http://www.eurekalert.org/pub_releases/2016-08/w-hvf080116.php

HPV vaccine found safe in girls and women with autoimmune diseases

Incidence of new-onset autoimmune disease in girls and women with pre-existing autoimmune disease after quadrivalent human papillomavirus vaccination: a cohort study

In a recent study of girls and women diagnosed with at least one autoimmune disease, vaccination against human papillomavirus (HPV) did not increase the risk of developing another autoimmune disease. In fact, being vaccinated was associated with a slightly reduced risk compared with not being vaccinated.

The study included all 70,265 girls and women between 10 and 30 years of age in Sweden in 2006 to 2010 diagnosed with an autoimmune disease.

Dr. Lisen Arnheim-Dahlstrom, senior author of the Journal of Internal Medicine study, noted that individuals with autoimmune disease are vulnerable to vaccine-preventable diseases.

Incidence of new-onset autoimmune disease in girls and women with pre-existing autoimmune disease after quadrivalent human papillomavirus vaccination: a cohort study

Abstract

Objective

To assess whether quadrivalent human papillomavirus (qHPV) vaccination is associated with increased incidence of new-onset autoimmune disease in girls and women with pre-existing autoimmune disease.

Methods

*This register-based open cohort study included all girls and women between 10 and 30 years of age in Sweden in 2006–2012 diagnosed with at least one of 49 prespecified autoimmune diseases (*n *= 70 265). Incidence rate ratios were estimated for new-onset autoimmune disease within 180 days of qHPV vaccination using Poisson regression adjusting for, country of birth, parental country of birth, parental income and parental education.*

Results

A total of 70 265 girls and women had at least one of the 49 predefined autoimmune diseases; 16% of these individuals received at least one dose of qHPV vaccine. In unvaccinated girls and women, 5428 new-onset autoimmune diseases were observed during 245 807 person-years at a rate of 22.1 (95% CI 21.5–22.7) new events per 1000 person-years. In vaccinated girls and women, there were 124 new events during 7848 person-years at a rate of 15.8 (95% CI 13.2–18.8) per 1000 person-years. There was no increase in the incidence of new-onset autoimmune disease associated with qHPV vaccination during the risk period; on the contrary, we found a slightly reduced risk (incidence rate ratio 0.77, 95% CI 0.65–0.93).

Conclusion

In this nationwide study, qHPV vaccination was not associated with increased incidence of new-onset autoimmune disease in girls and women with pre-existing autoimmune disease.

http://onlinelibrary.wiley.com/doi/10.1111/joim.12535/abstract;jsessionid=F45014C9721E7495CBF3FE2415318F31.f02t03

http://www.eurekalert.org/pub_releases/2016-08/uovh-hwt073116.php

Here's why the epidemic strain of C. difficile is so deadly -- and a way to stop it

UVA finds answers about infection CDC has labeled 'urgent threat'

A new, epidemic strain of C. difficile is proving alarmingly deadly, and new research from the University of Virginia School of Medicine not only explains why but also suggests a way to stop it.

Until now, scientists have not understood what made this strain worse than other strains of the bacteria, the most common cause of hospital-acquired infections. The new strain kills up to 15 percent of infected patients, including those who receive antibiotics, and has become increasingly common over the last 15 years. This has prompted the federal Centers for Disease Control and Prevention to label it an "urgent threat."

A Potent Toxin

The finding comes from the lab of Bill Petri, MD, PhD, chief of UVA's Division of Infectious Diseases and International Health, and a team of international collaborators. PhD student Carrie A. Cowardin was working in Petri's lab when she discovered the diabolical mechanisms this strain of C. diff uses to overcome the body's natural defenses.

The strain is so deadly because it produces a toxin that kills protective cells, called eosinophils, found in the gut, Cowardin found. By destroying the gut's natural barrier, the bacteria can spread inflammation throughout the body. "We think that this toxin makes disease more severe by killing beneficial eosinophils, which seem to play an important role in promoting a healthy immune response during C. difficile infection. When the eosinophils were depleted with an antibody or by the toxin, we saw dramatically increased inflammation. Restoring eosinophils by transferring them from a mouse that cannot recognize the toxin prevented the damage inflicted by the epidemic strain," said Cowardin, now a postdoctoral fellow at Washington University in St. Louis. "This builds on previous work in our lab showing that eosinophils are beneficial and suggests that one reason this strain causes such severe disease is due to its ability to kill these cells."

Further, Cowardin discovered exactly how the toxin works, and how well it functions in this role. The toxin, she determined, requires a particular human

protein that recognizes bacteria, a protein that plays a key role in the immune response. In short, C. diff is subverting the body's natural defenses to overcome those defenses.

This understanding of the toxin's action could be of great importance, as blocking it can rescue the protective cells in the gut. And that approach could lead to a new treatment to stop this deadly strain of C. diff in its tracks.

"Nearly every day that I care for patients I am faced with this potentially deadly infection," Petri said. "Carrie Cowardin's discovery of why this strain of C. diff is so dangerous, and most importantly how to combat it, is a huge and most needed advance."

Findings Published

The findings have been published online by the scientific journal Nature Microbiology. The article was written by Cowardin, Erica L. Buonomo, Mahmoud M. Saleh, Madeline G. Wilson, Stacey L. Burgess, Sarah A. Kuehne, Carsten Schwan, Anna M. Eichhoff, Friedrich Koch-Nolte, Dena Lyras, Klaus Aktories, Nigel P. Minton and Petri.

The research was funded by the National Institutes of Health, grants No. R01AI124214, R01AI026649 and R21AI114734.

http://bit.ly/2an48Il

Troubled Japanese Space Agency Seeks Fresh Start

Push to resurrect instrument lost during satellite failure highlights JAXA's resilience

By Alexandra Witze, Nature magazine on August 1, 2016

The Japan Aerospace Exploration Agency (JAXA) is on a quest for redemption. In March, a software error caused the agency's Hitomi X-ray astronomy satellite to break up in space, cutting short a planned three-year mission after only one month.

Now JAXA is considering whether to rebuild and relaunch a copy of the spacecraft's key instrument—a US-built X-ray spectrometer—with help from NASA. On August 5, representatives of the two space agencies will meet to discuss the possibility of resurrecting the instrument that was the heart of Hitomi's science. But whether JAXA can regain the confidence of the Japanese nation, and of its international partners, remains to be seen.

Space experts note that JAXA has pulled off stunning recoveries before. It coaxed its crippled Hayabusa spacecraft to bring back dust from an asteroid, and nudged its Akatsuki probe into orbit around Venus 5 years after an engine failure seemed to render the spacecraft useless.

"It's important to note how resourceful JAXA has been at recovering from failures that typically would be catastrophic," says Ralph Lorenz, a planetary scientist at the Johns Hopkins University Applied Physics Laboratory in Laurel, Maryland, and co-author of the book Space System Failures (Praxis, 2005).

Hitomi broke apart because an erroneous software command prompted the spacecraft to spin faster and faster, until its solar panels flew off into space. A JAXA investigation blamed faulty project-management techniques for not catching the error.

The failure has reverberated at every level of JAXA's Institute of Space and Astronautical Science (ISAS) in Sagamihara, which managed Hitomi. JAXA president Naoki Okumura was one of three leading officials who took a 10% pay cut for four months "to express our regret and caution ourselves", he said in a June press conference. He has also ordered a systems review of the institute's next big project: a mission to study Earth's radiation belts that is slated to launch in the coming months.

Before Hitomi, JAXA's lowest point was perhaps the loss of its Nozomi mission to Mars, which sailed past the red planet in 2003 without entering orbit as it was supposed to. The same year, a new JAXA rocket design failed during a test launch, prompting a review of all agency projects.

Try, try again

Some have questioned whether JAXA is trying to do too much with too little. It often assigns one person to cover a number of tasks that NASA would spread among multiple project engineers, says Lorenz, who collaborates on the Akatsuki Venus probe.

Okumura has acknowledged as much, saying that ISAS will generally develop a mission using a small in-house team, along with the spacecraft manufacturer. By contrast, Hitomi involved a larger number of complex systems. There were simply not enough safeguards built into the process to catch the software error. "The previously conventional ISAS methods were not necessarily suited for the production of modern satellites and spacecraft," Okumura said.

JAXA has released an extraordinary level of technical detail about the failure. Agency officials have said that because Hitomi was meant as a community mission to serve X-ray astronomers across the globe, they feel obligated to explain what happened so that nobody makes the same mistake.

Because of this determination and openness, "I think Hitomi's successor is in safe hands with JAXA," says Elizabeth Tasker, an astrophysicist at Hokkaido University in Sapporo, Japan.

But such projects may be a hard sell to politicians. "High-profile setbacks like Nozomi and Hitomi make it difficult for JAXA to justify big-ticket science missions in today's political atmosphere," says Saadia Pekkanen, an expert in Japanese space policy at the University of Washington in Seattle.

JAXA has not yet decided whether a Hitomi successor would fly or which instruments it would carry, says ISAS spokeswoman Chisato Ikuta. But Hitomi's

premier scientific instrument was the spectrometer provided by NASA; data that it collected before the spacecraft died revealed secrets about gas flows in the Perseus galaxy cluster.

The spectrometer seems to be thrice cursed; two earlier versions on different satellites were lost to a launch failure and a coolant leakage. Even so, a NASA advisory group reported on July 5that launching a copy of the instrument no later than 2023 “would fulfill the immense scientific promise of the Hitomi” spectrometer. The cost to rebuild would be roughly US$70 million to $90 million.

Paul Hertz, NASA’s astrophysics director, will meet with JAXA representatives to discuss the options. “Certainly we would not be overseeing JAXA,” he told a NASA advisory committee on July 20. “We can discuss practices that NASA implements to prevent us from making avoidable mistakes.”

Other international missions in the works from JAXA include a magnetospheric orbiter, which is scheduled to launch next year on the European Space Agency’s BepiColumbo mission to Mercury.

“The Olympics of engineering is when things go wrong,” says Lorenz. “Maybe the best time to fly is right after a failure.”

http://www.bbc.com/news/health-36940755

'Hacking nerves can control disease'

Controlling human nerve cells with electricity could treat a range of diseases including arthritis, asthma and diabetes, a new company says.

By James Gallagher Health and science reporter, BBC News website

Galvani Bioelectronics hopes to bring a new treatment based on the technique before regulators within seven years. GlaxoSmithKline and Verily, formerly Google, Life Sciences, are behind it.

Animal experiments have attached tiny silicone cuffs, containing electrodes, around a nerve and then used a power supply to control the nerve's messages.

One set of tests suggested the approach could help treat type-2 diabetes, in which the body ignores the hormone insulin. They focused on a cluster of chemical sensors near the main artery in the neck that check levels of sugar and the hormone insulin. The sensors send their findings back to the brain, via a nerve, so the organ can coordinate the body's response to sugar in the bloodstream.

GSK vice-president of bioelectronics Kris Famm/ told the BBC News website: "The neural signatures in the nerve increase in type 2-diabetes. "By blocking those neural signals in diabetic rats, you see the sensitivity of the body to insulin is restored."

And early work suggested it could work in other diseases too. "It isn't just a one-trick-pony, it is something that if we get it right could have a new class of therapies on our hands," Mr Famm said.

But he said the field was only "scratching the surface" when it came to understanding which nerve signals have what effect in the body. Both the volume and rhythm of the nerve signals could be having an effect rather than it being a simple case of turning the nerve on or off. And even if the approach works theoretically, a huge amount of effort will be needed to make the technology practical.

The kits to hack the nerves will need to be miniaturised, customisable to different patients' nerves, durable enough to survive in the body long-term and have sufficient battery power.

Dr Famm added: "In 10 to 20 years I think there will be a set of these miniaturised precision therapies that will be available for you and me when we go to a doctor."

Verily chief technology officer Brian Otis said: "Bioelectronic medicine is a new area of therapeutic exploration, and we know that success will require the confluence of deep disease biology expertise and new highly miniaturised technologies.

"This partnership provides an opportunity to further Verily's mission by deploying our focused expertise in low power, miniaturised therapeutics and our data analytics engine to potentially address many disease areas with greater precision with the goal of improving outcomes."

http://bit.ly/2aTilfB

What's Worse Than Death? Breathing Machines & Dementia, Patients Say

Majority of patients consider bowel and urinary incontinence and having to rely on a breathing machine to be fates worse than death

By Sara G. Miller, Staff Writer | August 1, 2016 11:06am ET

For patients facing serious illnesses, dying isn't necessarily the thing they dread the most — according to a new survey, a majority of patients consider bowel and urinary incontinence and having to rely on a breathing machine to be fates worse than death.

In the survey, researchers asked 180 patients with serious illnesses if they considered 10 different health states, ranging from being unable to get out of bed to being in a wheelchair, to be better or worse than dying. The results were published today (Aug. 1) in a research letter in the journal JAMA Internal Medicine.

Avoiding death is often the main goal for doctors and patients, the researchers, led by Dr. Emily Rubin, a fellow in pulmonary and critical-care medicine at the University of Pennsylvania, wrote in the letter. But "despite this general preference," studies have shown that a large minority, and in some cases a

majority, of healthy patients consider states such as severe dementia to be "worse than death," the researchers wrote.

For each of the health states in the survey, the researchers asked the patients to rank the condition on a five-point scale, as either worse than death, neither better nor worse than death, a little better than death, somewhat better than death, or much better than death.

All of the patients in the survey were ages 60 older and had serious illnesses, including advanced forms of cancer and heart failure, according to the researchers. They found that more than half of the patients considered bowel and bladder incontinence and relying on a breathing machine to live to be health states worse than death. In addition, more than half of the patients considered being unable to get out of bed, being confused all the time, having to rely on a feeding tube to live, and needing care all the time to be either worse than, or the same as, death.

The state that the majority of the patients ranked as "much better than death" was being in a wheelchair, the researchers found. Less than 5 percent of the patients ranked being in a wheelchair as a condition worse than death, according to the study. More than three-quarters of the patients ranked being at home all day and being in moderate pain all the time as either much better than death, somewhat better than death, and a little better than death.

And more than 50 percent of the patients considered living in a nursing home to be better than death, while the remaining patients thought it was the same or worse than death, the researchers found.

When patients in the hospital are facing serious illnesses, they are often at a high risk for ending up in many of the health states that the researchers included in the survey. But many hospitals assume "implicitly or explicitly that death is an outcome to be avoided no matter what the alternatives are," the researchers wrote.

There are many reasons why patients in hospitals receive care to prolong life even when they are living in states that they have deemed to be the same or worse than death, according to the researchers. For example, patients may change their preferences as death nears, or they may believe that their health will be restored, the researchers wrote. In addition, doctors may not offer options that are consistent with what the patient wants, they added.

But patients may also underestimate their abilities to adapt to certain health states, the researchers wrote. It's possible that these "once-feared states" may become more tolerable once they have been experienced, they said.

The researchers noted that while there are some limitations to the study (for example, it was carried out in just one health-care system), the findings suggest that more research is needed to improve patient outcomes.

The patients completed the survey between July 1, 2015, and March 7, 2016.

http://www.eurekalert.org/pub_releases/2016-08/hcfa-iel080116.php

Is Earthly life premature from a cosmic perspective?

Theoretical work suggests that present-day life is actually premature from a cosmic perspective

The universe is 13.8 billion years old, while our planet formed just 4.5 billion years ago.

Some scientists think this time gap means that life on other planets could be billions of years older than ours. However, new theoretical work suggests that present-day life is actually premature from a cosmic perspective.

"If you ask, 'When is life most likely to emerge?' you might naively say, 'Now,'" says lead author Avi Loeb of the Harvard-Smithsonian Center for Astrophysics. "But we find that the chance of life grows much higher in the distant future."

Life as we know it first became possible about 30 million years after the Big Bang, when the first stars seeded the cosmos with the necessary elements like carbon and oxygen.

Life will end 10 trillion years from now when the last stars fade away and die. Loeb and his colleagues considered the relative likelihood of life between those two boundaries.

The dominant factor proved to be the lifetimes of stars. The higher a star's mass, the shorter its lifetime. Stars larger than about three times the sun's mass will expire before life has a chance to evolve.

Conversely, the smallest stars weigh less than 10 percent as much as the Sun. They will glow for 10 trillion years, giving life ample time to emerge on any planets they host.

As a result, the probability of life grows over time. In fact, chances of life are 1000 times higher in the distant future than now.

"So then you may ask, why aren't we living in the future next to a low-mass star?" says Loeb.

"One possibility is we're premature. Another possibility is that the environment around a low-mass star is hazardous to life."

Although low-mass, red dwarf stars live for a long time, they also pose unique threats. In their youth they emit strong flares and ultraviolet radiation that could strip the atmosphere from any rocky world in the habitable zone.

