it always produced the enzyme, which the investigators dubbed XOR, at high cellular concentrations under all growth conditions.

They also tried unsuccessfully to grow "knock-out" mutants lacking a functional XOR gene. That result suggested, but does not prove that the enzyme is necessary for growth, said Adams.

And so far, the enzyme's function has not been determined. "Elucidating that function will likely be essential if we are to fully understand the bacterium's ability to grow on unpretreated plant biomass," said Adams.

That knowledge, he added, would make it possible to metabolically engineer C. bescii to produce fuels and other useful chemicals from such feedstocks.

http://bit.ly/1E9b2dw

Dementia is affecting people more and earlier than ever before — but is pollution the culprit?

People are developing and dying from dementia almost a decade earlier than they used to — and it might be thanks to pollution.

By Danny Lewis

A new study published in the *Surgical Neurology International* journal suggests that heightened levels of pollution and insecticides in the environment could be causing people to develop dementia younger than ever before. After comparing data from 21 countries between 1989 and 2010, researchers from Bournemouth University found that people are now regularly being diagnosed with dementia as early as their 40s, Daniela Deane writes for *The Washington Post*.

"The rate of increase in such a short time suggests a silent or even a 'hidden' epidemic, in which environmental factors must play a major part, not just aging," lead author Colin Pritchard wrote in a press release. "Modern living produces multi-interactional environmental pollution but the changes in human morbidity, including neurological disease is remarkable and points to environmental influences."

Growing dementia rates are particularly noticeable in the United States, where researchers found that deaths related to neurological problems have tripled for men and quintupled for women aged 55 and older. Dementia typically affects people aged 60 and older. According to Pritchard, the increase in early-onset dementia is so stark that it can't be blamed solely on aging populations and better diagnoses.

"The environmental changes in the last 20 years have seen increases in the human environment of petro-chemicals - air transport - quadrupling of motor vehicles, insecticides and rises in background electro-magnetic-field, and so on," Pritchard wrote.

However, not everyone is convinced that pollution is to blame. While increased pollution and insecticides could be a cause for higher rates of dementia, it is a complicated neurological disease that can be rooted in many different factors, Dr. Simon Ridley, head of research at Alzheimer's Research UK, tells Kat Lay for the *London Times*.

The Centers for Disease Control defines dementia as "an umbrella term for a group of cognitive disorders typically characterized by memory impairment, as well as marked difficulty in the domains of language, motor activity, object recognition, and disturbance of executive function – the ability to plan, organize, and abstract."

While Alzheimer's disease is the most common and well-known form of dementia, there are several other forms, too. It's also possible that as medications for conditions like heart disease have gotten better, dementia has risen to take its place. After all, as one expert told Lay, people have to die of something.

http://bit.ly/1Lqbsio

A New Cooking Oil Can Be Reused 80 Times

Could it make for better French fries and disrupt a worldwide black market at the same time?

By Danny Lewis

It's common knowledge that the older the oil in an establishment's fryer, the grosser the taste that's infused into its fried foods. But soon, that local fried chicken joint may be applauded for using the same batch of oil over and over again — thanks to a new type of cooking oil that can be used up to 80 times.

Earlier this month, researchers at the University of Putra Malaysia announced that they had developed a new kind of cooking oil that's not only super reusable, but also contains antioxidants, has antibacterial properties and contributes less to heart disease and cancer than typical products, Hilary Pollack writes for Vice Munchies. Oh yeah, and it also makes everything crispier and tastier, too, according to a press release.

"Extracts from Rutaceaea herb serve as a natural antioxidant that prevents cooking oil from damage," lead researcher Suhaila Mohamed said in a statement. "Wastage can be avoided through the use of cooking oil for 80 times, without affecting one's health."

Besides putting your grandma's fried chicken to shame, the new kind of cooking oil generates dramatically less waste than conventional oil, Pollack writes. But there is a tradeoff: the oil is based on palm oil, which is one of the most environmentally destructive and ubiquitous food products on supermarket shelves, Michael Casey and Ntungwe Elias write for Scientific American.

The product's developers maintain that their new oil can impart its abilities into normal cooking oils by adding just a spoonful of the reusable oil for every half-cup of the traditional kind, extending regular oil's shelf life with a mere splash.

The new oil could also disrupt a lucrative black market in stolen cooking oil. It's become an increasingly hot commodity over the last ten years as biofuels have become more popular around the world. Because cooking oil can be easily refined into biofuel and diesel, thieves can make a quick buck by scooping up leftovers from the grease trap at the end of the day. While restaurant owners used to have to pay to have their spent cooking oil disposed of, now they have to guard their grease traps closely. Used oil can fetch high prices at biofuel refineries – up to $4 per gallon on the black market.

In a world where some restaurants have been accused of being so desperate as to use oil scraped from gutters for cooking, a little more frying time could go a long way.

http://www.eurekalert.org/pub_releases/2015-08/acs-ewb071615.php

Eliminating water-borne bacteria with pages from The Drinkable Book could save lives

Inexpensive, simple and easily transportable nanotechnology-based method to purify drinking water

BOSTON - Human consumption of bacterially contaminated water causes millions of deaths each year throughout the world--primarily among children.

