http://www.eurekalert.org/pub_releases/2011-03/afot-asf031411.php

A seismograph for ancient earthquakes

Learning from history, Tel Aviv University invention can improve earthquake prediction today

Earthquakes are one of the world's biggest enigmas - impossible to predict and able to wreak untold damage within seconds. Now, a new tool from Tel Aviv University may be able to learn from earthquakes of the ancient past to better predict earthquakes of the future. Prof. Shmuel Marco of Tel Aviv University's Department of Geophysics and Planetary Sciences in the Raymond and Beverly Sackler Faculty of Exact Sciences and his colleagues have invented a new tool which he describes as a "fossil seismograph," to help geophysicists and other researchers understand patterns of seismic activity in the past.

Inspired by a strange "wave" phenomenon he studied in disturbed sediment in the Dead Sea region, Prof. Marco says the new tool, developed with input from geologists and physicists, is relevant to areas where earthquakes affect bodies of water, like the West Coast of the United States. It also can help engineers understand what's at risk when they plan new hydroelectric power plants. The new research was published in the journal Geology.

A geophysical yardstick for centuries past

"Current seismographical data on earthquakes only reaches back a century or so," says Prof. Marco. "Our new approach investigates wave patterns of heavy sediment that penetrates into the light sediments that lie directly on top of them. This helps us to understand the intensity of earthquakes in bygone eras - it's a yardstick for measuring the impact factor of earthquakes from the past."

Prof. Marco, his departmental colleague Prof. Eyal Hefetz, and doctoral student Nadav Wetzer took a highly technical look at layers of mud at the Dead Sea. The layers were originally stratified in a very stable manner, but now heavier sediment appears to have been pulled up into the lighter sediment.

The researchers propose that the physics governing the sediment patterns is similar to a phenomenon found in clouds and sea waves but in the case of rocks it was the earthquake shaking (rather than wind) that triggered the formation of waves. The scientists call it the "Kelvin-Helmholtz Instability," which describes a theory of turbulence in fluids. The Tel Aviv University team applied this theory to analyze the deformation of sediment caused by past earthquakes.

Earthquakes cause deformation in rocks and sediment. Using the basic principles of friction, the researchers considered the geometry of the shapes they found in the Dead Sea sediment and combined it with a number of other parameters found in physical science to calculate how earthquakes from the past were distributed in scale, time and place.

The bigger geological picture

Prof. Marco and his colleagues found that the deformation begins as moderate wave-like folds, evolves into complex recumbent folds, and finally exhibit instability and fragmentation. The deformation process advances depending on the earthquake size - the stronger the earthquake, the more intense the deformation.

The seismological record for fault lines like those near Jerusalem and Los Angeles simply isn't old enough to predict when the next quake might strike. "We've expanded the window of observation beyond 100 years, to create, if you will, a 'fossil seismograph,'" says Prof. Marco. He adds that the tool is only relevant in earthquake zones that intersect with bodies of water such as lakes or the sea.

But it could be very relevant to geologists studying earthquake patterns in areas like the Salton Sea in Colorado. The Salton Sea, only 100 years old, is located directly on the San Andreas Fault in California's Border Region.

http://www.eurekalert.org/pub_releases/2011-03/uoca-nwn031111.php

Neanderthals were nifty at controlling fire, says CU-Boulder-led study

But Neanderthal predecessors pushed into cold regions of Europe at least 800,000 years ago without the use of fire

A new study involving the University of Colorado Boulder shows clear evidence of the continuous control of fire by Neanderthals in Europe dating back roughly 400,000 years, yet another indication that they weren't dimwitted brutes as often portrayed.

The conclusion comes from the study of scores of ancient archaeological research sites in Europe that show convincing evidence of long-term fire control by Neanderthals, said Paola Villa, a curator at the University of Colorado Museum of Natural History. Villa co-authored a paper on the new study with Professor Wil Roebroeks of Leiden University in the Netherlands. A paper on the subject was published in the March 14 issue of the Proceedings of the National Academy of Sciences.