To determine which possibility is correct -- our premature existence or the hazard of low-mass stars -- Loeb recommends studying nearby red dwarf stars and their planets for signs of habitability.

Future space missions like the Transiting Exoplanet Survey Satellite and James Webb Space Telescope should help to answer these questions.

http://www.eurekalert.org/pub_releases/2016-08/asfm-ar072716.php

Antibiotic resistance persists in bacteria, even absent selection pressure from antibiotics

Bacteria that acquire plasmids containing resistance genes rarely lose them

Washington, DC - Plasmids are pieces of independent DNA that often carry multiple antibiotic resistance genes. Plasmids can jump from one bacterium to another, spreading that resistance.

A team of French investigators now shows that bacteria that acquire plasmids containing resistance genes rarely lose them. The research is published in Antimicrobial Agents and Chemotherapy, a journal of the American Society for Microbiology.

In the study, the investigators focused on plasmids carrying resistance to extended spectrum cephalosporins. "Cephalosporins are antimicrobials that are critical to human health, as they are used to treat urinary tract, and other infections," said corresponding author Isabelle Kempf, D.V.M., head of the Mycoplasmology-Bacteriology Unit, the Agence Nationale de Securité Sanitaire, Université de Bretagne Loire, Ploufragan, France.

The gene for resistance to extended spectrum cephalosporins is frequently carried on plasmids, often along with multiple genes for resistance to other antimicrobials.

The investigators inoculated pigs with an extended spectrum cephalosporin-resistant, non-pathogenic strain of Escherichia coli, and placed the pigs in pens with non-inoculated pigs. A plasmid in the E. coli carried the gene for extended spectrum cephalosporin resistance, as well as four other resistance genes.

The investigators collected fecal samples from the pigs, at different time points following inoculation. From these, they grew 353 isolates of E. coli.

During the experiment, the pigs did not receive extended spectrum cephalosporin antibiotics. That meant that there was no selection pressure that might have favored the persistence of extended spectrum cephalosporin resistance in the bacterial populations. Nonetheless, all but three of the 353 isolates carried the resistance gene.

"Our results show that once a plasmid encoding resistance genes is transferred to a bacterial host, the probability that the bacteria will lose the encoded resistances is quite low, even absent a selective pressure," said Kempf

"Plasmids have developed sophisticated mechanisms to ensure their transmission to daughter cells during cell division," Kempf explained. "A better knowledge of these mechanisms and development of innovative tools to counteract them could result in new strategies to combat antimicrobial resistance."

http://www.eurekalert.org/pub_releases/2016-08/ps-spi072816.php

St. Paul Island mammoths most accurately dated 'prehistoric' extinction ever

While the Minoan culture on Crete was just beginning, woolly mammoths were disappearing from St. Paul Island, Alaska, according to an international team of scientists who have dated this extinction to 5,600 years ago.

UNIVERSITY PARK, Pa. - "It's amazing that everything turned out so precisely with dating of extinction at 5,600 plus or minus 100 years," said Russell Graham, professor of geosciences, Penn State."

St. Paul Island lies about 400 miles north of the Aleutian Islands and was part of the Bering Land Bridge before sea level rose when the last glacial period ended. Previous researchers radiocarbon-dated remains of five mammoths to about 6,480 years ago, but there was no way to know if these were the last five animals.

The researchers used a variety of proxies to date the demise of the mammoths on the island. Proxies are things in the environment that can be used to independently document the presence of an organism, even though they are not parts of it. In this study, three different spores from fungi that grow on large animal dung were extracted from lake cores and used to determine when the mammoths were no longer on the island. Proxies in sediments from cores from a lake near the cave were used to determine the time of the demise of the mammoth population.

"We see a reduction in the three species of fungus, all of which are associated with the dung of large animals," said Graham. "These spores are a marker for the presence of large animals like mammoths."

Beside the mammoths, the only animals appearing on the island in "prehistoric" times were arctic foxes, shrews and polar bears, and there is no evidence of polar bears before 4,000 years ago. Humans did not arrive on the island until 1787 C.E. The only large mammals present were mammoths.

Sediment DNA from the lake cores showed the presence of mammoth DNA until 5,650 years ago, plus or minus 80 years. After that time, there is no mammoth DNA and so no mammoths on the island. The youngest of the newly dated mammoth remains' dates fall within the mammoth DNA range and the fungal spore dates as well.

Using state-of-the-art methods for radiocarbon dating, the researchers used 14 newly recovered remains from various areas on the island to help document the time of extinction.

"The St. Paul mammoth demise is now one of the best-dated prehistoric extinctions, " the researchers report today (August 1) in the Proceedings of the National Academy of Sciences.

The researchers also used environmental proxies to investigate habitat changes at the time of extinction. The island, which formed between 14,700 and 13,500 years ago rapidly shrank until 9,000 years ago and continued slowly shrinking until 6,000 years ago and now is only 42 square miles in area. While large animals like mammoths became extinct on the continents about 12,000 years ago due to climate change and habitat restructuring, the process was different on the island.

The shrinking of the island concentrated the mammoths in a smaller area and diminished available water. Pollen from the lake cores indicate that the area around the lake was denuded of vegetation by the mammoths. Like elephants today, when the water became cloudy and turgid, the mammoths probably dug holes nearby to obtain cleaner water. Both of these things increased erosion in the area and helped fill in the lake, decreasing the available water even more.

After the extinction of the mammoths, the cores show that erosion stopped and vegetation returned to the area. In essence, the mammoths contributed to their own demise.

The researchers note that this research "highlights freshwater limitation as an overlooked extinction driver and underscores the vulnerability of small island populations to environmental change, even in the absence of human influence,"

Also working on this project from Penn State were Soumaya Belmecheri, former postdoctoral fellow now at the Laboratory of Tree Ring Research, University of Arizona; Brendan J. Culleton, research associate in anthropology; and Lee Newsom, associate professor of anthropology.

The team also consisted of Kyungcheol Choy, Ruth Rawcliffe, and Émilie Saulnier-Talbot, Alaska Stable Isotope Center; and Matthew J. Wooller, Alaska Stable Isotope Center and School of Fisheries and Ocean Science, University of Alaska, Fairbanks; Lauren J. Davies, Duane Froese, University of Alberta; Peter D. Heintzman, Beth Shapiro and Joshua D. Kapp, University of California, Santa Cruz; Carrie Hritz, AAAS Science and Technology Policy Fellow; and Yue Wang and John W. Williams, University of Wisconsin, Madison.

The National Science Foundation supported this work.

http://www.bbc.com/news/health-36946000

HIV campaigners win NHS drug battle

The High Court has told the NHS in England it can fund a drug that can prevent HIV - after health bosses argued it was not their responsibility.

NHS England previously said councils should provide the pre-exposure prophylaxis (Prep) drug as they are in charge of preventative health.

This stance was successfully challenged by the National Aids Trust (NAT).

But the High Court ruling does not make funding of Prep automatic and the NHS is set to appeal.

The ruling by Mr Justice Green said health bosses had "erred" in arguing it was not their responsibility. NHS England has already announced it will appeal against the ruling - and even if that goes against health bosses it is not a given that Prep will be considered effective enough to warrant NHS funding. If the Court of Appeal uphold the ruling NHS bosses would then assess Prep's cost-effectiveness alongside the merits of other treatments the NHS is being asked to provide.

HIV drug row: A very modern dilemma for the NHS

Using Prep has been shown to reduce the risk of HIV infection by 86%.

The once-a-day pill, which costs £400 a month per person, works by disabling the virus to stop it multiplying. It is currently used in the US, Canada, Australia and France to help protect the most at-risk gay men.

'This is about saving lives'

He says: "I've seen the panic on the face of previous boyfriends when they are awaiting their [HIV test] results - it's a huge fear and it affects everything you do.

"To be able to have sex without having that fear hanging over you all the time is huge."

Harry says taking Prep has still not become socially acceptable. "Too many people seem to think it will encourage a hedonistic lifestyle, but for me this is about saving lives," he says. "People reacted with cynicism when the contraceptive pill for women was first introduced.

"For me, taking Prep has helped me to trust again, have relationships and build bridges and that shouldn't be taken away."

NHS England had argued that because Prep was preventative it was not its responsibility. In May, it said it had legal advice that said it did not have the "legal power to commission Prep" and that under 2013 regulations "local authorities are the responsible commissioner for HIV prevention services".

NHS England has also warned that if it prioritised Prep, there was a risk of a legal challenge from people wanting similar access to other preventative treatments.

But the National Aids Trust (NAT) said local authorities did not have sole responsibility for HIV prevention in England. The NHS in Wales, Scotland and Northern Ireland have not yet made a decision on Prep.

Side effects

Deborah Gold, chief executive of NAT, said: "This is fantastic news. It is vindication for the many people who were let down when NHS England absolved itself of responsibility for Prep." She urged NHS to act immediately and start funding Prep.

"Prep works. It saves money and it will make an enormous difference to the lives of men and women across the country who are at risk of acquiring HIV. The delay to commissioning Prep is both unethical and expensive."

But a spokesman for NHS England said an appeal would be launched first. "NHS England has considered the judgement carefully and has taken legal advice.

Queen's Counsel has advised that the court's ruling interprets the legislation governing NHS England's role and functions in a way that is inconsistent with Parliament's intention."

Meanwhile Dr Jonathan Fielden of NHS England, told the BBC: "Prep, subject to the appeal, will seen and considered alongside 13 other treatments including treatments for children with cystic fibrosis, for prosthetic limbs and certain types of auditory implants for deafness."

Councillor Izzi Seccombe, of the Local Government Association, which represents councils, said she was "pleased" with the ruling. "We firmly rejected the argument by the NHS that it should fall to councils."

http://www.bbc.com/news/health-36940756

Women without appendix 'more fertile'

Women who have had their appendix or tonsils removed appear to be more fertile, a 15-year study suggests.

By James Gallagher Health and science reporter, BBC News website

The researchers, at the University of Dundee, analysed medical records from more than half a million British women. They argue the operations could directly affect fertility or there may be a "behavioural" explanation.

Experts said the findings might lead to new treatments, but advised women not to have their tonsils and appendix taken out unnecessarily. The study found that for every 100 pregnancies in women who had had no procedures there were:

134 pregnancies in women who had had their appendix removed
149 pregnancies in women who had had their tonsils removed
and 143 pregnancies in women who had had both removed

One of the researchers, Dr Sami Shimi, said most doctors were wrongly taught that having an appendix removed damaged fertility.

'Reassuring'

He told BBC News: "This [study] is very important in reassuring young women that appendicectomy will not reduce their chances of future pregnancy.

"More importantly, looking at both the appendix and tonsils together, this study confirms beyond doubt that removal of inflamed organs or organs likely to suffer from repeated inflammation, in women, improves their chances of pregnancy."

Explaining the findings, published in Fertility and Sterility, is more of a challenge. One biological possibility is that regularly infected tonsils or appendixes raise levels of inflammation in the body, which affects the ovaries and womb.

The Dundee team favour a behavioural explanation such as women enjoying more "liberal sexual activity", being both more likely to get pregnant and have pelvic inflammatory disease, which could lead to an appendix being removed.

More research is needed to figure this out.

'Interesting paper'

Prof Allan Pacey, from the University of Sheffield, told the BBC: "This is an interesting paper which suggests that surgical removal of the appendix or tonsils (or both) in young women is associated with an increase in their fertility later in life. "There are several explanations which may account for these observations, one of which is that the removal of these tissues makes an alteration to their immune system which has an impact to some aspect of the reproductive process (such as how their embryos implant in the womb).

"If true, this may ultimately give doctors and scientists some new ideas for novel drugs or therapies to enhance women's fertility. "But to suggest that infertile women have their tonsils or appendix removed as a way of improving their chances is a step too far at this stage."

http://bit.ly/2b0CA9B

Murder victim's phone unlocked with paper fingerprint after 3D printing fails

Phone unlocked with a 2D image of the dead man's fingerprints

By Rich McCormick Aug 2, 2016, 4:10a

Researchers who attempted to unlock a murder victim's phone using a 3D-printed replica of one of his fingers were forced to use an alternative method last week, after the models produced were found not to be accurate enough to gain access. The team from Michigan State University was asked by police to gain access to the phone, which was eventually unlocked with a 2D image of the dead man's fingerprints, enhanced manually to fill in gaps in the original image, and rendered on conductive paper.

Both 2D and 3D versions of the dead man's fingerprints were produced, but the poor quality of the original image kept in police files stymied the efforts of the team, led by professor Anil Jain. After a failed first attempt, the team used an image enhancement algorithm to fill in broken lines in the print, allowing them to successfully unlock the Samsung Galaxy S6 involved in the investigation. Fortunately for the team, the phone in question did not require a passcode after failed fingerprint attempts, allowing Jain and his colleagues to keep trying options indefinitely.

Jain and his team at MSU published a technical report earlier this year that detailed the 2D method, explaining how anyone could theoretically unlock a phone with a high-quality fingerprint, a regular inkjet printer, and some conductive paper. At the time, they tested it successfully on a Samsung Galaxy S6, Huawei Honor 7, but couldn't consistently gain access to an iPhone 5S, and Meizu MX4 Pro. Other methods of fingerprint spoofing have also been published, including one that uses latex milk or wood glue.

The Samsung Galaxy S6 didn't require a passcode after failed fingerprint attempts. Smartphone fingerprint scanners work when the ridges in your fingers close small electrical circuits, meaning that standard plastic — and severed fingers — wouldn't unlock a phone. The researchers took this into account, creating the 2D image on conductive paper to allow electricity to pass through it, and coating the 3D replica fingers in a layer of metallic particles. That process involved the use of a $600,000 machine to apply a coating of a conductive metal onto the fingers, which themselves were produced on a $250,000 3D printer.

Despite this high-tech attempt, it was the comparatively simpler 2D fingerprint that ended up unlocking the phone, an eventuality that Jain says should make smartphone manufacturers consider how secure fingerprint scanners are. "Hopefully the phone companies are watching this and they will make fingerprint devices more robust against such simple attacks," Jain told *NPR*.

http://www.eurekalert.org/pub_releases/2016-08/ps-wts072616.php

Where there's smoke -- and a mutation -- there may be an evolutionary edge for humans

A genetic mutation may have helped modern humans adapt to smoke exposure from fires and perhaps sparked an evolutionary advantage over their archaic competitors, including Neandertals, according to a team of researchers.

UNIVERSITY PARK, Pa. -- Modern humans are the only primates that carry this genetic mutation that potentially increased tolerance to toxic materials produced by fires for cooking, protection and heating, said Gary Perdew, the John T. and Paige S. Smith Professor in Agricultural Sciences, Penn State. At high concentrations, smoke-derived toxins can increase the risk of respiratory infections. For expectant mothers, exposure to these toxins can increase the chance of low birth weight and infant mortality.

The mutation may have offered ancient humans a sweet spot in effectively processing some of these toxins -- such as dioxins and polycyclic aromatic hydrocarbons -- compared to other hominins.

"If you're breathing in smoke, you want to metabolize these hydrophobic compounds and get rid of them, however, you don't want to metabolize them so rapidly that it overloads your system and causes overt cellular toxicity," said Perdew.

The researchers, who released their findings in the current issue of Molecular Biology and Evolution, suggest that a difference in the aryl hydrocarbon receptor -- which regulates the body's response to polycyclic aromatic hydrocarbons -- between humans, Neandertals and other non-human primates may have made humans more desensitized to certain smoke toxins. The mutation in the receptor is located in the middle of the ligand-binding domain and is found in all present-day humans, Perdew added. Ligands are small molecules that attach to receptor proteins in certain areas in much the same way that keys fit into locks.

"For Neandertals, inhaling smoke and eating charcoal-broiled meat, they would be exposed to multiple sources of polycyclic aromatic hydrocarbons, which are known to be carcinogens and lead to cell death at high concentrations," said Perdew. "The evolutionary hypothesis is, if Neandertals were exposed to large amounts of these smoke-derived toxins, it could lead to respiratory problems, decreased reproductive capacity for women and increased susceptibility to respiratory viruses among preadolescents, while humans would exhibit decreased toxicity because they are more slowly metabolizing these compounds."

There is evidence that both humans and Neandertals used fire, according to George Perry, assistant professor of anthropology and biology, Penn State, who worked with Perdew.

"Our hominin ancestors -- they would technically not be called humans at that time -- were likely using fire at least a million years ago, and some infer an earlier control and use of fire approximately 2 million years ago," said Perry.

Fire would have played an important role for both humans and Neandertals.