While studying the material properties of paper as a graduate student, Theresa Dankovich, Ph.D., discovered and developed an inexpensive, simple and easily transportable nanotechnology-based method to purify drinking water. She calls it The Drinkable BookTM, and each page is impregnated with bacteria-killing metal nanoparticles.

Dankovich will explain her technology and reveal new results of recent field tests conducted in Africa and Bangladesh at the 250th National Meeting & Exposition of the American Chemical Society (ACS). ACS is the world's largest scientific society. The national meeting takes place here through Thursday.

Although silver and similar metals have been known for centuries to have the ability to kill bacteria, no one had put them into paper to purify drinking water, Dankovich notes.

While earning her doctorate at McGill University, she found that sheets of thick filter paper embedded with silver nanoparticles could do just that, eliminating a wide variety of microorganisms, including bacteria and some viruses.

She continued her research at the University of Virginia's Center for Global Health, expanding the repertoire of embedded nanoparticles to include ones made of inexpensive copper. Dankovich also began field investigations of water purification applications in Limpopo, South Africa, as well as northern Ghana, Haiti and Kenya.

"In Africa, we wanted to see if the filters would work on 'real water,' not water purposely contaminated in the lab," she says. "One day, while we were filtering lightly contaminated water from an irrigation canal, nearby workers directed us to a ditch next to an elementary school, where raw sewage had been dumped. We found millions of bacteria; it was a challenging sample.

"But even with highly contaminated water sources like that one, we can achieve 99.9 percent purity with our silver- and copper-nanoparticle paper, bringing bacteria levels comparable to those of U.S. drinking water," Dankovich adds.

"Some silver and copper will leach from the nanoparticle-coated paper, but the amount lost into the water is within minimal values and well below Environmental Protection Agency and World Health Organization drinking water limits for metals."

Last year, she formed a nonprofit company, pAge Drinking Paper. In collaboration with the nonprofit WATERisLIFE organization and Brian Gartside, a designer formerly with DDB New York and now with Deutsch, her company developed a unique product that is essentially a book comprised of pages embedded with silver nanoparticles.

Printed on each page is information on water safety both in English and the language spoken by those living where the filter is to be used.

Each page can be removed from the book and slid into a special holding device in which water is poured through and filtered. A page can clean up to 26 gallons (100 liters) of drinking water; a book can filter one person's water needs for four years.

Now a postdoctoral researcher at Carnegie Mellon University, Dankovich is further developing the technology and conducting more field studies in rural communities.

In June, Dankovich teamed up with International Enterprises (iDE)-Bangladesh, an international nonprofit, in a field trial to explore commercialization of the silver nanoparticle paper filter for household water treatment.

In several districts in southern Bangladesh, customer-focused surveys provided rich insights into easily accepted and culturally appropriate filter designs, she says, adding that the field tests continued to show significant reductions in coliform bacteria counts.

Dankovich is also connecting her chemistry expertise with industrial designers at the University of Cincinnati and with environmental engineers at Carnegie Mellon. "We have a bunch of designs, and we are trying to trim them down and keep them simple," she says. "Worldwide, many people use a 5-gallon bucket for many needs, so we are basing our approach on that type of container.

"Along with applications, our biggest current focus is to scale up, going from a lab bench experiment to a manufactured product. We have to go from 'cool chemistry' to something everyone can understand and use." (A video about the project is available at https://www.youtube.com/watch?v=qYTif9F188E.)

Dankovich acknowledges funding from iDE-Bangladesh, Carnegie Mellon University, WATERisLIFE, NIH Fogarty International Center and Natural Sciences & Engineering Research Council of Canada.

http://www.eurekalert.org/pub_releases/2015-08/uom-1yo081315.php

1,800 years of global ocean cooling halted by global warming

Comprehensive analysis of ocean surface temperature data shows a cooling trend preceding the Industrial Revolution

Prior to the advent of human-caused global warming in the 19th century, the surface layer of Earth's oceans had undergone 1,800 years of a steady cooling trend, according to a new study. During the latter half of this cooling period, the trend was most likely driven by large and frequent volcanic eruptions.

An international team of researchers reported these findings in the August 17, 2015 issue of the journal Nature Geoscience. The study also indicates that the coolest temperatures occurred during the Little Ice Age--a period that spanned the 16th through 18th centuries and was known for cooler average temperatures over land.

The concurrence of cooling events on both land and sea suggests that a global cooling phenomenon was erased by subsequent human-caused global warming.

"Today, the Earth is warming about 20 times faster than it cooled during the past 1,800 years," said Michael Evans, second author of the study and an associate professor in the University of Maryland's Department of Geology and Earth System Science Interdisciplinary Center (ESSIC). "This study truly highlights the profound effects we are having on our climate today."

Compared to the atmosphere, the oceans can absorb much more heat and trap it for longer periods of time. Thus the ocean can buffer short-term changes in global temperature. But when events such as volcanic eruptions cluster together in a relatively short period of time, the temperature changes can become prolonged.