"Until now, many scientists have thought Neanderthals had some fires but did not have continuous use of fire," said Villa. "We were not expecting to find a record of so many Neanderthal sites exhibiting such good evidence of the sustained use of fire over time."

Neanderthals are thought to have evolved in Europe roughly 400,000 to 500,000 years ago and went extinct about 30,000 years ago. Neanderthals ranged over much of Europe and stretched to Central Asia. Neanderthals were stockier than anatomically modern humans and even shared the same terrain for a time, and there is evidence that contemporary humans carry a small amount of Neanderthal DNA. Modern humans began migrating out of Africa to Europe some 40,000 years ago.

Archaeologists consider the emergence of stone tool manufacturing and the control of fire as the two hallmark events in the technological evolution of early humans. While experts agree the origins of stone tools date back at least 2.5 million years in Africa, the origin of fire control has been a prolonged and heated debate.

Villa and Roebroeks, who together speak and read six languages, have visited or worked at dozens of the Neanderthal excavation sites in Europe. They also combed libraries throughout Europe and the United States for research papers on evidence for early fire use in Europe, contacting researchers involved in the excavations when possible for additional information and insight.

As part of the study they created a database of 141 potential fireplace sites in Europe dating from 1.2 million years ago to 35,000 years ago, assigning an index of confidence to each site. Evidence for the sustained use of fire includes the presence of charcoal, heated stone artifacts, burned bones, heated sediments, hearths and rough dates obtained from heated stone artifacts. Sites with two or more of the characteristics were interpreted as solid evidence for the control of fire by the inhabitants.

The second major finding in the PNAS study - perhaps even more surprising than the first - was that Neanderthal predecessors pushed into Europe's colder northern latitudes more than 800,000 years ago without the habitual control of fire, said Roebroeks. Archaeologists have long believed the control of fire was necessary for migrating early humans as a way to reduce their energy loss during winters when temperatures plunged below freezing and resources became more scarce.

"This confirms a suspicion we had that went against the opinions of most scientists, who believed it was impossible for humans to penetrate into cold, temperate regions without fire," Villa said. Recent evidence from an 800,000-year-old site in England known as Happisburgh indicates hominids - likely Homo heidelbergensis, the forerunner of Neanderthals - adapted to chilly environments in the region without fire, Roebroeks said.

The simplest explanation is that there was no habitual use of fire by early humans prior to roughly 400,000 years ago, indicating that fire was not an essential component of the behavior of the first occupants of Europe's northern latitudes, said Roebroeks. "It is difficult to imagine these people occupying very cold climates without fire, yet this seems to be the case."

While the oldest traces of human presence in Europe date to more than 1 million years ago, the earliest evidence of habitual Neanderthal fire use comes from the Beeches Pit site in England dating to roughly 400,000 years ago, said Villa. The site contained scattered pieces of heated flint, evidence of burned bones at high temperatures, and individual pockets of previously heated sediments. Neanderthals, like other early humans, created and used a unique potpourri of stone tools, evidence that they were the ancient inhabitants of particular sites in Europe.

The sites catalogued by the team were dated by several methods, including electron spin resonance, paleomagnetism and thermoluminescence. Some research teams also have used microscopic studies of sediment at sites to confirm the presence of ashes. While some of the best evidence for controlled use of fire in Europe comes from caves, there are many open-air sites with solid evidence of controlled fire, they said.

According to Villa, one of the most spectacular uses of fire by Neanderthals was in the production of a sticky liquid called pitch from the bark of birch trees that was used by Neanderthals to haft, or fit wooden shafts on, stone tools. Since the only way to create pitch from the trees is to burn bark peels in the absence of air, archaeologists surmise Neanderthals dug holes in the ground, inserted birch bark peels, lit them and covered the hole tightly with stones to block incoming air.

"This means Neanderthals were not only able to use naturally occurring adhesive gums as part of their daily lives, they were actually able to manufacture their own," Villa said. "For those who say Neanderthals did not have elevated mental capacities, I think this is good evidence to the contrary."