"Cooking with fire could have allowed our ancestors to incorporate a broader range of foods in our diets, for example, by softening roots and tubers that might otherwise have been hard to chew," Perry said. "Cooking could also help increase the digestibility of other foods, both in chewing time and reduced energetic investment in digestion."

Fire also provided warmth, particularly in the higher latitudes, according to Perry.

"Besides heating and cooking, humans used -- and still use -- fire for landscape burning and as part of hunting and gathering, and now as part of agriculture," said Perry. The study may also lend support to a recent theory that the invention of cooking may have helped humans thrive, according to Perdew.

He also suggested that the receptor might give humans a better tolerance for cigarette smoke, allowing people to smoke, but also putting them at risk of cancer and other chronic diseases.

"Our tolerance has allowed us to pick up bad habits," Perdew said.

The researchers used computational and molecular techniques to examine the difference in the genetics of polycyclic aromatic hydrocarbon tolerance between humans and Neandertals. They examined a genomic database of humans, Neandertals and a Denisovan, a hominin more closely related to Neandertals than humans.

"We thought the differences in aryl hydrocarbon receptor ligand sensitivity would be about ten-fold, but when we looked at it closely, the differences turned out to

be huge," said Perdew. "Having this mutation made a dramatic difference. It was a hundred-fold to as much of a thousand-fold difference."

In contrast, the sensitivity of the aryl hydrocarbon receptor for some endogenous -- produced in the body -- ligands is the same between human and Neanderthal, which further illustrates that modern humans may have adapted to specific environmental toxin exposures through this critical mutation in the aryl hydrocarbon receptor.

Perdew and Perry also worked with Troy D. Hubbard, graduate student and Aswathy Sevastian, computational scientist, both in biochemistry and molecular biology; Iain A. Murray, research associate in veterinary and biomedical sciences; Alexis P. Sullivan, doctoral student in biology and Nina Jablonski, Evan Pugh University Professor of Anthropology, all of Penn State and William H. Bisson, assistant professor of agricultural sciences, Oregon State University.

National Institutes of Health supported this work.

http://www.eurekalert.org/pub_releases/2016-08/uoh-hti080216.php

Hidden tooth infections may predispose people to heart disease

Hidden dental root tip infections are very common: as many as one in four Finns suffers from at least one. Such infections are usually detected by chance from X-rays.

"Acute coronary syndrome is 2.7 times more common among patients with untreated teeth in need of root canal treatment than among patients without this issue," says researcher John Liljestrand. The study was carried out at the Department of Oral and Maxillofacial Diseases of the University of Helsinki, in cooperation with the Heart and Lung Centre at Helsinki University Hospital. Its results were published in the latest issue of the Journal of Dental Research.

Dental root tip infection, or apical periodontitis, is a bodily defence reaction against microbial infection in the dental pulp. Caries is the most common cause of dental root tip infection.

Today, information is increasingly available about the connection between oral infections and many common chronic diseases. For example, periodontitis, an inflammatory disease affecting the tissues that surround the teeth, causes low-grade inflammation and is regarded as an independent risk factor for coronary artery disease and diabetes. Dental root tip infections have been studied relatively little in this context, even though they appear to be connected with low-grade inflammation as well.

The study consisted of 508 Finnish patients with a mean age of 62 years who were experiencing heart symptoms at the time of the study. Their coronary arteries were examined by means of angiography, and 36 per cent of them were found to be suffering from stable coronary artery disease, 33 per cent were undergoing acute coronary syndrome, and 31 did not suffer from coronary artery disease to a significant degree. Their teeth were examined using panoramic tomography of the teeth and jaws, and as many as 58 per cent were found to be suffering from one or more inflammatory lesions.

The researchers also discovered that dental root tip infections were connected with a high level of serum antibodies related to common bacteria causing such infections. This shows that oral infections affect other parts of the body as well. The statistical analyses took account of age, gender, smoking, type 2 diabetes, body mass index, periodontitis and the number of teeth as confounding factors.

Cardiovascular diseases cause more than 30 per cent of deaths globally. They can be prevented by a healthy diet, weight control, exercise and not smoking. With regard to the health of the heart, measures should be taken to prevent or treat oral infections, as they are very common and often asymptomatic. Root canal treatment of an infected tooth may reduce the risk of heart disease, but more research is needed.

Source: J. M. Liljestrand, P. Mäntylä, S. Paju, K. Buhlin, K. A. E. Kopra, G. R. Persson, M. Hernandez, M. S. Nieminen, J. Sinisalo, L. Tjäderhane, P. J. Pussinen. Association of Endodontic Lesions with Coronary Artery Disease. J Dent Res 2016.

http://jdr.sagepub.com/content/early/2016/07/26/0022034516660509.full

http://www.eurekalert.org/pub_releases/2016-08/mgh-lwi080216.php

Lower weight in late life may increase risk of Alzheimer's disease

BWH/MGH study associates lower body mass index with greater deposits of Alzheimer's-associated amyloid plaques in the brains of older individuals

Researchers at Brigham and Women's Hospital (BWH) and Massachusetts General Hospital (MGH) have found an association between lower weight and more extensive deposits of the Alzheimer's-associated protein beta-amyloid in the brains of cognitively normal older individuals. The association -- reported in the Journal of Alzheimer's Disease -- was seen in particular among individuals carrying the APOE4 gene variant, which is known to increase the risk of Alzheimer's.

"Elevated cortical amyloid is believed to be the first stage of the preclinical form of Alzheimer's disease, so our findings suggest that individuals who are underweight late in life may be at greater risk for this disease," says Gad Marshall, MD, of the MGH and BWH Departments of Neurology, senior author of the report. "Finding this association with a strong marker of Alzheimer's disease risk reinforces the idea that being underweight as you get older may not be a good thing when it comes to your brain health."

While the concept of a preclinical version of Alzheimer's disease is theoretical and not yet being used to guide clinical diagnosis or treatment, the current

hypothesis involves three stages. Individuals at stage 1 are cognitively normal but have elevated amyloid deposits; stage 2 adds evidence of neurodegeneration, such as elevated tau deposits or characteristic loss of certain brain tissues, with no cognitive symptoms; and stage 3 adds cognitive changes that, while still in a normal range, indicate a decline for that individual. The current study is part of the MGH-based Harvard Aging Brain Study (HABS), designed to identify markers that predict who is likely to develop Alzheimer's disease and how soon symptoms are likely to develop.

This investigation explored the relationship between body mass index (BMI) and beta amyloid levels in the brains of the first 280 participants to enroll in HABS, who were ages 62 to 90, cognitively normal and in good general health. Participants' initial enrollment data included medical histories; physical exams; testing for the presence of APOE4, the major genetic risk factor for late-onset Alzheimer's; and PET imaging with Pittsburgh compound B (PiB), which can visualize amyloid plaques in the brain.

After adjusting for factors including age, sex, education and APOE4 status, researchers found that having a lower BMI was associated with greater retention of PiB, indicating more extensive amyloid deposits in the brain. The association was most pronounced in normal-weight participants, who were the group with the lowest BMI in the study. Analysis focused on APOE status revealed that the association between lower BMI and greater PiB retention was particularly significant for individuals with the APOE4 gene variant, which is associated with increased Alzheimer's disease risk.

Researchers hope that future studies will explain the mechanism behind the association between lower BMI and increased amyloid levels. "A likely explanation for the association is that low BMI is an indicator for frailty - a syndrome involving reduced weight, slower movement and loss of strength that is known to be associated with Alzheimer's risk," says Marshall, who is an assistant professor of Neurology at Harvard Medical School. "One way to get closer to determining any cause and effect relationship will be following these individuals over time to see whether their baseline BMI does predict the development of symptoms, which we are doing in HABS, and eventually investigating whether maintaining or even increasing BMI in late life has an effect on outcomes. Right now, we're also studying whether BMI is associated with any other clinical and imaging markers of Alzheimer's disease."

David C. Hsu, MD, formerly with the MGH Department of Psychiatry and the BWH Department of Neurology and now at Mercy Medical Group in Sacramento, Calif., is lead author of the Journal of Alzheimer's Disease paper. This study was supported by the Harvard Aging Brain Study (NIH/NIA P01 AG036694, R01 AG037497, and R01 AG046396), K23 AG033634, K24 AG035007, and the Massachusetts Alzheimer's Disease Research Center (P50AG005134).

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80 Percent of Open-Ocean Fish Make Light

Lighting up is the rule, not the exception, for marine fish

By Jennifer Frazer on July 29, 2016

To be a fish in the ocean void is to glow, according to a new paper in PLOS ONE: an astounding 80% of open water marine fish can make their own light. What's more, the trait has arisen 27 separate times in ray-finned fish lineages, a number much higher than previously realized or expected.

In a world without sun, fish have repeatedly found ways to shine. But why is that ability so widespread in the ocean, yet absent among vertebrates on land?

A bioluminescent midshipman (*Porichthys*) glows with light it makes itself, not by symbiotic bacteria. **Davis et al. 2016**

Bioluminescence, for one thing, is useful. The potential uses are probably endless, but blending in with the environment, defense from being eaten, attracting someone else to eat, or sending any number of messages to your colleagues are probably the most common reasons. Fish may either generate their own light by an enzyme reaction between a protein called a luciferin and an enzyme called luciferase that results in the emission of a photon, or they may host bacteria that do that job for them. But this cannot be the whole story.

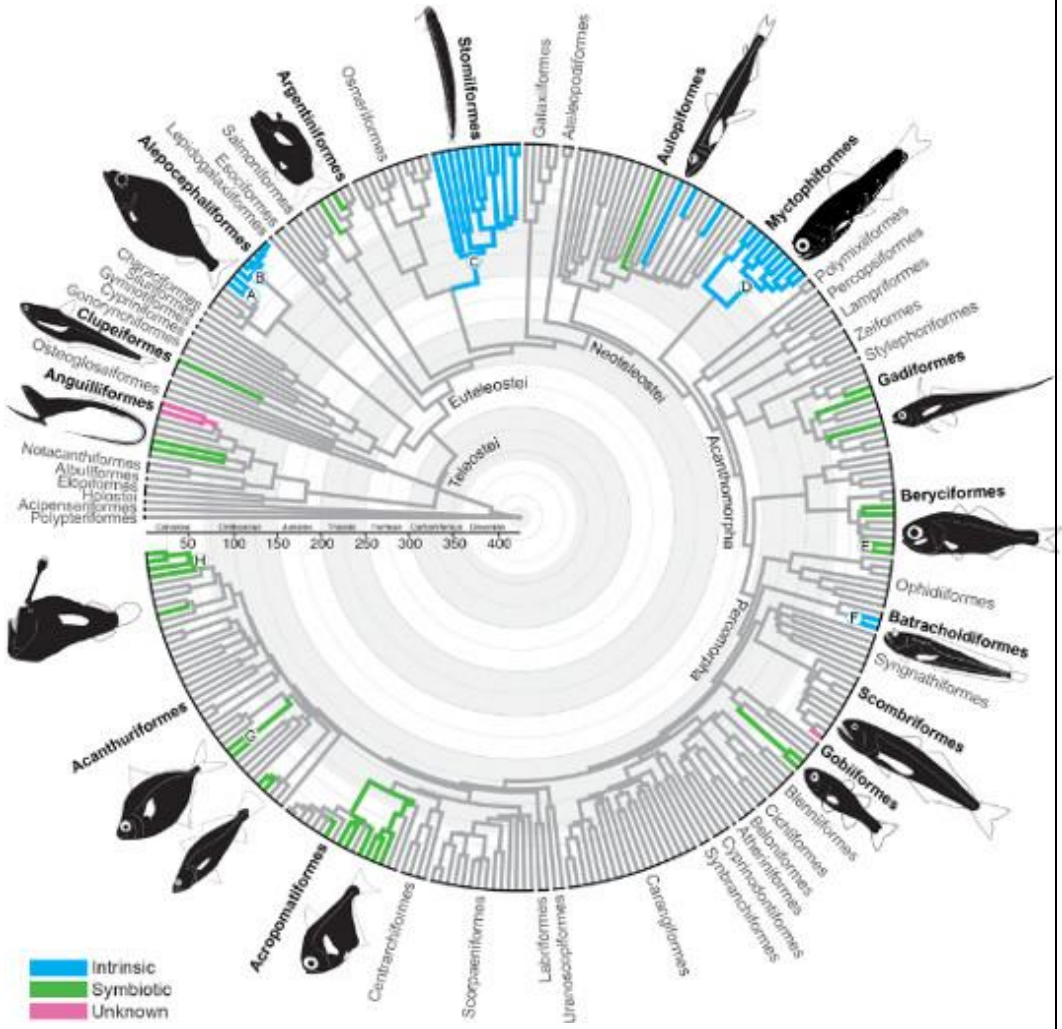
In this study, scientists at St. Cloud State University, the American Museum of Natural History, and the University of Kansas compared 11 gene fragment sequences from 300 different groups of fish, mostly genera. They used computer programs that help them infer the most likely evolutionary relationships between them and then superimposed the bioluminescent status of the groups on the resulting family tree. This is what they found:

The 27 instances among the ray-finned fish (that is, all fish except for those with cartilaginous skeletons like sharks, or the lobe-finned fish that gave rise to terrestrial vertebrates) occur in fish found throughout the ocean. They span from the deep-sea lanternfish or anglerfish, whose eerie lures beckon fish to their doom, all the way up to the coral reef, where cardinalfish and pineconefish softly illuminate the nighttime seas. Since bioluminescence also seems to have evolved

once or twice in the cartilaginous fishes like sharks, the trait may actually have evolved at least 29 times in the marine vertebrates.

Family tree of ray-finned fish with acquisitions of bioluminsecence highlighted. Click the credit for a larger version of image. Davis et al. 2016.

It is so common in the open ocean that bioluminescence seems "almost a requirement" for these fish, according to one of the authors. Indeed, the most common vertebrate on Earth, a fish called the bristlemouth, exists by the (not making this up) quadrillions in the world's oceans, is also bioluminescent.



Of the 27 instances in ray-finned fish, 17 resulted from fish shanghai-ing light-producing bacteria (a symbiotic acquisition, labeled green above), and these 17 events produced about 48% of all bioluminescent fish species. It may be relatively easy to do this, which would explain the large number of independent instances. Bioluminescent bacteria that can live inside fish are common in the environment and they are not picky about their hosts, seemingly being content to be adopted by any fish that care to feed and house them.

Because bioluminescent bacteria are not under fishes' direct control, they must devise structures (or other inducements) around them that are if they wish to regulate the glow. Fish that host symbiotic bacteria have many anatomical structures to feature, focus, or control the light their bacteria make, from shutters to windows to dangling lures. These structures may have encouraged rapid speciation among these lineages by giving evolution a shiny new plaything. Indeed, bioluminescent bacteria-hosting flashlightfish, ponyfish, and deep-sea anglerfish are species rich given the age of their groups.

The other eight acquisitions of light production by fish involve "intrinsic bioluminescence", or the ability to glow without the help of bacteria (labeled blue above). But those eight origin events ultimately generated more than half of the species that can emit light – some 785 of 1,510 light-up fish.

The vast majority of the most diverse groups of deep-sea fish resulted from the evolution of intrinsic bioluminescence; almost 90 percent of groups with exceptional species richness glow with light they make themselves. One group, the netdevils (which sound like they should have their own NBA team), has even managed to acquire both types: a lure perched atop their head glows with bacteria, while a chin barbel shines with light they make themselves.

Groups that acquired their lighting by either method who use that light for communication or identification rather than camouflage seem to be particularly diverse: none of the most species-rich glowing fish lineages use it exclusively for hiding. In a place where there are no physical barriers like mountain ranges or deserts to promote speciation by physical separation, traits like illuminated pick-up lines could provide an easy way for species to diversify by natural selection. Small changes to the wording could result in big consequences for mate recognition and reproduction.

Thus, bioluminescence in marine fish may be so widespread not just because it is advantageous for fish to have a powerful new ability, or that picking up the bacteria that can make light is easy by comparison to land, but also that, once acquired, bioluminescence provides an easy platform upon which natural selection can act, promoting both the evolution of new species, and more and more twinkly fish.

Reference *Davis, Matthew P., John S. Sparks, and W. Leo Smith. "Repeated and Widespread Evolution of Bioluminescence in Marine Fishes."* PloS one *11, no. 6 (2016): e0155154.*

http://bit.ly/2aDwqWI

Did the Universe Boot Up with a "Big Bounce?"