"Volcanic eruptions have a short-term cooling effect on the atmosphere, but our results showed that when volcanic eruptions occurred more frequently, there was long-term ocean cooling," said lead author Helen McGregor, an Australian Research Council (ARC) Future Fellow at the University of Wollongong in Australia. "With this research, we now have new insight into the century-scale global sea-surface temperature variations that came before man-made greenhouse gas forcing."

The scientists are the first to combine 57 previously published marine surface temperature reconstructions that cover all of the world's oceans, from near-polar to tropical regions. The team compiled the data within 200-year brackets to observe long-term trends, and then compared the findings to land-based reconstructions, which revealed similar cooling trends.

"No matter how we divided the data set, the cooling trend stands out as a robust signal," McGregor said.

To investigate the cause of the cooling trend, the researchers turned to climate models. They examined how sea-surface temperatures reacted to various "forcing" factors, such as changes in solar output, Earth's orbit, land use, volcanic activity and greenhouse gases. Only volcanic events resulted in a cooling trend that matched the team's real-world observations.

Understanding how forcing factors changed ocean temperatures in the past can open a window into future climate change.

"Model simulations by others have shown us that the oceans can impart a substantial delay in the warming of the surface climate," said Evans, who is also the lead of the Ocean2k working group of the Past Global Changes (PAGES) program. "With much of the heat from global warming entering our oceans, recent ocean surface warming may foreshadow additional future warming, in the same way ocean cooling appeared as a long-term response to large and frequent volcanic events in recent centuries."

"We are still learning how the oceans mediate climate variations," Evans added. "Further work combining both observations and simulations of ocean climate will refine our understanding of the ocean's role in climate change."

This research was funded by the National Science Foundation, the National Oceanic and Atmospheric Administration and the Swiss National Science Foundation via the PAGES (Past Global Changes) Program, as well as 22 additional grants and fellowships awarded to individual researchers and institutions. The content of this article does not necessarily reflect the views of these organizations.

The research paper, "Robust global ocean cooling trend for the pre-industrial Common Era," Helen McGregor, Michael Evans, et al., was published August 17, 2015 in the journal Nature Geoscience.

Supplemental information about the study, including FAQs, data, figures, and photos are available on the PAGES website: http://www.pages-igbp.org/ini/wg/ocean2k/faq-pre

http://www.eurekalert.org/pub_releases/2015-08/acs-nmc071615.php

New method could detect blood clots anywhere in the body with a single scan

Method may someday allow health care providers to quickly scan the entire body for a blood clot

BOSTON - A blood clot is a dangerous health situation with the potential to trigger heart attacks, strokes and other medical emergencies. To treat a blood clot, doctors need to find its exact location. But current clinical techniques can only look at one part of the body at a time, slowing treatment and increasing the risk for complications. Now, researchers are reporting a method, tested in rats, that may someday allow health care providers to quickly scan the entire body for a blood clot.

The team will describe their approach in one of more than 9,000 presentations at the 250th National Meeting & Exposition of the American Chemical Society (ACS), the world's largest scientific society, taking place here through Thursday.

If a person suffers a stroke that stems from a blood clot, their risk for a second stroke skyrockets, says Peter Caravan, Ph.D. The initial blood clot can break apart and cause more strokes if it is not quickly found and treated. Depending on where the blood clot is located, the treatment varies -- some of them respond well to drugs, while others are better addressed with surgery.

To locate a blood clot, a physician may need to use three different methods: ultrasound to check the carotid arteries or legs, magnetic resonance imaging (MRI) to scan the heart and computed tomography to view the lungs. "It's a shot in the dark," Caravan says. "Patients could end up being scanned multiple times by multiple techniques in order to locate a clot. We sought a method that could detect blood clots anywhere in the body with a single whole-body scan."

In previous work, Caravan's team at the Martinos Center for Biomedical Imaging at Massachusetts General Hospital identified a peptide that binds specifically to fibrin -- an insoluble protein fiber found in blood clots. In the current study, they developed a blood clot probe by attaching a radionuclide to the peptide. Radionuclides can be detected anywhere in the body by an imaging method called positron emission tomography (PET). The researchers used different radionuclides and peptides, as well as different chemical groups for linking the radionuclide to the peptide, to identify which combination would provide the brightest PET signal in blood clots. They ultimately constructed and tested 15 candidate blood clot probes.

The researchers first analyzed how well each probe bound to fibrin in a test tube, and then they studied how well the probe detected blood clots in rats. "The probes all had a similar affinity to fibrin in vitro, but, in rats, their performances were quite different," says Caravan. He attributed these differences to metabolism. Some probes were broken down quickly in the body and could no longer bind to blood clots, but others were resistant to metabolism. "The best probe was the one that was the most stable," he says. The team is moving forward into the next phase of research with this best-performing probe, called FBP8, which stands for "fibrin binding probe #8." It contained copper-64 as the radionuclide.

"Of course, the big question is, 'How well will these perform in patients?'" he says. Caravan explains that the group is hoping to start testing the probe in human patients in the fall, but it could take an additional five years of research before the probe is approved for routine use in a clinical setting.

Caravan acknowledges funding from the National Heart, Lung, and Blood Institute; HL109448.