The cosmos may have rebounded from an earlier contraction and "big crunch" into a "big bang" that started it all over again

By Clara Moskowitz on August 3, 2016

Did the universe start with a bang or a bounce—or something else entirely? The question of our origins is one of the thorniest in physics, with few answers and lots of speculation and strong feelings. The most popular theory by far is inflation, the notion that the cosmos blew up in size in the first few fractions of a second after it was born in a bang. But an underdog idea posits that the birth of this universe was not actually the beginning—that an earlier version of spacetime had existed and contracted toward a "big crunch," then flipped and started expanding into what we see today. Now a new study suggesting a twist on this "bounce" scenario has supporters excited and inflation proponents newly inflamed over a "rival" they say they have repeatedly disproved, only to have it keep bouncing back.

Inflation has many admirers because the rapid expansion it posits seems to explain numerous features of the universe, such as the fact that it appears relatively flat (as opposed to curved, on large scales) and roughly uniform in all directions (there is roughly the same amount of stuff everywhere, again on large scales). Both conditions result when regions of space that ended up very far away initially started out close together and in contact with one another. Yet the latest versions of the theory seem to suggest—even require—that inflation created not just our universe but an infinite landscape of universes in which every possible type of universe with every possible set of physical laws and characteristics formed somewhere. Some scientists like this implication because it could explain why our particular universe, with its seemingly random yet perfectly calibrated-to-life conditions, exists—if every type of cosmos is out there, it is no wonder that ours is, too. But other physicists find the multiverse idea repulsive, in part because if the theory predicts that every possibility will come to pass, it does not uniquely foretell a universe like the one we have.

"Big bounce" theories also predict a flat and uniform cosmos, thanks to smoothing-out effects on space that can take place during the contraction. But the sticking point of the bounce idea has long been the transition between shrinking and expanding, which seemed to require the much-hated idea of a "singularity"—a time when the universe was a single point of infinite density—seen by many as a mathematically meaningless proposition that indicates a theory has gone off the rails. Now physicists say they have found a way to calculate the bounce without encountering any singularities. "We found we could describe the quantum evolution of the universe exactly," says study co-author Neil Turok, director of the Perimeter Institute for Theoretical Physics in Ontario. "We found that the universe passes smoothly through the singularity and out the other side. That was our hope, but we'd never really accomplished this before." He and Steffen Gielen of Imperial College London published their calculations last month in Physical Review Letters.

A Quantum Cosmos

The breakthrough came thanks to two techniques the researchers adopted. One was to use the nascent and still-not-complete theory of quantum cosmology—a mash-up between quantum mechanics and general relativity—instead of classical general relativity to describe the universe. The second was to assume that when the cosmos was young matter behaved like light in that the laws of physics that describe it did not depend on scale. For example, light acts the same regardless of its wavelength. The physics of matter, on the other hand, usually vary from small to large scales. "We know that in the first 50,000 years the universe was essentially just filled with radiation," says Anna Ijjas, a physicist at Princeton University who was not involved in the research. "The normal matter we see now was not really very significant. I think a scaleless early universe is actually very much suggested by our current measurements."

Under those conditions Turok and Gielen found that the contracting universe would never actually become a singularity—essentially it would "tunnel through" the worrisome point by hopping from a state right before it to a state right after it. Although such sidestepping sounds like cheating, it is a proved phenomenon in quantum mechanics. Because particles do not exist in absolute states but rather hazes of probability there is a small but real chance they can "tunnel" through physical barriers to reach locations seemingly off-limits to them—the equivalent, on a microscopic scale, of walking through walls. "The fuzziness in space and time and the matter conspires to make it uncertain where the universe is at a given time," Turok explains. "This allows the universe to pass through the singularity."

Other big bounce proponents say the work is a significant step. "By making those two plausible assumptions, they find a very interesting result, which is that a bounce can occur," says Princeton physicist Paul Steinhardt, one of the founders of inflation theory who has more recently become one of its sharpest critics. He was not involved in Turok and Gielen's study. "It shows that in principle a singularity can be avoided." Steinhardt and Ijjas have been working on another way to mathematically demonstrate the possibility of a bounce, by introducing to the universe a special type of field that causes the contraction to turn into expansion well before space gets small enough to become a singularity. Their solution uses classical general relativity as opposed to quantum cosmology. "It

means that classical, nonsingular bounces are also possible," Steinhardt says. They reported their work in a paper posted June 28 to the preprint server arXiv.org.

Both studies are still preliminary. Turok and Gielen were able to calculate the bounce only for the case of an idealized universe that is completely smooth and lacks the small density fluctuations that lead to the formation of stars and galaxies in the real cosmos. "The cases that we can actually solve exactly are very simple universes," Gielen says. "The question you always have is, 'Will that still be there if you go to something more complicated?' That's what we're working on at the moment."

If the universe bounced once, a natural question is whether it will again. But not all bounce theories suggest we are destined to cycle forever through contractions and expansions—for example, even if our universe bounced before, we have no indication so far that it is heading for another contraction. The dark energy thought to make up the largest chunk of the cosmos' total mass–energy budget seems to be pulling our universe apart at an ever-accelerating rate. What is truly in store for the future is a very open question—about as open, in fact, as the issue of how it all got started.

Bad Blood

Many advocates of inflation are highly skeptical of any bounce model, especially because they say proponents had repeatedly claimed in the past to be able to calculate bounces without singularities, only to be disproved. "I'm not happy that they do not admit that all their earlier papers should be disregarded," says Stanford University physicist Renata Kallosh, who calculated errors in previously proposed bounce models. "They now make a new claim, and this new claim I don't believe." Alan Guth, a pioneer of inflation based at Massachusetts Institute of Technology, agrees. "I'm still skeptical whether they have actually achieved a nonsingular solution," he says. "I would like to wait and see how it develops. If they have succeeded in what they claim they've done, I do agree it's very important—even if it's not the best model for the history of the universe."

Some inflation researchers are more forgiving, though. "I think that this is a very intriguing line of research," says Marc Kamionkowski of Johns Hopkins University. "The bounce scenarios, although not yet developed to the level that inflation has been developed, are promising, and it's imperative to try to develop them further. This paper provides an interesting mathematical result, in a toy model," he adds, referring to the idealized universe the researchers worked with.

Kallosh and others object to using quantum cosmology to describe a bounce, because the universe may not have been microscopically small at such a stage. "They have the collapse of a big universe—why should a big universe be different from what general relativity says?" Turok counters that any ultimate theory of the universe will have to incorporate quantum mechanics into general relativity, because the classical theory on its own is known to break down at certain extremes. "Nature is quantum," he says. "We know that classical theories don't make any sense at a very basic level."

Turok and other critics of inflation have their own problems with the dominant theory. They charge that inflation requires unlikely circumstances to get started (a claim proponents disagree with) and that it does not resolve the specter of a singularity at the moment of the big bang itself. Furthermore, "inflation leads to this nightmare scenario of a multiverse," Turok says, "which for some strange reason is surprisingly popular."

He suggests that the heated debate in the field and the heavy scrutiny new ideas receive will help scientists ultimately converge on a better theory of our origins. "People hold very strong opinions," Turok says. "I freely admit I do and I freely admit my opinions aren't shared by 95 percent of cosmologists. I'm actually critical of all these theories, including the ones I invented. But today we have spectacular observations pointing us at incredible simplicity in the universe. To me that means that all of our existing theories are way too complicated. The observations are pointing at simplicity and it's our job to come up with a simple theory that will hopefully explain those."

http://nyti.ms/2az8OX0

Why 'Useless' Surgery Is Still Popular

Before a drug can be marketed, it has to go through rigorous testing to show it is safe and effective. Surgery, though, is different.

Gina Kolata @ginakolata AUG. 3, 2016

The Food and Drug Administration does not regulate surgical procedures. So what happens when an operation is subjected to and fails the ultimate test — a clinical trial in which patients are randomly assigned to have it or not?

The expectation is that medical practice will change if an operation turns out not to help.

If only.

It looks as if the onus is on patients to ask what evidence, if any, shows that surgery is better than other options.

Take what happened with spinal fusion, an operation that welds together adjacent vertebrae to relieve back pain from worn-out discs. Unlike most operations, it actually was tested in four clinical trials. The conclusion: Surgery was no better than alternative nonsurgical treatments, like supervised exercise and therapy to help patients deal with their fear of back pain. In both groups, the pain usually diminished or went away.

The studies were completed by the early 2000s and should have been enough to greatly limit or stop the surgery, says Dr. Richard Deyo, professor of evidence-based medicine at the Oregon Health and Sciences University. But that did not happen, according to a recent report. Instead, spinal fusion rates increased — the clinical trials had little effect.

Spinal fusion rates continued to soar in the United States until 2012, shortly after Blue Cross of North Carolina said it would no longer pay and some other insurers followed suit.

"It may be that financial disincentives accomplished something that scientific evidence alone didn't," Dr. Deyo said.

Other operations continue to be reimbursed, despite clinical trials that cast doubt on their effectiveness.

In 2009, the prestigious New England Journal of Medicine published results of separate clinical trials on a popular back operation, vertebroplasty, comparing it to a sham procedure. They found that there was no benefit — pain relief was the same in both groups. Yet it and a similar operation, Kyphoplasty, in which doctors inject a sort of cement into the spine to shore it up, continue to be performed.

Dr. David Kallmes of the Mayo Clinic, an author of the vertebroplasty paper, said he thought doctors continued to do the operations because insurers pay and because doctors remember their own patients who seemed better afterward.

"When you read a study, you reflect on whether it is representative of your patient population," Dr. Kallmes said. "It is easy to conclude that the answer is 'no.' The mean age in the study is different or 'I do it differently.'"

"I think there is a placebo effect not only on patients but on doctors," Dr. Kallmes adds. "The successful patient is burned into their memories and the not-so-successful patient is not. Doctors can have a selective memory that leads them to conclude that, 'Darn it, it works pretty well.'"

The latest controversy — and the operation that arguably has been studied the most in randomized clinical trials — is surgery for a torn meniscus, a sliver of cartilage that acts as a shock absorber in the knee. It's a condition that often afflicts middle-aged and older people, simply as a consequence of degeneration that can occur with age and often accompanying osteoarthritis. The result can be a painful, swollen knee. Sometimes the knee can feel as if it catches or locks. So why not do an operation to trim or repair the torn tissue?

About 400,000 middle-aged and older Americans a year have meniscus surgery. And here is where it gets interesting. Orthopedists wondered if the operation made sense because they realized there was not even a clear relationship between knee pain and meniscus tears. When they did M.R.I. scans on knees of middle-aged people, they often saw meniscus tears in people who had no pain. And those who said their knee hurt tended to have osteoarthritis, which could be the real reason for their pain.

Added to that complication, said Dr. Jeffrey N. Katz, a professor of medicine and orthopedic surgery at Harvard Medical School, is the fact that not everyone improves after the surgery. "It is not regarded as a slam-dunk," he said. As a result, he said, many doctors have been genuinely uncertain about which is better — exercise and physical therapy or surgery. That, in fact, was what led Dr. Katz and his colleagues to conduct a clinical trial comparing surgery with physical therapy in middle-aged people with a torn meniscus and knee pain.

The result: The surgery offered little to most who had it. Other studies came to the same conclusion, and so did a meta-analysis published last year of nine clinical trials testing the surgery. Patients tended to report less pain — but patients reported less pain no matter what the treatment, even fake surgery.

Then came yet another study, published on July 20 in The British Medical Journal. It compared the operation to exercise in patients who did not have osteoarthritis but had knee pain and meniscus tears. Once again, the surgery offered no additional benefit.

An accompanying editorial came to a scathing conclusion: The surgery is "a highly questionable practice without supporting evidence of even moderate quality," adding, "Good evidence has been widely ignored."

So what should patients be told? Should they even be offered the surgery?

Patients should be told that physical therapy is a good first-line therapy for pain relief, Dr. Katz said, but that surgery also relieves pain. Pain relief can take longer with physical therapy, he says. With surgery, he said, patients have to recover from the operation but are likely to be back at work within two weeks.

"At the end of the day," he said, "patients ought to choose."

Of course, how they choose might depend on how the choice is presented.

Here's how Dr. Gordon H. Guyatt, a professor of medicine and epidemiology at McMaster University in Hamilton, Ontario, who wrote the editorial in The British Medical Journal, would deal with the clinical trial data:

"I personally think the operation should not be mentioned," he says, adding that in his opinion the studies indicate the pain relief after surgery is a placebo effect. But if a doctor says anything, Dr. Guyatt suggests saying this: "We have randomized clinical trials that produce the highest quality of evidence. They strongly suggest that the procedure is next to useless. If there is any benefit, it is very small and there are downsides, expense and potential complications."

Hearing that, he says, "I cannot imagine that anybody would say, 'Go ahead. I will go for it.'"

http://bit.ly/2anvVbP

There could already be 40,000 people carrying Zika in the US

As many as 40,000 people in the US could already be carrying the Zika virus, having caught it while travelling abroad, a team analysing the epidemic has warned.

By Andy Coghlan

This figure was calculated by extrapolating from the numbers of pregnant women who have been confirmed to be carrying the virus after visiting countries where it is established, like Brazil and Colombia. In most people, Zika has no symptoms or causes only mild illness, but babies born to women infected during pregnancy can have microcephaly, which can cause brain damage.

Infected pregnant women who have travelled are the best proxies for the total number of travel-related cases, says Alessandro Vespignani at Northeastern University in Boston, Massachusetts. This is because pregnant women see medical professionals more regularly, so any infections they have are more likely to be detected.

Taking airline transit numbers and epidemic data from South America into account, Vespignani's model estimates that pregnant women account for around 1 per cent of the total numbers of infected travellers returning to the US.

Newly released figures from the US Centers for Disease Control and Prevention reveal that the number of infected pregnant returnees to the US has now risen to 433, bringing Vespignani's estimate for the total number infected up to 43,300.

Local transmission

Oliver Brady at the London School of Hygiene and Tropical Medicine says that Vespignani's predictions are supported by multiple data sources, but that the extrapolation should be treated only as a ballpark figure. It may be an overestimate because many travellers from the US can afford to stay in air-conditioned hotels and use insect repellants, factors that reduce the risk of infection.

Nevertheless, Vespignani's estimate makes it seem likely that many people are already carrying the virus in areas of the US that are inhabited by the Aedes aegypti mosquitoes that are capable of spreading the virus between people.

The first locally spread cases of Zika in the US were confirmed by the CDC last week, in Miami, Florida, and the number who have been infected there has since risen to 14. The CDC is now advising pregnant women to avoid visiting the "transmission area" in the Wynwood neighbourhood of Miami.

But sooner or later, we are likely to see Zika transmission in other sites in the US. "On any given day, there are hundreds, if not more, people entering from Central and South America and the Caribbean," says Peter Hotez at Baylor College of Medicine in Houston, Texas. "That's why we can expect multiple foci of transmission on the Gulf Coast and Florida, where the Aedes aegypti mosquitoes are widespread now."

Cold-like symptoms

Vespignani's team originally estimated that there were around 30,000 people carrying Zika in the US, but have revised their numbers based on the latest CDC data. "It's changing day by day," says Vespignani.

The estimate is important for giving an idea of how widespread the virus may already be. Many people who have Zika don't become ill, or have only mild symptoms that could be mistaken for a cold. "Around 80 per cent of cases are asymptomatic, and even among those who do get ill, only around 20 per cent get diagnosed," says Vespignani.

Although thousands may be carrying the virus, the breeding season of the Aedes mosquitoes will soon come to an end, limiting their capacity to disperse Zika further.

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http://www.eurekalert.org/pub_releases/2016-08/ip-ith080316.php

Inosine treatment helps recovery of motor functions after brain injury

First study in primates shows promise reports restorative neurology and neuroscience

Brain tissue can die as the result of stroke, traumatic brain injury, or neurodegenerative disease. When the affected area includes the motor cortex, impairment of the fine motor control of the hand can result. In a new study published in Restorative Neurology and Neuroscience, researchers found that inosine, a naturally occurring purine nucleoside that is released by cells in response to metabolic stress, can help to restore motor control after brain injury.

Based on evidence from rodent studies, researchers used eight rhesus monkeys ranging in age from 5 to 10 years (approximately equivalent to humans from 15 to 30 years of age). All received medical examinations and motor skills were tested, including video recording of fine motor functions used to retrieve small food rewards. All monkeys were given initial MRI scans to ensure there were no hidden brain abnormalities.

Brain injuries were created in the area controlling each monkey's favored hand. Four monkeys received inosine treatment, while four received a placebo. Research staff were not informed regarding which monkeys were included in the treatment vs placebo groups. Recovery of motor function was then measured for a period of 14 weeks after surgery.

While both the treated and placebo groups recovered significant function, three out of four of the treated monkeys were able to return to their pre-operative grasping methods. The placebo group developed a compensatory grasping method for retrieving food rewards unlike the original thumb-and-finger method.