Development of a fibrin-targeted radiopharmaceutical: effect of chelate type, linker, and radiometal on in vivo efficacy

Abstract

Thrombosis is often the underlying cause of major cardiovascular diseases including heart attack, stroke, and venous thromboembolism, which are leading causes of morbidity and mortality. Thrombus imaging would benefit from a whole-body approach instead of multiple examinations (current approach), especially for those cardiovascular events (e.g., thromboembolism) where the identification of both culprit embolus and source thrombus is required. We have been developing a fibrin-specific probe for thrombus detection by derivatizing a short, cyclic peptide that has high affinity and specificity for fibrin. We took an agnostic approach and compared different radionuclides (Cu-64, Ga-68, F-18, In-111, Tc-99m), different chelators, and different linkers. We characterized the affinity of the cold compound to fibrin and measured thrombus uptake, pharmacokinetics, biodistribution, and metabolism in a common rat model of arterial thrombosis. While all probes had similar affinity for fibrin, the in vivo studies showed a wide range of efficacy and these differences could be traced to differences in metabolic stability, either peptide metabolism or dechelation of the radiometal. There was no correlation of in vivo efficacy with in vitro measures of thermodynamic stability or kinetic inertness. Here we describe these structure-activity studies which led us to identify one specific probe for clinical translation.

http://www.eurekalert.org/pub_releases/2015-08/ehs-pic081715.php

Peripherally inserted central catheters can cause blood clots in lower limbs

According to new study in The American Journal of Medicine

Philadelphia, PA - Peripherally inserted central catheters (PICCs), a type of IV typically inserted in a vein in the arm, are frequently used by healthcare professionals to obtain long-term central venous access in hospitalized patients. While there are numerous benefits associated with PICCs, a potential complication is deep vein thrombosis (DVT), or blood clots, in upper limbs. A new study of more than 70,000 patients in 48 Michigan hospitals indicates that PICC use is associated not only with upper-extremity DVT, but also with lower-extremity DVT. The results are published in The American Journal of Medicine.

"Prior studies had not assessed whether PICCs are independently associated with an increase in the risk of subsequent lower extremity DVT," explained lead investigator Vineet Chopra, MD, MSc, Assistant Professor of Medicine, University of Michigan School of Medicine, and The Michigan Hospital Medicine Safety Consortium. "Our study confirmed that PICCs are strongly associated with DVT in upper limbs. However, what is novel and noteworthy in this study is that the presence of a PICC was also associated with an increased risk of lower-extremity DVT."

Researchers used data from 76,242 hospitalized patients from 48 Michigan hospitals to review PICC placement, existing medical conditions, venous thrombosis risk factors, and thrombotic events within 90 days of hospital admission. A total of 3790 patients received a PICC during hospitalization.

Analysis revealed 876 thromboembolic events, including 208 upper-extremity DVTs, 372 lower-extremity DVTs and 296 pulmonary emboli. After adjusting for other risk factors, researchers found that PICC use was independently associated with a three-fold higher risk for any type of thromboembolic event compared to patients who had not received a PICC. Specifically for upper-extremity DVT, the risk was more than 10 times higher, while for lower-extremity DVT, the risk was nearly 50% higher. There was no increased risk of pulmonary embolism from PICC use.

The investigators also found that infusion of drugs to prevent venous thromboembolism did not reduce the risk of subsequent DVT. "Taken together, these findings suggest that the thrombotic burden associated with peripherally inserted central catheters may not be restricted to the extremity where the device resides or easily attenuated after insertion," commented Dr. Chopra.

PICCs are not appropriate for every patient. Dr. Chopra and his co-investigators advise that, "Careful weighing of the risks and benefits of PICC use and consideration of alternative devices in patients at high risk of deep vein thrombosis seem essential. Of note, our data suggest that clinicians should not focus only on the extremity where a peripherally inserted central catheter resides, but the composite risk of venous thromboembolism among patients who receive a peripherally inserted central catheter."

Short-term central venous catheters are placed in a patient's neck or chest, while PICCs, are placed into a vein in the arm and threaded to the central vein, enabling them to be used for diverse tasks including the easy administration of drugs like antibiotics or chemotherapy, as well as hemodynamic monitoring.

http://www.bbc.com/news/health-33932930

Diabetes cases soar by 60% in past decade

The number of people living with diabetes has soared by nearly 60% in the past decade, Diabetes UK warns.

By James Gallagher Health editor, BBC News website

The charity said more than 3.3 million people have some form of the condition, up from 2.1 million in 2005. The inability to control the level of sugar in the blood can lead to blindness and amputations and is a massive drain on NHS resources.

The NHS said it was time to tackle poor lifestyle, which is a major factor behind the rise. Diabetes UK called for the NHS to improve care for patients and for

greater efforts to prevent diabetes. Roughly 90% of cases are type 2 diabetes, which is the form closely linked to diet and obesity.

People with type 1 generally develop it in childhood and are unable to produce the hormone insulin to control their blood sugar levels.

New diagnosis

Dr Joan St John, a GP in Brent in north-west London, where diabetes levels are some of the highest in the country, said the condition had become incredibly widespread. She told the BBC News website: "It's very noticeable in that not a week goes by that you don't make a new diagnosis of diabetes, at least one if not two or three; previously that might have been one a month."