"In the clinical context, the enhanced recovery of grasp pattern suggests that inosine facilitates greater recovery from this type of cortical injury and motor impairment," explained lead investigator Tara L. Moore, PhD, of the Department of Anatomy & Neurobiology and the Department of Neurology, Boston University School of Medicine, Boston, MA, USA. "To our knowledge, this is the first study to demonstrate the positive effects of inosine for promoting recovery of function following cortical injury in a non-human primate."

Inosine has also been administered in human clinical trials for multiple sclerosis and Parkinson's disease and has been proven to be safe in doses up 3000 mg/day. Athletes have used inosine as a nutritional supplement for decades, and inosine supplements are widely available commercially. "Given the effectiveness of inosine in promoting cortical plasticity, axonal sprouting, and dendritic branching, the present evidence of efficacy after cortical injury in a non-human primate, combined with a long history of safe use, indicates a need for clinical trials with inosine after cortical injury and spinal cord injury," noted Dr. Moore.

The study points to neural plasticity, whereby the brain essentially "re-wires" connections between neurons to reestablish control pathways, as a therapeutic target for the recovery of fine motor control and grasping ability. Further study of cortical tissue from these monkeys is currently being completed and may provide further insights into the mechanisms underlying recovery.

http://www.eurekalert.org/pub_releases/2016-08/mu-bst080316.php

Big step towards cure for lifelong viral infections

New research has taken us a step closer to finding a cure for human immunodeficiency virus (HIV), as well as other infections including the glandular fever virus, which is associated with the development of lymphoma.

Some infections, such as HIV, cannot be cured with antiviral therapy because the virus effectively hides from the immune system.

An international team of scientists, led by Monash Biomedicine Discovery Institute researcher Dr Di Yu, and Dr Axel Kallies from the Walter and Eliza Hall Institute, have discovered that killer T cells, a specialised type of white blood cells, can find these "hidden" infected cells in tissue and destroy them. This discovery, published today in Nature Immunology, could provide new insights into finding a lifelong cure for chronic infections such as HIV.

Dr Yu said this type of killer T cell was naturally found in the body during infection, but their numbers and killing function needed to be boosted to allow them to eradicate chronic infections. "We've shown for the first time that there are specialised killer T cells that can migrate into a part of the lymphoid tissue and control hidden infection," Dr Yu said.

Although treatments for HIV with antiretroviral drugs are highly effective, treatment is lifelong and there is no cure. Other infections such as Epstein-Barr virus, the cause of glandular fever, may also hide and persist for many years, but become active when the immune system is compromised.

The researchers discovered that these specialised killer T cells, called follicular cytotoxic T cells, can enter hiding spots inside lymphoid tissue, where viruses can hide on treatment. These hiding spots are called B cell follicles.

Dr Yu's PhD student Mr Yew Ann Leong, who conducted a large portion of the research, also from the Monash Biomedicine Discovery Institute, said that although some infections including HIV could hide within B cell follicles, these killer T cells are specialised to eradicate this hidden virus pool.

"This discovery will help us to design new therapies that could eventually treat many different infections, including HIV," Mr Leong said.

Dr Axel Kallies, fellow lead researcher on the study from the Walter and Eliza Hall Institute, said he was excited to have co-led this exciting piece of international research.

"The potential of this discovery is huge. It helps us to understand how we may be able to treat diseases that affect the immune system itself, such as HIV or B cell lymphoma," Dr Kallies said.

Professor Sharon Lewin, the Director of the Peter Doherty Institute for Infection and Immunity, a joint venture of the University of Melbourne and Royal Melbourne Hospital and a co-author on the study, said there were a few ways this discovery could be translated into a treatment for people with chronic infections.

"We could potentially transfer these specialised super potent killer T cells into patients, or we could treat patients with proteins that can drag these specialised killer T-cells into the right spots, specifically to the hot spots where HIV can hide on antiviral treatment," Professor Lewin said.

Dr Yu said he hoped human trials of such treatments would begin within the next five years.

The researchers' work was supported by several international funding bodies, including the Australian National Health and Medical Research Council, the Sylvia and Charles Viertel Foundation, the amfAR Research Consortium on HIV eradication, the National Institutes of Health, the International AIDS Society and the Creative and Novel Ideas in HIV Research Program.

http://www.eurekalert.org/pub_releases/2016-08/bch-nho080216.php

Nearly half of pediatric clinical trials go unfinished or unpublished

Researchers cite waste; thousands of children enrolled in trials that don't inform science

Recent legislation is encouraging clinical trials in children, including the Best Pharmaceuticals for Children Act and the Pediatric Research Equity Act. Yet clinical trials in children commonly go either uncompleted or unpublished, finds a comprehensive study conducted by researchers at Boston Children's Hospital. Results were published online August 4 by the journal Pediatrics.

In all, 19 percent of trials were discontinued early, and 30 percent of completed trials remained unpublished in the medical literature several years later. "We feel there is a lot of inefficiency and waste that could be addressed," says senior investigator Florence Bourgeois, MD, MPH, of Boston Children's Hospital.

Overall, trials sponsored by industry were more likely to be completed than trials sponsored by academic institutions, the investigators found. However, completed trials sponsored by industry were less likely to be published than trials sponsored by academia. These findings are similar to those seen for clinical trials in adults.

"Our findings are in line with previously published studies focusing on adult trials, which may speak to how commonplace discontinuation and non-publication are in medical research in general," says coauthor Natalie Pica, MD, PhD, a resident at Boston Children's. "We need to make sure that when children participate in clinical trials, their efforts are contributing to broader scientific knowledge."

Pica and Bourgeois tracked 559 randomized, controlled pediatric trials registered on ClinicalTrials.gov from 2008 to 2010 and whose final status (completed or discontinued) was confirmed by the end of 2012. They then searched for related peer-reviewed publications through September 1, 2015. When no publication could be found, they inquired with study investigators and sponsors via email.

Their findings:

Of the 559 trials, 104 (19 percent) were discontinued early. Two thirds of these had already enrolled participants.

Of the 455 completed trials, 136 (30 percent) remained unpublished after an average of 58 months post-completion. (Forty-two of these, or 31 percent, did post results to ClinicalTrials.gov.)

Of the 104 discontinued trials, 39 percent were sponsored by industry and 55 percent by academic institutions. (The rest were funded by other sources.)

Two years after trial completion, academia-sponsored trials accounted for 30 percent of unpublished trials, and industry-sponsored trials for 63 percent. Three years after trial completion, academia-sponsored trials accounted for 23 percent of unpublished trials, and industry-sponsored trials for 70 percent.

In a multivariate analysis, the likelihood of non-publication was more than doubled for industry-sponsored trials two years after completion (odds ratio, 2.21) and more than tripled three years after completion (OR, 3.12).

Overall, more than 8,000 children were enrolled in trials that were never completed, and more than 69,000 children were enrolled in completed trials that were never published.

"This is the first study to look systematically at discontinuation and nonpublication of interventional pediatric clinical trials," says Bourgeois. "A number of legislative initiatives have been implemented to increase the study of interventions in children. Now we need to make sure that the proper resources are in place to ensure that information gleaned from these studies reaches the scientific community."

One proposed initiative cited by the paper is RIAT (Restoring Invisible and Abandoned Trials), which is supported by some high-profile journals. RIAT invites researchers with unpublished trials to either commit to publish within a year or provide public access to their data, allowing independent investigators to become "restorative authors."

"It's hard to reanalyze others' data," says Pica, "but this may be a useful mechanism to make sure that findings from completed trials are disseminated in the medical literature."

The study was supported by the National Institute of Child Health and Human Development (1R21HD072382) of the National Institutes of Health and the Fred Lovejoy House-Staff Research and Education Fund at Boston Children's Hospital.

http://wapo.st/2bacAYU

At least 30 children dead in Myanmar from unknown disease

At least 30 children have died in northwestern Myanmar since mid-June from an unknown disease that causes breathing difficulty, officials said Thursday.

YANGON, Myanmar — “We have this problem since two months ago and we haven’t received any help from the government yet,” said Kay Sai, a local administrator.

He said the deaths have been recorded in Nanyun and Lahe towns in the Naga region, one of the poorest in the country, about 1,300 kilometers (800 miles) from Yangon, adjoining India’s Nagaland state. He said most of the victims have been younger than 5.

Kay Sai said officials have not been able to identify the disease, which appears to be contagious. Blood samples have been sent to a hospital in the neighboring Saggaing division and results are awaited. There has been no response from the Ministry of Health, or the Department of Prevention of Transmitted Diseases on

the outbreak. He said local authorities have temporarily banned people from traveling around to prevent contagion.

The Naga area is the least developed part of Myanmar and is in utter neglect with the absence of even the most basic health care, education and infrastructure.

Law Yone, a local lawmaker of Lahe township, said that the region suffers from inadequate transportation, insufficient number of health care workers and medicine. Because of the backwardness, even curable diseases have proved to be deadly in the past he said.

http://www.eurekalert.org/pub_releases/2016-08/giot-ssw080316.php

Schizophrenia simulator: When chemistry upends sanity's balance

Engineers simulate chemical imbalances in schizophrenia memory disturbance to fast-track research and treatment solutions

It's called mental imbalance for a reason. Sanity hangs, in part, in the gentle balance of chemicals strung together within regions of the brain in an intricate matrix.

In schizophrenia, the matrix is sharply jarred, debilitating the mind and triggering hallucinations. Now, researchers at the Georgia Institute of Technology have created an interactive model of that matrix to fast-track research and treatment of the tormenting disorder.

It uses massive amounts of research data to simulate major systemic chemical changes in the brains of schizophrenia sufferers but depicts them in simple, colorful graphics.

Clinicians could use it to help patients and their loved ones better understand the chemical underpinnings of the disease and therapeutic alternatives. And researchers could test out hypotheses virtually, quickly and easily, and get a better overall sense of the disease.

The forest, not the trees

Research on schizophrenia can be a bit compartmentalized.

"Most researchers study a disease from their own specialty's focus and perspective. Then they may form a hypothesis based on dopamine or glutamate or some other single neurotransmitter," said research engineer Zhen Qi from the Wallace H. Coulter Department of Biomedical Engineering at Georgia Tech and Emory University. "Our model integrates all neurotransmitter systems."

The research results have been published and are also to appear in print in the journal Biochimica et Biophysica Acta (BBA) - General Subjects. The work is funded by the National Institutes of Health, the National Science Foundation, and the Georgia Research Alliance.

Peace, love, dopamine

There are a handful of neurochemicals most people have already heard of in connection with mental well-being.

Who hasn't read articles encouraging us all to eat more chocolate in hopes it will make us cheerier by boosting dopamine and serotonin?

"Dopamine triggers reward systems in the brain," Qi said. "Illegal drugs like amphetamines work with it. Dopamine makes you feel good."

Serotonin is subtler, and has mainly auxiliary functions. It sometimes counteracts dopamine's effects. Norepinephrine is also well-known, though often mistakenly referred to as adrenalin (which is actually epinephrine).

Together with other substances, these neurotransmitters help regulate the activities of at least 11 regions of the brain to do things like orchestrating parts of consciousness, including what's called "working memory."

Daily dysfunction

Qi and his team built the computational model around the neurochemistry behind that cognitive function, which goes badly awry in schizophrenia. Working memory is short-term recollection that lends the mind coherence. It remembers what we saw, said or did seconds ago and what we want to do seconds from now.

Hallucinations may be the eye-catching, popularized symptom of schizophrenia, but the disease's impairment of working memory, though less attention-grabbing, arguably debilitates sufferers more.

"Working memory deficits disrupt storing and processing of information as basic as letters and numbers, and they hinder the recall of stored information," Qi said. "That makes learning and planning difficult."

Sorry, no drugs

The researchers found that there is a stark lack of medical treatment for this symptom. "Cognitive symptoms were actually associated with schizophrenia before symptoms like hallucinations became the focus," said Eberhard Voit, a Georgia Tech biomedical engineer and a Georgia Research Alliance eminent scholar, who supervised the modeling effort. "Yet, drugs for schizophrenia mainly target the latter symptoms."

Two neurotransmitters, glutamate and gamma-aminobutyric acid (GABA) are crucial to working memory, as they coordinate two brain regions, the dorsal prefrontal cortex and the basal ganglia. Glutamate boosts nerve transmission, and GABA tones it down, and it's important for the two to strike a balance. But other neurotransmitters associated with additional brain regions also tug at that balance.

The matrix cracked

They all hang together much like in a mobile over a baby's crib. Bump one substance, and it knocks a whole system out of whack.

"Increasing the amount of any one neurotransmitter corresponds to pulling on that mobile. But this one neurotransmitter also affects all the other neurotransmitters through an interaction web," Voit said. "The new state of the mobile is very difficult to foresee."

This makes it challenging for a psychiatrist to adjust a patient's prescriptions and predict what the overall effects might be. That's where Qi's and Voit's computational model comes in.

Mind map

The Georgia Tech researchers collected studies on brain chemistry in schizophrenia from nearly 50 labs around the world, and mined the data.

To interpret them, they consulted researchers who have dedicated their lives to exploring schizophrenia and they fed the information into differential equations representing relationships between neurochemical systems.

They arrived at a novel map of the brain chemistry behind working memory dysfunction in schizophrenia. "That is new, this map. It reflects the collective knowledge of the scientific community," Voit said.

"With the information assembled, we wrote code to implement this model," Qi said. The result is a program of the neurochemical matrix that's easy to use.

Playing with mobiles

Users can input varying levels of neurotransmitters, and the matrix model simulates the labyrinthine domino effects they have on each other. But the output to the user is much simpler, even playful.

"What the user sees is a mobile tilting back and forth," Voit said. Color-coded dots on the mobile represent neurotransmitters. If doctors or researchers tug at one, the others follow until a new state is reached. "The mobile looks simple, although it takes into account the underlying complex interactions among neurotransmitters that determine the nodes in the mobile," Qi said.

With a few months' work, a graphic user interface could be constructed to allow doctors and researchers to easily use Georgia Tech's new computational model.

The more new research data other scientists add, the better Qi and Voit will be able to optimize the system and connect isolated pockets of knowledge from labs around the world to a greater whole for the greater good.

Gina Yu from Georgia Tech; Felix Tretter from the Bertalaniffy Center for the Study of Systems Science in Vienna, Austria; Oliver Pogarell from the University of Munich, and Anthony Grace from the University of Pittsburgh co-authored the paper. The research was funded by grants from the National Institutes of Health P01-ES016731, the National Science Foundation MCB-1517588 and an endowment from the Georgia Research Alliance. Any opinions, findings, conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the sponsoring institutions.

http://www.eurekalert.org/pub_releases/2016-08/ku-sbm080416.php

Smiling baby monkeys and the roots of laughter

Kyoto University macaque findings point to older smile origins

Kyoto, Japan -- When human and chimp infants are dozing, they sometimes show facial movements that resemble smiles. These facial expressions -- called spontaneous smiles -- are considered the evolutionary origin of real smiles and laughter.

Researchers at Kyoto University's Primate Research Institute show that this not only happens to higher-order primates like humans and chimpanzees, but also in newborn Japanese macaques, which are more distant relatives in the evolutionary tree.

The short, lop-sided smiles of baby Japanese macaques. When human and chimpanzee infants are dozing, they sometimes show facial movements that resemble smiles. These facial expressions -- called spontaneous smiles -- are considered the evolutionary origin of real smiles and laughter. Researchers at Kyoto University's Primate Research Institute show that this not only happens to higher-order primates like humans and chimpanzees, but also in newborn Japanese macaques, which are more distant relatives in the evolutionary tree. **Kyoto University Primate Research Institute**

"About a decade ago we found that chimp infants also display spontaneous smiles," says study author Masaki Tomonaga. "Since we see the same behavior in more distant relatives, we can infer that the origin of smiles goes back at least 30 million years, when old world monkeys and our direct ancestors diverged."

Lead author Fumito Kawakami caught macaque infants smiling when they were receiving routine health checkups. "These checkups can take quite long, so the infants tend to nap in between," says Kawakami. "We took this opportunity to empirically examine the behavior."

In total they observed 58 spontaneous smiles from seven macaque infants, all of which showed spontaneous smiles at least once. "Spontaneous macaque smiles are more like short, lop-sided spasms compared to those of human infants. There were two significant similarities; they both happened between irregular REM sleep, and they show more lop-sided smiles compared to symmetrical, full smiles," says Kawakami. "A major difference, though, is that the smiles were much shorter."

Some researchers have argued that infants' spontaneous smiles exist to make parents feel that their children are adorable and to enhance parent-child

communication. On the other hand, this study suggests that spontaneous smiles don't express feelings of pleasure in chimpanzees and Japanese monkeys; rather, the smiles are more similar to submissive signals (grimaces) rather than smiles (play faces). The team interpreted that spontaneous smiles facilitate the development of cheek muscles, enabling humans, chimpanzees, and Japanese monkeys to produce smiles, laughs, and grimaces.