The complications of uncontrolled blood sugar levels can be severe, including nerve damage, loss of vision and organ damage.

The condition even leads to 135 foot amputations every week across the country.

Dr St John added: "Unfortunately that historical myth that it is not a serious condition is still retained by some people and you have to dispel that myth."

"One of the most miserable complications is neuropathy [nerve damage] which can cause a constant nagging, gnawing ache, usually in the legs or feet, and this can be really disturbing and there is no cure for it," she added.

Data published last week showed that diabetes medication now accounts for 10% of the NHS drugs bill.

Nearly £869m was spent on drugs, including insulin and metformin, marking a sharp rise from the £514m being spent a decade ago, when the drugs accounted for just 6.6% of the prescriptions budget.

Part of GP pay is linked to diagnosing and treating diabetes - and has been for years. The government says this is to improve care.

The reasons why levels of type 1 diabetes are increasing are not understood.

However, the explanation for the soaring cases of type 2 are being placed squarely on the nation's ballooning waistline.

Barbara Young, the chief executive of Diabetes UK, said the government needed to act to prevent new cases and improve treatment for those already affected.

She said: "Diabetes already costs the NHS nearly £10bn a year, and 80% of this is spent on managing avoidable complications."

"So there is huge potential to save money and reduce pressure on NHS hospitals and services through providing better care to prevent people with diabetes from developing devastating and costly complications," she added.

Dr Martin McShane, NHS England's Director for Long Term Conditions, said: "These figures are a stark warning and reveal the increasing cost of diabetes.

"We've said it before and we'll say it again, it's time to get serious about lifestyle change."

http://bit.ly/1LoFMqD

This Sweet-Smelling Herb Can Ward Away Mosquitoes

Traditionally used by some Native American peoples, sweetgrass contains chemicals known to repel pesky bugs

By Brian Handwerk

If you hate the pungent odor of most mosquito repellents, there might be a very sweet-smelling alternative. Researchers have identified two mosquito-repelling chemicals naturally found in sweetgrass, an aromatic herb that some Native American peoples have traditionally used to ward off the pesky insects.

In one test, distilled sweetgrass oil even matched the repellent potency of DEET, the current gold standard for anti-mosquito effectiveness.

Stopping mosquito bites is about more than enjoying a barbecue in peace. It's a serious human health issue—as vectors for diseases such as malaria and yellow fever, mosquitoes kill more humans than murderers do. There are some unusual ideas for how to ward off the pests, including silencing the bacteria on your skin, but most people are still in search of a safe and effective topical repellent they can use when needed.

Sweetgrass (Hierochloe odorata) is the latest in a line of traditional, natural repellents to be examined by chemist Charles Cantrell and his colleagues at the USDA's Natural Products Utilization Research Unit at the University of Mississippi.

“We're always looking for new leads for discovering new biopesticides,” says Cantrell. “Traditional or folk remedies have been a good source of leads for natural things that may be effective in repelling insects. We've looked at beautyberry, we've looked at breadfruit from the Hawaiian Islands, which is one that you burn, and we've looked at Jatropha from India, which is another one you burn. They've all kind of led us in different directions chemically, and sweetgrass has another different chemistry.”

Despite concerns about its toxicity to humans and potential environmental damage, DEET remains the gold standard for repelling mosquitoes, ticks, fleas and other pests. The main reason, Cantrell says, is that it not only works, but it also lasts for a long time.

“You see that the market is being flooded with natural products, essential oil-based insect repellents,” he says. “There are some that work, but there are a lot of them that may only work for 20 or 30 minutes. What we're ideally looking for is something natural and nontoxic that's just as effective as DEET, that will work as an effective repellent for 10 or 12 hours like DEET.”So far, finding a natural product with the same staying power has been challenging, which is why Cantrell's lab has been exploring so many different plants.

Sweetgrass had many ceremonial uses among Native Americans. Some people wore braids of it around their necks or adorned their homes with the aromatic plant to help repel mosquitoes. Because of these uses, Cantrell theorized that the plant's sweet smell must include bug-repellent chemicals that waft off the plant in nature.

His team extracted sweetgrass's essential oils via steam distillation and then put it to the test. They presented mosquitoes with vials containing a feeding agent much like human blood. Each vial was covered with a thin membrane that was then treated with a variety of repellents, including the sweetgrass oil and, for comparison, DEET.

The scientists watched the mosquitoes' biting behavior and even satisfyingly smashed the insects on paper to see which false bloods they had ingested. Sweetgrass oil performed very well—matching the repellency of DEET, the team reported this week at the 250th American Chemical Society National Meeting & Exposition in Boston.

The team then broke down sweetgrass oil into its chemical components using nuclear magnetic resonance spectroscopy and mass spectrometry to reveal two chemicals that appeared to be responsible for the plant's repellent powers—coumarin and phytol.

Scientific literature on essential oils had previously suggested that phytol can play a repellent role. And coumarin has actually been commonly used as an insect repellent for many years—though it's never been marketed as one.