So is smiling special to monkeys and primates? Tomonaga says he won't rule out the possibility.

"There are case reports about mice laughing when they get tickled and dogs displaying facial expressions of pleasure. It may be the case that many mammal infants display spontaneous smiles, in which case smiling would have an older evolutionary origin. Who knows? " he says with a smile.

The paper "The first smile: spontaneous smiles in newborn Japanese macaques (Macaca fuscata)" appeared 2nd August, 2016 in Primates, with doi: 10.1007/s10329-016-0558-7

http://www.eurekalert.org/pub_releases/2016-08/b-amh080316.php

Acupuncture may help to improve dementia precursor -- impaired memory

May also boost power of drug treatment, but further good quality evidence needed

Acupuncture may help to improve the subtle memory loss that precedes the development of dementia, otherwise known as mild cognitive impairment, or MCI for short, suggests a review of the available published evidence in Acupuncture in Medicine. And it may be particularly effective when combined with drug treatment, the findings indicate, although further better quality research is needed, caution the researchers.

MCI refers to a transitional state between normal ageing and dementia, whereby an affected person typically exhibits a subtle deterioration in memory capacity beyond what would be expected for his/her age. Around 5-10% of MCI cases will evolve into dementia every year.

Several previous studies have suggested that acupuncture may reduce MCI symptoms, and the researchers wanted to analyse the available evidence to try and quantify the safety and effectiveness of the technique.

The researchers trawled Western and Chinese research databases for relevant trials comparing acupuncture and medical treatment that had been published up to July 2015. Out of 10 trials, five that involved a total of 568 people, and had been published in 2012 and 2013, were deemed suitable for inclusion in the study. Three directly compared acupuncture with nimodipine, while two evaluated acupuncture combined with nimodipine. The number of participants in each study varied from 26 to 94, while acupuncture treatment was provided three to five times a week for 8 weeks in four trials, and for 3 months in one.

Analysis of the pooled data showed that those in receipt of acupuncture fared better than those on nimodipine alone. And they achieved better scores on two of the principal tests used to assess MCI and dementia: the mini mental state exam and picture recognition.

Furthermore, a combination of acupuncture and nimodipine significantly improved mini mental state exam scores when compared to nimodipine alone.

Three of the trials reported side effects, which for acupuncture included fainting during treatment and slow bleeding (errhysis) at the needle sites, and for nimodipine included gut symptoms and mild headache.

The researchers point to several caveats, including the high or unclear risk of bias in the trials, the randomisation process, and the trial design which didn't take account of potential placebo effects. Most of the trials were also carried out in China where patients may prefer acupuncture to medical treatment.

Despite the promising findings, further large rigorous clinical trials in Western settings are needed before any firm conclusions can be drawn about the effectiveness and safety of acupuncture for treating MCI, conclude the researchers.

http://www.eurekalert.org/pub_releases/2016-08/giom-tlo080316.php

The Lancet Oncology: Australian researchers uncover complex genetic secrets of cancer risk

Cancer is a disease of our genes - yet our understanding of how our genetic makeup affects our risk of cancer is still rudimentary.

Now, that's set to change, following pioneering work by Australian researchers to understand the genetics of risk in sarcoma. In a landmark study of over 1000 sarcoma patients, the researchers uncovered numerous new genetic risk factors for the cancer - and, in a world first for any cancer type, they showed that carrying two or more of these rare mutations increases an individual's cancer risk.

Sarcomas are cancers of connective tissues that disproportionately affect the young. They are one of the three leading causes of disease-related death among children and young adults in Australia, and sarcoma survivors are at higher risk of developing a second cancer.

The new findings relating to cancer risk were uncovered through the International Sarcoma Kindred Study (ISKS), an Australian-led international consortium that is exploring the genetic basis of sarcoma in over 1000 individuals - the largest study ever conducted in this disease. The research is published today in the leading journal The Lancet Oncology.

The ISKS team used a 'gene panel' of 72 genes to detect mutations in each study participant. They identified mutations in a number of new genes that significantly increase the risk of developing sarcoma, including in the genes ERCC2, ATR, BRCA2 and ATM.

Importantly, in individuals carrying mutations in two genes, the risk of developing sarcoma was measurably higher than in those with a mutation in only one gene. And in carriers of three or more mutations, the risk was greater still.

"This is the first time - in any cancer - that anyone has quantified the effect of multiple rare genetic mutations on cancer risk," says Professor David Thomas (Head of The Kinghorn Cancer Centre and the Cancer Division of the Garvan Institute of Medical Research), who led the study.

"Until now, we've been limited to single-gene thinking, so we tell patients, for instance, that carrying a BRCA1 mutation means their breast cancer risk is higher, or that their risk of sarcoma and other cancers is higher if they've got a particular mutation in the p53 gene.

"The study shows us that the landscape of cancer risk is far more complex than that. We can now see that the risk for developing sarcoma is increased through the combined effect of multiple genes, and that the more mutations someone carries, the earlier the onset of cancer. "These previously invisible effects are at least as large as the impact of mutations in the p53 gene itself, which is currently the strongest known genetic cause of sarcoma."

Dr Mandy Ballinger (Garvan), who co-ordinates the ISKS globally, says the study will radically change how sarcoma risk is understood.

"It's well accepted for a few cancers - like breast cancer and bowel cancer - that cancer risk is substantially determined by the genes we inherit from our parents. Our study brings sarcoma into that select group.

"About half the study participants carried at least one of these apparently cancer-promoting mutations, and almost a quarter carried more than one, which really underscores that sarcoma risk is inherited to a large extent from one's parents."

"We've never been able to identify these at-risk individuals, and their families, before. Now we can," adds Prof Thomas. "That means we can manage risk better, and help those people to get the care they need, when they need it."

Prof Thomas says the study's findings are an important step towards personalised medicine for cancer.

"Understanding the genetic drivers that give a person an increased risk of cancer also helps us understand how best to treat that person's cancer. And for about a third of the individuals we studied, the gene mutations they carry give us important information about how regularly they should be monitored and how they should or should not be treated.

"To give one example, the ERCC2 gene is involved in detoxifying chemotherapeutic agents - so for those individuals who carry an ERCC2 mutation, chemotherapy may not be an appropriate treatment.

"And for individuals carrying a BRCA2 mutation, we now know that they are at risk of sarcoma as well as breast and ovarian cancer - which also brings into play new treatment approaches."

"A lot of what we're doing going forward is looking at how we use genetic information about risk to alter the way we treat people. The more we know, the more precisely we can match individuals with the best possible treatment for them."

The researchers say that an important new direction for the research will be to investigate the entire genome for genetic mutations that increase sarcoma risk.

"We have only scratched the surface of cancer's genetic underpinnings," says Dr Ballinger. "Ultimately, we want to identify the entire set of genetic mutations that affect the risk of developing this devastating cancer."

Whole-genome studies of sarcoma risk will be aided by the NSW Cancer Genomic Medicine Program announced last year by the NSW Government, as part of the Sydney Genomics Collaborative program.

http://www.eurekalert.org/pub_releases/2016-08/uom-ttb080416.php

Toe-tapping to better health: Fidgeting helps prevent arterial dysfunction from sitting

Researchers recommend leg movement when walking is not an option

COLUMBIA, Mo. -- Previous research has shown that sitting for an extended period of time at a computer or during a long airline flight reduces blood flow to the legs, which may contribute to the development of cardiovascular disease. Now, researchers from the University of Missouri have found that fidgeting while sitting can protect the arteries in legs and potentially help prevent arterial disease.

"Many of us sit for hours at a time, whether it's binge watching our favorite TV show or working at a computer," said Jaume Padilla, Ph.D., an assistant professor of nutrition and exercise physiology at MU and lead author of the study. "We wanted to know whether a small amount of leg fidgeting could prevent a decline in leg vascular function caused by prolonged sitting. While we expected fidgeting to increase blood flow to the lower limbs, we were quite surprised to find this would be sufficient to prevent a decline in arterial function."

During the study, the researchers compared the leg vascular function of 11 healthy young men and women before and after three hours of sitting. While sitting, the participants were asked to fidget one leg intermittently, tapping one foot for one minute and then resting it for four minutes, while the other leg remained still

throughout. On average, the participants moved their feet 250 times per minute. The researchers then measured the blood flow of the popliteal -- an artery in the lower leg -- and found that the fidgeting leg had a significant increase in blood flow, as expected, while the stationary leg experienced a reduction in blood flow.

Research has shown that increased blood flow and its associated shear stress -- the friction of the flowing blood on the artery wall -- is an important stimulus for vascular health. However, fidgeting's protective role had not been established.

While only one leg was exposed to fidgeting during the experiment, in a real-world scenario the researchers recommend tapping both legs to maximize the beneficial effects. However, the researchers caution that fidgeting is not a substitute for walking and exercise, which produce more overall cardiovascular benefits.

"You should attempt to break up sitting time as much as possible by standing or walking," Padilla said. "But if you're stuck in a situation in which walking just isn't an option, fidgeting can be a good alternative. Any movement is better than no movement."

The study, "Prolonged Sitting-induced Leg Endothelial Dysfunction is Prevented by Fidgeting," recently was published by the American Journal of Physiology Heart and Circulatory Physiology. Research reported in this publication was supported by the National Institutes of Health (K01 HL-297 125503 and R21 DK-105368) and the Japan Society for the Promotion of Science (14J09537). The researchers have no conflicts of interest to declare related to this study.

In addition to Padilla, the research team included Jill Kanaley, Ph.D., professor and associate chair of the MU Department of Nutrition and Exercise Physiology; Lauren Walsh, graduate student in the MU Department of Nutrition and Exercise Physiology; Robert Restaino, graduate student in the MU Department of Medical Pharmacology and Physiology; Takuma Morishima, Ph.D., postdoctoral fellow in the MU Department of Nutrition and Exercise Physiology; and Paul Fadel, Ph.D., professor of kinesiology and director of clinical translational science at the University of Texas at Arlington College of Nursing and Health Innovation.

The MU Department of Nutrition and Exercise Physiology is jointly administered by the School of Medicine, the College of Agriculture, Food and Natural Resources, and the College of Human Environmental Sciences.

http://www.eurekalert.org/pub_releases/2016-08/nioa-tva080416.php

Three vaccine approaches protect monkeys against Zika infection

NIH-supported study provides insight into possible Zika vaccine designs

WHAT: Three different investigational Zika virus vaccine platforms--an inactivated virus vaccine, a DNA-based vaccine, and an adenovirus vector-based vaccine--protected against infection, induced immune responses, and produced no adverse side effects when tested in rhesus macaques challenged with the Zika virus, according to findings appearing August 4 in the journal Science. The results suggest that each of the three approaches holds promise for designing an effective Zika vaccine, according to the authors.

Researchers supported by the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health, first tested the inactivated Zika virus vaccine in 16 rhesus macaques, with eight receiving the experimental vaccine and eight receiving a placebo injection. Within two weeks after the initial injection, all vaccinated animals developed neutralizing antibodies as well as antibodies specific to the viral envelope protein, a key vaccine target on the Zika virus. A second dose was given four weeks later, which substantially boosted antibody levels. The monkeys were then challenged with Zika virus; following exposure, the vaccinated animals had no detectable virus and showed no other evidence of infection, while the group that received the placebo injection developed high levels of virus replication in the blood and other tissues for six to seven days.

In another experiment, the researchers administered two doses of an experimental DNA vaccine, one dose of an experimental adenovirus vector vaccine, or a placebo injection to three groups of four monkeys each. The group that received the DNA vaccine received a booster shot four weeks after the initial vaccination. Minimal levels of antibodies were detected after the first injection. However, after the second injection, researchers detected Zika-specific neutralizing antibodies in the animals. The adenovirus vector-based vaccine induced Zika-specific neutralizing antibodies two weeks after the single injection. Monkeys were exposed to Zika virus four weeks after the final vaccination, and both the DNA and adenovirus vector vaccine provided complete protection against infection. These encouraging findings suggest a path forward for clinical development of Zika vaccines in humans, according to the researchers.

ARTICLE: *P Abbink et al. Protective efficacy of multiple platforms against Zika virus challenge in rhesus monkeys. Science DOI: 10.1126/science.aah6157 (2016).*

http://bit.ly/2aDdiMd

Astronomers Watch as Io's Atmosphere Collapses

Jupiter's shadow makes this volcanic moon's atmosphere freeze solid once per day

By Sarah Lewin, SPACE.com on August 4, 2016

Jupiter's volcanic moon Io boasts an atmosphere made from sulfur dioxide gas—when the satellite is in sunlight. For the first time, researchers have observed the atmosphere during the moon's daily pass through Jupiter's shadow, watching that atmosphere temporarily freeze and collapse. Credit: Image Courtesy of Southwest Research Institute

Jupiter's active moon Io has a collapsible atmosphere: New views show the satellite's shroud of sulfur dioxide freezing when Io enters its planet's shadow each day and converting back to gas when the moon emerges.

Io, Jupiter's fifth moon, is the solar system's most volcanically active body; plumes of the sulfur dioxide gas bursts from multiple active volcanoes, reaching up to 300 miles (480 kilometers) above the moon's surface at a scalding 3,000 degrees Fahrenheit (1,650 degrees Celsius). The Jupiter moon's surface, on the other hand, is frigidly cold, and gets even colder when Jupiter blocks out the sun—which prompts the atmospheric collapse.

"This confirms that Io's atmosphere is in a constant state of collapse and repair, and shows that a large fraction of the atmosphere is supported by sublimation of sulfur dioxide ice [when it turns to gas]," John Spencer, a researcher at Southwest Research Institute (SwRI) in Colorado and co-author on the new work, said in a statement. "Though Io's hyperactive volcanoes are the ultimate source of the sulfur dioxide, sunlight controls the atmospheric pressure on a daily basis by controlling the temperature of the ice on the surface."

"We've long suspected this, but can finally watch it happen," Spencer added in the same statement.

The researchers used the Gemini North telescope in Hawaii and the Texas Echelon Cross Echelle Spectrograph (TEXES) to watch Io cross into and out of Jupiter's shadow on two different nights. At the time, Io was more than 420 million miles (675 million km) from Earth. Previous studies were unable to make out Io's atmosphere in the dark, but this new work relied on detecting the atmosphere radiating heat, researchers said in the statement.

In sunlight, Io's surface averages out to minus 235 degrees F (minus 150 degrees C), but once the moon passes into Jupiter's shadow, that temperature drops to minus 270 degrees F (minus168 degrees C). No longer warmed by the sun, the atmosphere of sulfur dioxide gas freezes and turns to frost on the moon's surface.

Io leaves Jupiter's shadow after 1.7 Earth days, which is 2 hours of Io's day, and the sulfur dioxide sublimates—goes straight from solid to gas—and pumps up the atmosphere once again when the moon re-enters sunlight.

Understanding the volcanic, lava-covered Io is key to understanding the environment around Jupiter, where NASA's Juno spacecraft arrived July 4, researchers said in the statement. "Io spews out gases that eventually fill the Jupiter system, ultimately seeding some of the auroral features seen at Jupiter's poles," said Constantine Tsang, the study's lead author (also at SwRI). "Understanding how these emissions from Io are controlled will help paint a better picture of the Jupiter system."

http://www.medscape.com/viewarticle/866789

Which Psoriasis Biologics Have the Best Response Rates?

ORBIT (Outcome and Retention Rate of Biologic Treatments for Psoriasis): A Retrospective Observational Study on Biologic Drug Survival in Daily Practice

Vilarrasa E, Notario J, Bordas X, López-Ferrer A, Gich IJ, Puig L

J Am Acad Dermatol. *2016;74:1066-1072*

Graeme M. Lipper, MD

Biologic drugs such as adalimumab (ADA), etanercept (ETN), infliximab (IFX), and ustekinumab (UST) have revolutionized the way we manage moderate to severe psoriasis vulgaris and psoriatic arthritis. Patients who once had debilitating disease can now enjoy clear or almost-clear skin in most cases, with many seeing dramatic improvement within 1 month of therapy. Biologics are so effective because they target specific proinflammatory pathways that are critical to the pathogenesis of psoriasis.

First-generation biologics (ETN, IFX, ADA) work by blocking tumor necrosis factor-alpha signaling, while second-generation biologics (UST) target the proinflammatory cytokines interleukin (IL)-12/23, and third-generation biologics target IL-17. All biologics yield superior efficacy rates (Psoriasis Area Severity Index [PASI] 75 responses ranging from 40% to > 90%) when compared with methotrexate, cyclosporine, and acitretin, with fewer adverse events and better overall tolerability. Treatment failures do occur, however; some patients do not achieve PASI 75 clearance, some experience diminished efficacy over time, and others discontinue the medication because of adverse events both mild (eg, injection-site reactions) and severe (eg, opportunistic infections).