“You may remember that for a long time there was a buzz surrounding Avon's Skin-So-Soft, which many people are convinced had repellent properties,” Cantrell says. “Avon never made any such claims because Skin-So-Soft wasn't registered as a repellent, it was formulated for skin care. But the general consensus of people who looked at the product was that coumarin was acting as a repellent."

Avon now makes skin produces that are branded as repellents, but those don't contain coumarin, because the chemical is not registered as a repellent with the EPA.

It's still unclear whether coumarin will prove to have the same long-lasting effectiveness as DEET, so Cantrell plans to subject sweetgrass oils to further study. He's quick to note, too, that showing there is sound science behind the herb's bug-busting properties doesn't mean that all traditional repellents will have merit. “When you look at these traditional remedies, those people certainly didn't bat 1,000,” Cantrell notes. “But we have had good luck with some of them, and they've really been fun projects.”

http://nyti.ms/1JbXq95

The Multicolor Signals of Mucus

Q. When children are sick, why does their nasal discharge turn green?

By C. CLAIBORNE RAY

A. The presence of immune cells that fight infections, as well as disease-causing germs themselves, alter mucus color as an illness like a cold progresses in both children or adults. Clear mucus may be a response to an infection, but green mucus is not necessarily a green light for taking an antibiotic.

“When germs that cause colds first infect the nose and sinuses, the nose makes clear mucus,” says a fact sheet published by the Centers for Disease Control and Prevention. “This helps wash the germs from the nose and sinuses.”

After two or three days, the body’s immune cells fight back, changing the mucus to white or yellow. “As the bacteria that live in the nose grow back, they may also be found in the mucus, which changes the mucus to a greenish color,” the C.D.C. says.

The green discharge is normal, and contrary to what many people believe, it does not mean that the sufferer needs an antibiotic. An antibiotic is ineffective against a virus, and there is also a risk of producing antibiotic resistance in other disease-causing organisms.

The type of infection cannot be determined by looking at mucus color. Instead, a sputum analysis should be done.

Other factors to be considered in deciding on treatment include the quantity, viscosity and odor of the mucus. Sometimes a microbial culture is necessary to identify the infecting organism. question@nytimes.com

http://bit.ly/1NBJv6K

Warmest ever superconductor works at Antarctic temperatures

Warmest ever superconductor works at Antarctic temperatures

Superconductors have just reached a new high. A material has been shown to transmit electricity with no resistance at the highest temperatures ever: the chilly conditions you might experience in Antarctica.

Mikhail Eremets at the Max Planck Institute for Chemistry in Mainz, Germany and his colleagues used a diamond anvil to squeeze a tiny quantity of hydrogen sulphide to almost 1.6 million times atmospheric pressure.

Although hydrogen sulphide is most familiar as a toxic colourless gas with a smell of rotten eggs, when it is chilled and held at high pressure it transforms into a metal. The researchers found that under the pressure from their diamond anvil it transformed into a material that superconducted at temperatures as high as -70 °C, breaking the previous record of around -110 °C.

They're not sure why it works, but it could have to do with the material's hydrogen ions, which help electrons form so-called Cooper pairs – a configuration that lets current travel more swiftly.

Efficiency in pairs

Electrons traveling through a metal constantly ricochet off ions, losing energy with each bounce. However, in the process they slightly shift the position of positive ions in the metal, generating small clouds of positive charge. These positive clouds can pull electrons together, and result in the formation of Cooper pairs, which are much less likely to bump into metal ions and lose energy. Because of this, the electron pairs conduct a charge far more efficiently than single electrons.

However, the forces holding together these Cooper pairs are weak – any thermal energy in the system would break them apart, which is why superconductors typically work only at very low temperatures.

What's different about the new superconductor is that its positive ions include light hydrogen, which is more easily shifted by the electrons. This means the positive clouds are denser, and the electrons form stronger Cooper pairs that are less easily broken by heat.

Eremets hopes the new record will be beaten. There are still a lot of materials to try which could have even higher thresholds, he says. Finding room-temperature superconductors would spell a revolution in electronics – they could sustain a current indefinitely, without having to top up the power. "Theoretically they are not forbidden," says Eremets.

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http://nyti.ms/1MExxIN

Scientists Find Evidence of Prehistoric Massacre in Europe

Rare evidence of a 7,000-year-old massacre in Europe found in a mass grave

By THE ASSOCIATED PRESS AUG. 17, 2015, 3:05 P.M. E.D.T.

BERLIN — Scientists say they have found rare evidence of a prehistoric massacre in Europe after discovering a 7,000-year-old mass grave with skeletal remains from some of the continent's first farmers bearing terrible wounds.

Archaeologists who painstakingly examined the bones of some 26 men, women and children buried in the Stone Age grave site at Schoeneck-Kilianstaedten, near Frankfurt, say they found blunt force marks to the head, arrow wounds and deliberate efforts to smash at least half of the victims' shins — either to stop them from running away or as a grim message to survivors.

"It was either torture or mutilation. We can't say for sure whether the victims were still alive," said Christian Meyer, one of the authors of the study published Monday in the journal Proceedings of the National Academy of Sciences.

Meyer said the findings from Schoeneck-Kilianstaedten bolster theories put forward after the earlier discovery of two other grave sites in Germany and Austria. At all three sites, the victims and the perpetrators appeared to have been from the Linearbandkeramik — or LBK — culture, a farming people who arrived in central Europe about 5,500 B.C. Their name derives from the German phrase for "linear band ceramics," a reference to the style of their pottery.

Intriguingly, the sites have all been dated toward the end of the LBK's 600-year presence, suggesting that members of this culture — which is thought to have developed in what is now Hungary and spread along the Danube River — may have turned on each other.

"It's about finding patterns. One mass grave was spectacular, but it was just a single grave. But when several such sites are found from the same period, then a pattern emerges," said Meyer. In their article, the authors suggested that "the new evidence ... in conjunction with previous results, indicates that massacres of entire communities were not isolated occurrences but rather were frequent features of the last phases of the LBK."

Chris Scarre, an archaeologist at the University of Durham, England, who wasn't involved in the study, said its conclusions seemed well supported by the evidence.

"What is particularly interesting is the level of violence. Not just the suppression of a rival community — if that is what it was — but the egregious and systematic breaking of the lower legs," said Scarre. "It suggests the use of terror tactics as part of this inter-community violence."

Meyer, an anthropologist at the University of Mainz, Germany, said nobody can say for sure what prompted the killings so long after the fact. But it's possible to put forward theories, based on what's known about the LBK culture and the conditions they faced. For example, the end of LBK culture coincided with a period of climate change.

"The LBK population had expanded considerably, and this increases the potential for conflict," said Meyer. "Also, the LBK were farmers, they settled. So unlike hunter gatherers, who could move away to avoid conflict, these people couldn't just escape. Add to this the fact that there may have been a period of drought that constrained resources, causing conflicts to erupt."

Meyer said the theory of conflict between different groups within the LBK is supported by the existence of an apparent ancient border near the Schoeneck-Kilianstaedten site. Archaeologists have found that flint was traded on either side of the divide but not necessarily across it — suggesting the two groups did not see each other as kin, he said.

The attackers, however, spared some members of the group, with victims skewed toward young children, adult men and older women. "It's likely that the young

women, who are missing in the grave, were kidnapped by the attackers," said Meyer.

http://www.eurekalert.org/pub_releases/2015-08/uol-aro081315.php

Aspirin reverses obesity cancer risk

Research has shown that a regular dose of aspirin reduces the long-term risk of cancer in those who are overweight in an international study of people with a family history of the disease.

The study, conducted by researchers at Newcastle University and the University of Leeds, UK, is published today in the Journal of Clinical Oncology.

They found that being overweight more than doubles the risk of bowel cancer in people with Lynch Syndrome, an inherited genetic disorder which affects genes responsible for detecting and repairing damage in the DNA. Around half of these people develop cancer, mainly in the bowel and womb.

However, over the course of a ten year study they found this risk could be counteracted by taking a regular dose of aspirin.

Professor Sir John Burn, professor of Clinical Genetics at Newcastle University who led the international research collaboration, said: "This is important for people with Lynch Syndrome but affects the rest of us too. Lots of people struggle with their weight and this suggests the extra cancer risk can be cancelled by taking an aspirin.

"This research adds to the growing body of evidence which links an increased inflammatory process to an increased risk of cancer. Obesity increases the inflammatory response. One explanation for our findings is that the aspirin may be supressing that inflammation which opens up new avenues of research into the cause of cancer."

The randomised controlled trial is part of the CAPP 2 study involving scientists and clinicians from over 43 centres in 16 countries which followed nearly 1,000 patients with Lynch Syndrome, in some cases for over 10 years.

937 people began either taking two aspirins (600 mg) every day for two years or a placebo. When they were followed up ten years later, 55 had developed bowel cancers and those who were obese were more than twice as likely to develop this cancer - in fact 2.75 times as likely. Following up on patients who were taking two aspirins a day revealed that their risk was the same whether they were obese or not.

The trial was overseen by Newcastle Hospitals NHS Foundation Trust and funded by the UK Medical Research Council, Cancer Research UK, the European Union and Bayer Pharma.

Professor John Mathers, Professor of Human Nutrition at Newcastle University who led this part of the study said: "For those with Lynch Syndrome, we found that every unit of BMI above what is considered healthy increased the risk of bowel cancer by 7%. What is surprising is that even in people with a genetic predisposition for cancer, obesity is also a driver of the disease. Indeed, the obesity-associated risk was twice as great for people with Lynch Syndrome as for the general population.

"The lesson for all of us is that everyone should try to maintain a healthy weight and for those already obese the best thing is to lose weight. However, for many patients this can be very difficult so a simple aspirin may be able to help this group."

Professor Tim Bishop from the University of Leeds who led on the statistics for the study added: "Our study suggests that the daily aspirin dose of 600 mg per day removed the majority of the increased risk associated with higher BMI. However, this needs to be shown in a further study to confirm the extent of the protective power of the aspirin with respect to BMI".

However, Professor Burn advises: "Before anyone begins to take aspirin on a regular basis they should consult their doctor as aspirin is known to bring with it a risk of stomach complaints including ulcers.