Is there a way to predict real-life response rates to biologics? Placebo-controlled clinical trials with outcome measures such as PASI 75/90/100 response rates and Physician Global Assessment (PGA) scores are the best benchmarks of clinical efficacy, but these studies rarely evaluate long-term efficacy (> 4 years of follow-up). To address this deficiency, Vilarrasa and colleagues conducted a retrospective study to determine "drug survival" (the mean length of time patients remain on a drug) in a cohort of 427 patients (63.5% male; mean age, 50.2 years) with moderate to severe psoriasis vulgaris (mean baseline PASI, 16.4). In addition to determining mean drug survival times for ETN, IFX, ADA, and UST, investigators searched for variables that positively or negatively affected drug survival times.

The cohort of 427 Spanish patients received 703 courses of biologic therapy during the study period (January 2007-June 2013). Roughly half of these patients entered the study period without previous exposure to biologic therapy. Roughly a third of patients received combination treatment, most commonly with

methotrexate (76.1% of combination therapy cases). Drug survival was calculated from start to discontinuation of therapy due to primary lack of effectiveness (failure to reach PASI 75 response by week 16), secondary treatment failure (loss of PASI 50 response), or biologic-associated adverse events.

On the basis of their statistical analysis, the authors observed the following:

Overall mean drug survival for all biologics was 31.0 months.

Drug survival for all biologics was lower in obese patients (BMI > 30 kg/m^2) versus nonobese patients (23.0 months versus 37.3 months).

Drug survival was longest for patients taking UST (> 48 months) versus all other biologics (ADA = 30.5 months; ETN = 24.8 months; IFX = 30.0 months).

Drug survival was shortest for patients taking ETN (24.8 months).

Dose augmentation (increasing the dose for suboptimal response) only increased drug survival in the IFX group; in contrast, combination therapy did not affect drug survival.

PASI 75 and PASI 90 responses at week 16 increased drug survival (45.0 months and 50.9 months, respectively).

Variables that did not affect drug survival included: gender, presence of psoriatic arthritis, biologic-naive status prior to treatment, and use of combination therapy.

Viewpoint

When considering biologic therapies for patients with moderate to severe psoriasis vulgaris, clinicians have a growing list of options to choose from. "Real-life" drug survival isn't the only predictive measure of treatment success, but it should be considered along with adverse risk considerations, patient compliance, comorbidities, and, unfortunately, drug expense and insurance coverage.

Vilarrasa and colleagues acknowledge that their retrospective study was not randomized; hence, there may have been hidden factors influencing which biologic was chosen for which patient, and these in turn may have influenced the drug survival data. Nevertheless, their findings that drug survival was shortest for ETN and longest for UST (versus TNF-alfa inhibitors) is in agreement with findings of similar Dutch and Danish studies,[1-3] as is the observation that obesity predicts a higher likelihood of treatment failure for all biologics.[4]

These results should help to educate patients and to manage expectations. Patients who respond rapidly to biologic therapy (PASI 70 or PASI 90 clearance during the induction phase) are more likely to enjoy long-term remission. In contrast, those with a high BMI should be advised that their psoriasis may take longer to respond and may need combination therapy for optimal clearance.

Abstract

References

1. Gniadecki R, Kragbelle K, Dam TN, Skov L. Comparison of drug survival rates for adalimumab, etanercept and infliximab in patients with psoriasis vulgaris. Br J Dermatol. 2011;164:1091-1096. Abstract

2. Gniadecki R, Bang B, Bryld LE, et al. Comparison of long-term drug survival and safety of biologic agents in patients with psoriasis vulgaris. Br J Dermatol. 2015;172:244-252. Abstract

3. Van den Reek JM, Zweegers J, Kievit W, et al. 'Happy' drug survival of adalimumab, etanercept and ustekinumab in psoriasis in daily practical care: results from the BioCAPTURE network. Br J Dermatol. 2014;171:1189-1196. Abstract

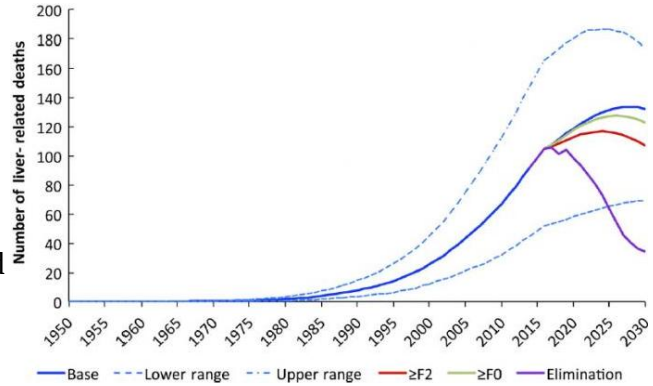
4. Di Lernia V, Tasin L, Pellicano R, Pellicano R, Zumiani, Albertini G. Impact of body mass index on retention rates of anti-TNF-alfa drugs in daily practice for psoriasis. J Dermatolog Treat. 2012;23:404-409. Abstract

http://www.eurekalert.org/pub_releases/2016-08/bu-mhc080416.php

Major treatment expansion could essentially eliminate hepatitis C in R.I. by 2030

Treatment for hepatitis C infection would reduce cases by 90 percent and prevent more than 70 percent of deaths

PROVIDENCE, R.I. -- A new Brown University study projects that increasing the number of Rhode Islanders treated every year for hepatitis C virus infection (HCV) to about 2,000 by 2020 would reduce cases by 90 percent and prevent more than 70 percent of expected liver-related deaths in the state by 2030.



***Projections show that the 'eliminiation' strategy could dramatically reduce liver-related deaths in Rhode Island over the next decade and a half*. Brandon Marshall, et. al.**

More moderate increases in treatment such as doubling the number treated each year could reduce death rates by less than 20 percent, the analysis showed.

"Hepatitis C virus-related morbidity and mortality can be reduced significantly in Rhode Island if an aggressive treatment strategy is implemented over the next decade," wrote public health Assistant Professor Brandon Marshall and colleagues in the journal Epidemiology and Infection.

"The medications available today are so effective that -- with increased treatment uptake -- we have the opportunity to all but eliminate the disease by 2030," he added.

Marshall's analysis comes as Rhode Island takes a deep look at the how the disease has impacted the state. July 28 was World Hepatitis Day. The Aug. 6 WaterFire marks that occasion. Meanwhile, next week the Rhode Island Department of Health plans to unveil an epidemiological report, in partnership

with the Rhode Island Public Health Institute, describing key aspects of the state of the epidemic.

Hepatitis C can take decades to cause serious disease, but ultimately the liver damage it can cause can be fatal as it progresses to cirrhosis, liver failure or liver cancer.

In recent years many baby boomers (infected as long ago as the 1950s, '60s and '70s) have been reaching those critical later stages of progression. One in 30 baby boomers in the U.S. has hepatitis C. At the same time, new treatments have made the disease curable in only a few weeks, very safely, but in the U.S. they are priced at tens of thousands of dollars.

"Hepatitis C kills more people in the United States than any other infectious disease," said study co-author Dr. Lynn E. Taylor, assistant professor of medicine, physician at The Miriam Hospital and founder of Rhode Island Defeats Hepatitis C. "In fact, hepatitis C causes more deaths than all other 60 infectious diseases reportable to the CDC, combined. This is the critical infectious disease epidemic of our time. Our goal is elimination. We need to scale up our testing and treatment with urgency to avert preventable illness and early death."

Modeling mortality

The new study sought to project the impact of expanding treatment by varying degrees using a sophisticated computer model loaded with data from Rhode Island's epidemic or, when that data wasn't available, from that of the U.S. more broadly.

Marshall's team, including lead author and Brown public health graduate student Dr. Ayorinde Soipe, included figures and estimates for the number of Rhode Islanders infected since 1950, the progression rate of hepatitis C's various strains and the rate of new infections. They also considered many other pertinent factors including how often people die of the disease vs. other causes over time, and the likelihood that they could clear the infection without treatment.

They then used the model to project the course of the next 14 years of the epidemic in Rhode Island based on four different treatment scenarios:

The Base Case: Treatment for 215 residents a year, restricted to patients with stage three fibrosis or worse.

Scale-up 1: Double treatment to 430 residents annually and treating patients with stage two fibrosis or worse.

Scale-up 2: Double treatment to 430 residents annually and treating patients irrespective of HCV disease stage.

The "Elimination" Scenario: Whatever the model says is needed to reduce infections by 90 percent by 2030, which turned out to be treating 2,000 patients a year by 2020.

The greatest reductions in liver-related deaths by 2030 occurred in the elimination scenario: a drop of 72.4 percent compared to the base case.

Scale-up 1 would reduce liver-related deaths by 19.3 percent, and Scale-up 2 would reduce them by 7.4 percent.

Similar patterns of reductions would also bring down the number of cases of cirrhosis, which could lead to more deaths after 2030.

Marshall said that the reason why maintaining a restriction on treating patients with more advanced liver disease would result in fewer deaths (as in Scale-up 1 vs. 2) is because with few people being treated, it would prevent more deaths if treatment resources were focused on those more acutely ill.

The study did not track the costs of expanding treatment, which would likely be in the tens of millions of dollars. The researchers noted, however, that while the upfront investment would be large, it would likely pay off eventually in preventing thousands of cases of cirrhosis, liver failure and liver cancer, which are expensive to treat and would drastically reduce the need for very costly liver transplants.

The study has other limitations, such as the need to make assumptions based on national rather than state data. It also might underestimate the prevalence of hepatitis C because it does not account for rising infection rates among young people amid the state's opioid and heroin epidemic.

Still, Marshall said, the study provides guidance for state policymakers, insurers and care providers about what it will take to bend the curve of the state's epidemic to result in far fewer deaths.

In addition to Soipe, Marshall and Taylor, the paper's other authors are Brown public health Assistant Professor Omar Galárraga and Drs. Homie Razavi and Devin Razavi-Shearer of the Center for Disease Analysis in Lafayette, Colorado.

The Rhode Island Foundation's support of R.I. Defeats HepC funded the research. Dr. Soipe was supported by a trainee award from the Lifespan/Tufts/Brown Center for AIDS Research (CFAR), and Dr. Marshall is supported by a Henry Merrit Wriston Fellowship from Brown University.

http://www.eurekalert.org/pub_releases/2016-08/w-wpf080516.php

Wiley provides free access to latest Zika research to coincide with events in Brazil

Wiley has made available all of its published Zika content on one site

Wiley has made available all of its published Zika content on one site http://www.wiley.com/go/zika to coincide with events in Brazil, a territory that has seen increased cases of Zika Virus recently. Access will be freely available until 30 September. New research from medicine, entomology, obstetrics, neuroscience and more will be added to Wiley's Zika page as it becomes available along with interactive content such as interviews, podcasts and videos, providing the latest updates on Zika virus.

Zika virus is transmitted primarily by Aedes mosquitoes and has been linked to causing neurological complications in humans.

Recent Zika research published by Wiley includes:

Survey of Blood Collection Centers and Implementation of Guidance for Prevention of Transfusion-Transmitted Zika Virus Infection -- Puerto Rico, 2016 (21 July 2016)
http://onlinelibrary.wiley.com/doi/10.1111/ajt.13941/full?campaign=wlytk-42586.1975347222

Zika Virus: An update on epidemiology, pathology, molecular biology and animal model, Journal of Medical Virology (5 May 2016)
http://onlinelibrary.wiley.com/doi/10.1002/jmv.24563/full?campaign=wlytk-42585.2038194444

Causal or not: applying the Bradford Hill aspects of evidence to the association between Zika virus and microcephaly, EMBO Molecular Medicine (14 March 2016)
http://onlinelibrary.wiley.com/doi/10.15252/emmm.201506058/full?campaign=wlytk-42585.2048842593

Zika: Where it has been, where it is going and how to stop it, International Journal of Clinical Practice (26 February 2016)
http://onlinelibrary.wiley.com/doi/10.1111/ijcp.12792/full?campaign=wlytk-42585.2026157407

http://www.eurekalert.org/pub_releases/2016-08/foas-wys080516.php

Why you're stiff in the morning: Your body suppresses inflammation when you sleep at night

Research in The FASEB Journal suggests that the CRYPTOCHROME protein represses inflammatory pathways during nighttime sleep, making inflammation symptoms, such as stiffness, seem worse when this effect wears off as you wake up

Federation of American Societies for Experimental Biology

New research published online in The FASEB Journal, describes a protein created by the body's "biological clock" that actively represses inflammatory pathways within the affected limbs during the night. This protein, called CRYPTOCHROME, has proven anti-inflammatory effects in cultured cells and presents new opportunities for the development of drugs that may be used to treat inflammatory diseases and conditions, such as arthritis.

"By understanding how the biological clock regulates inflammation, we can begin to develop new treatments, which might exploit this knowledge," said Julie Gibbs, Ph.D., a researcher involved in the work and arthritis research UK career development fellow at the Centre for Endocrinology and Diabetes at the Institute of Human Development at the University of Manchester, United Kingdom. "Furthermore, by adapting the time of day at which current drug therapies are administered, we may be able to make them more effective."

To make this discovery, Gibbs and colleagues harvested cells from joint tissue of healthy mice and/or humans. These cells, called "fibroblast-like synoviocytes," are important in the pathology that underlies inflammatory arthritis. Each of these cells keeps a 24-hour rhythm, and when this rhythm was disrupted by knocking out the cryptochrome gene there was an increased inflammatory response. This suggests that the cryptochrome gene product, the CRYPTOCHROME protein, has significant anti-inflammatory effects. To test this hypothesis, researchers administered drugs designed to activate the protein to determine if protection against inflammation could be achieved--and it was.

"This study reminds us that inflammation, typically thought of as chronic and brittle, can, in fact, be nuanced--In this case, under the influence of the brain's suprachiasmatic nucleus, which controls the body's circadian physiology," said Thoru Pederson, Ph.D., Editor-in-Chief of The FASEB Journal. "The clinical implications are far-reaching."

http://www.medscape.com/viewarticle/867109

5 Things Clinicians Should Know Now That Zika Has Made It to the United States

They said it would happen and it has.

Hallie Whitman; Stephanie Cajigal

The Florida Department of Health announced on July 29 that four people in Miami who tested positive for Zika likely acquired the virus through mosquito bites—the first suspected cases of local transmission to occur in the continental United States.

The count has since risen to 14 people, but the local cases weren't a surprise to US health officials who have warned for months that Zika would eventually make its way from Central and South America, the Caribbean, and Puerto Rico to the mainland United States. These facts should be on your radar now that local Zika transmission has begun:

1. **The number of patients in the United States who are infected with Zika is growing.**

The 14 locally transmitted Zika cases documented in Miami add to the increasing number of cases reported in the United States this year. According to the Centers for Disease Control and Prevention (CDC), there are 1658 total cases of Zika in the United States as of July 27, 2016, of which 15 were sexually transmitted.

While the first infections reported in the United States were contracted after travel to affected regions, the recent cases in Miami were transmitted locally via mosquito bites.

Zika cases within the US military and their families are also expanding rapidly; as

of August 3, at least 41 military members, including one pregnant woman, have been infected while overseas.

2. **The domestic travel ban only includes a 1-mile area within Miami.**

The confirmation of Zika in Florida led the CDC to issue a domestic travel warning for pregnant women, urging avoidance of all nonessential travel to the 1-mile area of active transmission north of downtown Miami. CDC Director Tom Frieden, MD, MPH, explained that there is no proof of further Zika outbreak outside of the small Miami neighborhood. Also, the *Aedes aegypti* mosquito responsible for spreading the virus cannot fly more than 150 meters in its lifetime; the advisory area extends far beyond that. Florida Governor Rick Scott stressed that the rest of the state "remains safe and open for tourism."

3. **Testing is available for any patient who requests it.**

The CDC recommends the use of real-time reverse transcription polymerase chain reaction (rRT-PCR) testing for diagnosis, which can detect Zika RNA in blood and urine samples for up to 2 weeks after symptom onset. Although a positive rRT-PCR result indicates infection, a negative result does not rule out Zika, so other antibody tests, such as immunoglobulin M, can be used for confirmation. The CDC recommends that all pregnant women be tested for infection at each prenatal care visit if they live in an active transmission area or if their sexual partner has traveled to one. Here is guidance for collecting and submitting the samples.

It can take weeks or longer to get testing results back, but a newly approved Quest Diagnostics version of the Zika test is expected to broaden testing capacity and increase speed of results.