"But if there is a strong family history of cancer then people may want to weigh up the cost-benefits particularly as these days drugs which block acid production in the stomach are available over the counter."

The international team are now preparing a large-scale follow-up trial and want to recruit 3,000 people across the world to test the effect of different doses of aspirin. The trial will compare two aspirin a day with a range of lower doses to see if the protection offered is the same.

Information on the next trial can be found at http://www.capp3.org

Mechanism

The researchers believe the study shows that aspirin is affecting an underlying mechanism which pre-disposes someone to cancer and further study is needed in this area. Since the benefits are occurring before the very early stages of developing a tumour - known as the adenoma carcinoma sequence - the effect must be changing the cells which are predisposed to become cancerous in later years.

One possibility is that a little recognised effect of aspirin is to enhance programmed cell death. This is most obvious in plants where salicylates trigger this mechanism to help diseased plants contain the spread of infection.

"We may be seeing a mechanism in humans whereby aspirin is encouraging genetically damaged stem cells to undergo programmed cell death, this would have an impact on cancer," says Sir John.

Obesity, Aspirin, and Risk of Colorectal Cancer in Carriers of Hereditary Colorectal Cancer: A Prospective Investigation in the CAPP2 Study

Mohammad Movahedi, D. Timothy Bishop, Finlay Macrae, Jukka-Pekka Mecklin, Gabriela Moeslein,Sylviane Olschwang, Diana Eccles, D. Gareth Evans, Eamonn R. Maher, Lucio Bertario, Marie-Luise Bisgaard,Malcolm G. Dunlop, Judy W.C. Ho, Shirley V. Hodgson, Annika Lindblom, Jan Lubinski, Patrick J. Morrison,Victoria Murday, Raj S. Ramesar, Lucy Side, Rodney J. Scott, Huw J.W. Thomas, Hans F. Vasen, John Burn,and John C Mathers. Journal of Clinical Oncology. Doi: 10.1200/JCO.2014.58.9952

http://bit.ly/1I243xY

Drinking coffee daily may improve survival in colon cancer patients

New research adds cancer recurrence to list of health benefits of getting your daily cup of joe

BOSTON - Regular consumption of caffeinated coffee may help prevent the return of colon cancer after treatment and improve the chances of a cure, according to a new, large study from Dana-Farber Cancer Institute that reported this striking association for the first time.

The patients, all of them treated with surgery and chemotherapy for stage III colon cancer, had the greatest benefit from consuming four or more cups of coffee a day (about 460 milligrams of caffeine), according to the study published in the Journal of Clinical Oncology. These patients were 42 percent less likely to have their cancer return than non-coffee drinkers, and were 33 percent less likely to die from cancer or any other cause.

Two to three cups of coffee daily had a more modest benefit, while little protection was associated with one cup or less, reported the researchers, led by Charles Fuchs, MD, MPH, director of the Gastrointestinal Cancer Center at Dana-Farber. First author is Brendan J. Guercio, MD, also of Dana-Farber.

The study included nearly 1,000 patients who filled out dietary pattern questionnaires early in the study, during chemotherapy and again about a year later. This "prospective" design eliminated patients' need to recall their coffee-drinking habits years later - a source of potential bias in many observational studies.

"We found that coffee drinkers had a lower risk of the cancer coming back and a significantly greater survival and chance of a cure," Fuchs said. Most recurrences happen within five years of treatment and are uncommon after that, he noted. In patients with stage III disease, the cancer has been found in the lymph nodes near the original tumor but there are no signs of further metastasis. Fuchs said these patients have about a 35 percent chance of recurrence.

As encouraging as the results appear to be, Fuchs is hesitant to make recommendations to patients until the results are confirmed in other studies. "If you are a coffee drinker and are being treated for colon cancer, don't stop," he said. "But if you're not a coffee drinker and wondering whether to start, you should first discuss it with your physician."

Fuchs said the study is the first to study an association between caffeinated coffee and risk of colon cancer recurrence. It adds to a number of recent studies suggesting that coffee may have protective effects against the development of several kinds of cancer, including reduced risks of postmenopausal breast cancer, melanoma, liver cancer, advanced prostate cancer.

Fuchs said the research focused on coffee and other dietary factors because coffee drinking - in addition to possibly being protective against some cancers - had been shown to reduce the risk of type 2 diabetes. Risk factors for diabetes - obesity, a sedentary life style, a Western diet high in calories and sugar, and high levels of insulin - are also implicated in colon cancer.

In analyzing the results of the new study, Fuchs and his colleagues discovered that the lowered risk of cancer recurrence and deaths was entirely due to caffeine and not other components of coffee. He said it's not clear why caffeine has this effect and the question needs further study. One hypothesis is that caffeine consumption increases the body's sensitivity to insulin so less of it is needed, which in turn may help reduce inflammation - a risk factor for diabetes and cancer, Fuchs said.

Other than drinking coffee, Fuchs said, people can take other measures to reduce cancer risks - avoiding obesity, exercising regularly, adopting a healthier diet, and eating nuts, which also reduce the risk of diabetes.

Jeffrey Meyerhardt, MD, MPH, clinical director of the Gastrointestinal Cancer Center at Dana-Farber, is co-senior author of the study.

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