4. **Zika prevention kits are available for patients.**

Many state and local health departments are offering Zika prevention kits for patients. The CDC also recommends that concerned patients build Zika kits, which include a bed net, standing water treatment tabs, insect repellent, permethrin spray, and condoms.

5. **Patients are likely to ask questions—here's how to answer.**

As fear of Zika in the United States grows, patients will want more information. Medscape's parent company, WebMD, offers this guide for patients. Clinicians can also continue to stay up-to-date on all Zika-related news and information with our Zika Virus Resource Center.

Still Have Questions?

If you have any questions about Zika that haven't been answered here, please ask them in the comments section. We will try to answer as many of your questions as possible in a follow-up article to be published soon.

http://bit.ly/2aTpxFT

Venus could have been habitable while life evolved on Earth

Wasn't always so hostile

By Aviva Rutkin

Nicknamed Earth's evil twin, Venus seems like everything our planet is not: scorching hot, dried out and covered in toxic clouds. But a mere one or two billion years ago, these two wayward siblings might have been more alike.

New computer simulations suggest that early Venus might have looked a lot like our home planet – and it might even have been habitable.

"It's one of the big mysteries about Venus.

How did it get so different from Earth when it seems likely to have started so similarly?" says David Grinspoon at the Planetary Science Institute in Tucson, Arizona.

"The question becomes richer when you consider astrobiology, the possibility that Venus and Earth were very similar during the time of the origin of life on Earth."

Grinspoon and his colleagues aren't the first to imagine that Venus was once hospitable.

It's similar to Earth in size and density, and the fact that the two planets formed so close together suggests that they're made of the same bulk materials.

Venus also has an unusually high ratio of deuterium to hydrogen atoms, a sign that it once housed a substantial amount of water, mysteriously lost over time.

Venus, but snowy

To simulate early Venus, the researchers turned to a model of environmental conditions often used to study climate change here on Earth.

They created four versions for Venus, each varying slightly in details such as the amount of energy the planet received from the sun, or the length of a Venusian day. Where information was scant about Venus's climate, the team filled in educated guesses.

They also added a shallow ocean, 10 per cent the volume of Earth's ocean, covering about 60 per cent of the planet's surface.

Looking at how each version might have evolved over time, the researchers say they were encouraged to believe that the planet might have looked much like an early Earth, and remained habitable for a substantial portion of its lifetime.

The most promising of the four Venuses enjoyed moderate temperatures, thick cloud cover and even the occasional light snowfall.

Could life have emerged on this early Venus? If it did, it's certainly no more, thanks to the oceans later boiling away and volcanoes drastically reshaping the landscape around 715 million years ago. But the team is not ruling it out.

“There’s great uncertainties in understanding Earth, not only its climate history but the history of how life began,” says Michael Way at the NASA Goddard Institute for Space Studies in New York City.

If it began in oceans on Earth – a theory we’ve yet to confirm – the same could be true on a waterlogged Venus. “There’s no reason that life on this world would not have existed in these oceans. But that’s about all you can say.”

Alternative histories

“Both planets probably enjoyed warm liquid water oceans in contact with rock and with organic molecules undergoing chemical evolution in those oceans,” says Grinspoon. “As far as we understand at present, those are the requirements for the origin of life.”

To bolster their findings, the team suggests a future mission to Venus should look out for signs of water-related erosion near the equator, which would provide evidence for the oceans detailed in their simulation.

Such signs have already been detected by missions at Mars.

NASA is currently weighing up two potential Venus projects, although neither has been confirmed.

One mission would drop a probe through the clouds down to the surface, while another would orbit around the planet and image its surface.

The researchers would also like to run simulations of further alternative pasts for Venus – perhaps one where it was a desert world, or submerged in as much water as Earth, to find out which scenario is most likely to lead to the Venus we see today.

The study could also aid astronomers in their search for exoplanets, says James Kasting at Pennsylvania State University. If Venus might have once been habitable, then it suggests that other planets close to their stars might be, too.

“If you make the habitable zone really wide, that raises the probability of finding an Earth.” *Reference: arxiv.org/abs/1608.00706*

http://www.bbc.com/news/health-36987243

Asthma pill 'promising' for people with severe symptoms

An experimental pill could help adults with severe asthma, an early study in the Lancet Respiratory Medicine journal suggests.

By Smitha Mundasad Health reporter, BBC News

In the small trial, patients who were given the drug, known as Fevipiprant, had less inflammation in their airways. And some patients with uncontrolled asthma felt their symptoms improved. Charity Asthma UK said the research showed "massive promise and should be greeted with cautious optimism".

More than five million people in the UK have asthma, a long-term condition that affects the airways in the lungs and can cause a cough, wheezing and breathlessness. For most people the right treatment - for example, inhalers - can help control it, but some people have more persistent symptoms.

'Less wheezy'

And flare-ups can be life-threatening. According to Asthma UK, 1,216 people died from asthma in 2014.

In this study, scientists at the University of Leicester looked at 60 patients who had severe asthma despite using steroid inhalers and being seen regularly by specialists. Half the group were given the Fevipiprant pill for three months on top of their usual medications and the other half continued to take their normal medication as well as a placebo pill.

Researchers found that while patients took Fevipiprant, they had fewer inflammatory blood cells in their phlegm and airways - which can be key signs of asthma.

Gaye Stokes, who has had severe asthma for 16 years, said: "I knew straight away that I had been given the drug. "I felt like a completely different person. I had more get up and go, I was less wheezy and for the first time in years, I felt really, really well." The 54-year-old added that once she stopped taking the drug her asthma deteriorated again.

But researchers say this is still an early proof-of-concept study and larger, long-term trials will be needed to see if the pill can help patients in everyday life.

Meanwhile, Dr Samantha Walker at Asthma UK said: "This research shows massive promise and should be greeted with cautious optimism.

"The possibility of taking a pill instead of using an inhaler will be a very welcome one, particularly as this study focused on people who develop the condition in later life, some of whom we know can struggle with the dexterity required to use an inhaler.

"More research is needed and we're a long way off seeing a pill for asthma being made available over the pharmacy counter, but it's an exciting development."

Prof Stephen Durham, a lung specialist at the Royal Brompton Hospital in London, said: "Prof Chris Brightling's group in Leicester provide compelling evidence that the novel tablet treatment has the ability to reduce asthmatic inflammation, increase lung function and improve asthma control in this severe group.

"The data strongly support further studies to see whether Fevipiprant may also reduce the frequency of asthma attacks, avoid steroid tablet side effects and reduce NHS costs in the management of these severely ill patients."

http://nyti.ms/2aZLS7r

Ready to Snap at Work? Get in Touch With Your Inner Animal

Ever experienced a bout of anxiety at work?

I just did.

By PHYLLIS KORKKI AUG. 6, 2016

One day last week I had several assignments to finish in quick succession. I could feel thoughts pinging around in my brain as I tried and failed to decide what to focus on first. Once I was able to get the pandemonium under control, my brain felt like mush.

So what did I do? I breathed deeply from the middle of my body. I imagined the top of my head, and pictured arrows coming out the sides of my shoulders. I stood up for a while and then walked around the newsroom. And went back to work.

These simple solutions to anxiety are not so easy to practice in an era of multitasking, multiple screens and mindless distractions. I learned them only after signing a contract to write a book — and becoming so anxious about it that I developed back and stomach pains. Unable to score a prescription for Klonopin (it's addictive, my doctor said), I was reduced to seeking out natural methods to relieve my anxiety.

The methods I learned helped me write the book. But they also made me realize that workers of all stripes could use them to reduce stress, and to think more clearly and creatively.

My first stop was Belisa Vranich, a clinical psychologist who teaches — or rather reteaches — people how to breathe. Dimly I sensed that the way I was inhaling and exhaling was out of whack, and she confirmed it by giving me some tests.

First off, like most people, I was a "vertical" breather, meaning my shoulders moved upward when I inhaled. Second, I was breathing from my upper chest, where the lungs don't have much presence.

In her Manhattan studio, Dr. Vranich taught me the right way to breathe: horizontally and from the middle of the body, where the diaphragm is. You should expand your belly while inhaling through your nose, she said, and squeeze your belly inward while exhaling.

At first, this seemed counterintuitive. And yet it is the natural way to breathe — the way children and animals do it, Dr. Vranich said. It's when society begins to exert its merciless pressure on us that we start doing things the wrong way.

When we are under stress at work, we tend to brace and compress ourselves, and our field of vision becomes narrow, Dr. Vranich said in a recent interview. This causes us to breathe more quickly and shallowly. The brain needs oxygen to function, of course, and breathing this way reduces the supply, causing muddled thinking. Also, the digestive system doesn't receive the movement and massage it needs from the diaphragm, and that can lead to problems like bloating and acid reflux, she said.

Stress can send people into fight-or-flight mode, which can lead them to brace their bellies to appear strong. This is exactly the stance that interferes with calm, alert thinking, Dr. Vranich said. The fight-or-flight response means business. It developed early when our ancestors needed it as protection from predators. It was so crucial to survival that it has stuck around to this day, as a response to stress.

Just enough stress (such as the kind provided by a realistic deadline) gets your adrenaline going and pushes you through to the finish line. But too much (the kind you feel when you have too many deadlines you know you can't meet) can push you into fight or flight, causing you to crouch, clench and tense.

I was also feeling pain and tension in my back and shoulders as I started to write my book - as if my body were trying to hide from a lion. So I took posture lessons.

When I told people I was working on my posture, they tended to feel ashamed of their slouchiness and lifted their chins, pulled their shoulder blades together and stiffened their necks and shoulders. But that is exactly what you don't want to do, said my posture teacher, Lindsay Newitter, who runs a company in New York called the Posture Police. Rather, you want to gently release the tension that you may not even be aware is compressing your body.

Ms. Newitter helped me undo habits that had been tensing me up for years. Having an expert try to correct your unique postural peculiarities can be a help, but even without lessons, a few basic principles can help you get through the workday.

First, as mentioned, simply imagine the top of your head. At the risk of looking like a monkey, you can even touch the top of your head to get a sense of where it is in space (you may be surprised at how off you were). This act of imagination gently guides you into better alignment.

Imagining horizontal arrows moving in opposite directions from the sides of your shoulders expands your chest area and allows you to breathe more freely.

Try to be aware of any part of the body where you are exerting more tension than you need. For example, the effort of operating your mouse should come more from your fingers than from gripping it with your hand, your wrist and your whole arm, Ms. Newitter said. The same principle applies to typing.

Good posture helps you feel "spready instead of squished," Ms. Newitter said recently, quoting her 9-year-old daughter.

Ms. Newitter teaches a method known as the Alexander Technique, which was developed in the 19th century by Frederick Matthias Alexander, an Australian actor who invented it to cure his career-killing hoarseness. He came up with a concept known as "end gaining," which has arguably only worsened as computers

and smartphones have come on the scene. It means trying to get somewhere before you are actually there, so you are not inhabiting your own body in the present.

Screens aggravate end-gaining because they cause people to curl forward to meet them, which compresses the spine, Ms. Newitter said. Let the screen come to you rather than lurch out toward it, she said.

Another important point I learned in my quest to calm down is that to do our best work, we need to move around. People mistakenly think that being in one position for a long period will improve concentration, but the body needs to move and take regular breaks to focus, said Alan Hedge, an ergonomics professor at Cornell University.

We've all heard that sitting for long periods is bad for you, but standing for a long time isn't good either, Professor Hedge said. You need to mix it up. He has done research showing that workers should sit for roughly 20 minutes, stand for about eight minutes and move around for two minutes.

This formula does not have to be exact. And once in a while, when you are in the magical state known as "flow," where you are completely absorbed in your task and lose track of time, it doesn't apply.

But as a rule, getting up and moving around is beneficial. And if you're stuck on an assignment, moving from one room to another can actually help recalibrate the brain, Professor Hedge said.

A chair is essentially an antigravity device, he said, and "gravitational stimulation is really important for the body." Research from NASA has shown that you need to have a regular sense of yourself in gravity to work effectively. "You need to get at least 16 of those signals a day," he said, by standing up, sitting down or moving around.

These basic lessons about the body can be hard to remember in the heat of a stressful moment. Even now, I still catch myself freezing in my chair like a cornered animal when I feel overwhelmed at work. But now I know I have the power to arise, expand and unscrunch, and to banish that imaginary lion from my cubicle.

http://www.eurekalert.org/pub_releases/2016-08/w-sbe080316.php

Studies bolster evidence that insurance status affects cancer patients' health outcomes

Two new studies indicate that health insurance status may impact patients' health outcomes following a diagnosis of cancer.

Cancer patients who were uninsured or had Medicaid coverage experienced a variety of disparities -- including being diagnosed at a later stage, receiving less than optimal treatment, and having shorter survival times -- when compared with patients with other forms of insurance. The findings are published early online in CANCER, a peer-reviewed journal of the American Cancer Society.

Many studies have revealed barriers to cancer care associated with health insurance status. Using population-based data from the Surveillance, Epidemiology, and End Results Program of the National Cancer Institute, these latest studies look at two cancers in particular: testicular germ cell tumors and glioblastoma.

In the testicular cancer study, a team led by Christopher Sweeney, MBBS, of the Dana-Farber Cancer Institute in Boston, identified 10,211 men diagnosed with testicular cancer between 2007 and 2011.

The researchers found that uninsured and Medicaid-covered patients had an increased risk of having larger testicular cancer tumors or metastatic disease at the time of diagnosis, and they were more likely to die from their disease compared with men with insurance.

Among patients with metastatic disease, those who were uninsured or had Medicaid coverage were more likely to have cancer categorized as "intermediate" or "poor" (rather than "good") risk.

Among patients with early stage disease, both uninsured and Medicaid patients were less likely to have lymph nodes removed, a procedure that can cure some patients.

Among patients with advanced disease, uninsured (but not Medicaid) patients were less likely to receive radiation therapy.

"Although testis cancer is curable with chemotherapy, this study supports the notion that lack of insurance may lead to delays in diagnosis and more advanced and less curable disease," said Dr. Sweeney.

"Our findings support the belief that early diagnosis and management is key, and removal of barriers to access to health care should be implemented."

In the study related to glioblastoma, which is the most common malignant primary brain tumor in adults, Judy Huang, MD, of the Johns Hopkins University School of Medicine, and her colleagues identified 13,665 patients diagnosed between 2007 and 2012.

Patients who were uninsured or had Medicaid were more likely to present with larger tumors and to die earlier from their disease compared with insured patients.

Patients with Medicaid insurance were less likely to receive surgical treatment, while both Medicaid insurance and uninsured status were associated with a lower likelihood of receiving adjuvant radiotherapy.

Only non-Medicaid insured patients experienced an improvement in survival over time, with patients diagnosed in 2012 living longer than those diagnosed in 2007.

"This suggests that while improvements in medical therapy have resulted in longer survival, this benefit is less likely to be accessible to Medicaid-insured or uninsured patients," said Dr. Huang.

"This study indicates significant disparities in the management of glioblastoma patients under our existing healthcare insurance framework that need to be addressed," added Wuyang Yang, MD, MS, co-lead author of the study.

In an accompanying editorial, Michael Halpern, MD, with Temple University in Philadelphia, Pennsylvania (previously with the University of Arizona Medical School in Tucson), and Otis Brawley, MD, of the American Cancer Society and Emory University in Atlanta, wrote that "while much of today's research focuses on basic understanding of cancer and the development of new treatments, diagnostics, and molecular markers, studies such as these are important if we are to truly address the cancer problem."

They added that "adequate healthcare should be considered an inalienable human right, and greater emphasis is needed on realizing strategies that will make this happen throughout the continuum of cancer care."

Full Citation: "Insurance Status and Disparities in Disease Presentation, Treatment and Outcomes in Men with Germ Cell Tumors." Sarah C. Markt, Carlos A. Lago-Hernandez, Rowan E. Miller, Brandon Mahal, Brandon Bernard, Laurence Albiges, Lindsay Frazier, Clair Beard, Alexi A. Wright, and Christopher J. Sweeney. CANCER; Published Online: August 8, 2016 (DOI: 10.1002/cncr.30159).

Full Citation: "Influence of Insurance Status on Survival of Adults with Glioblastoma (GBM): A Population Based Study." Xiaoming Rong, Wuyang Yang, Tomas Garzon-Muvdi, Justin M. Caplan Xuan Hui, Michael Lim, and Judy Huang. CANCER; Published Online: August 8, 2016 (DOI: 10.1002/cncr.30160).

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Editorial: "Insurance Status, Health Equity, and the Cancer Care Continuum." Michael T. Halpern and Otis W. Brawley. CANCER; Published Online: August 8, 2016 (DOI: 10.1002/cncr.30158).