Many archaeologists believe Neanderthals and other early hominids struck pieces of flint with chunks of iron pyrite to create the sparks that made fire and may well have conserved and transported fire from site to site.

Some anthropologists have proposed that Neanderthals became extinct because their cognitive abilities were inferior, including a lack of long-term planning, said Villa. But the archaeological record shows Neanderthals drove herds of big game animals into dead-end ravines and ambushed them, as evidenced by repeatedly used kill sites - a sign of long-term planning and coordination among hunters, she said.

Recent findings have even indicated Neanderthals were cooking, as evidenced by tiny bits of cooked plant material recovered from their teeth.

http://www.eurekalert.org/pub_releases/2011-03/f-coo031411.php

Cameras out of the salt shaker

Endoscopy has gone through amazing advancements in recent years.

Microcameras on the tip of endoscopes supply images from the inside of the human body in ever higher resolution, which often makes it possible to identify tumors at an early stage. Endoscopes to date have some downsides, since they are expensive and, because of their multiple usages, have to be put through time-consuming and exhaustive cleaning procedures every time they are used. This problem might be solved by a new microcamera that the Fraunhofer Institute for Reliability and Microintegration (IZM) in Berlin, Germany has developed together with Awaiba GmbH and with the support of the Fraunhofer Institute for Applied Optics and Precision Engineering IOF in Jena, Germany.

Martin Wilke, a scientist at the Fraunhofer Institute for Reliability and Microintegration, says "we can produce microcameras so inexpensively with our technology that doctors can dispose of endoscopes after using them only once." This is made possible by a new type of manufacturing process.

Digital camera systems consist of two components: a lens and a sensor that transforms the image into electrical signals. Electrical contacts on the sensor allow access to these signals and therefore also to the information of the image. Due to the way they are manufactured, these contacts are located between the sensor and the lens. The sensors are manufactured simultaneously in large numbers, like computer chips. Martin Wilke says, "you have to think of a book full of postage stamps where many thousand stamps are printed in one step. If you want to use them, you have to separate one from another. Instead of a sheet of paper, with image sensors you have a circular disc of silicon that is known as a wafer." About 28,000 image sensors fit onto one wafer and until recently, each and every one was sawed out, wired and mounted on the lens that was still missing. That means wiring them 28,000 times and mounting them just as often.

The researchers at the Fraunhofer Institute for Reliability and Microintegration have streamlined this process by developing a new way to access the electrical contacts. Now, the wiring process is faster and the entire camera system is smaller. The trick lies in the fact that they do not reach the contacts of each individual image sensor via the side any more but rather, simultaneously, with all sensors via their reverse side while they are still connected as a wafer. That means that you no longer have to mount the individual lenses. Instead, you can connect them with the image sensor wafers as lens wafers. Only then is the stack of wafers sawed apart into individual microcameras. Another upside is the fact that it supplies razor-sharp pictures even with very thin endoscopes.

To date, the camera systems built into them had to be divided because of their size. The lens was at the tip of the endoscope and the sensor at the other end of the glass fiber strand. The new microcamera is small enough for the tip of the endoscope. It has a resolution of 62,500 pixels and transmits the image information through the endoscope via an electrical cable. Stephan Voltz, who is the CEO of Awaiba GmbH, says that "at 1.0 times 1.0 times 1.0 millimeters, this camera is as small as coarsely ground grain of salt - the smallest camera that we are aware of."

It is not only medical technology, but also the automotive industry that is interested in this tiny camera. Presently, they are researching the possibility of replacing outside rearview mirrors on cars with microcameras. This would reduce flow resistance and energy consumption. Beyond this, installed in fittings, this camera would be able to calculate the driver's eye movements and prevent him from nodding off for a few seconds. Stephan Voltz is happy about the wide range of possible applications: "Starting in 2012, using Fraunhofer's expertise, we will be able to bring disposable endoscopes to market for only a few euros - we already have the prototype."

http://www.eurekalert.org/pub_releases/2011-03/nsf-hts031411.php

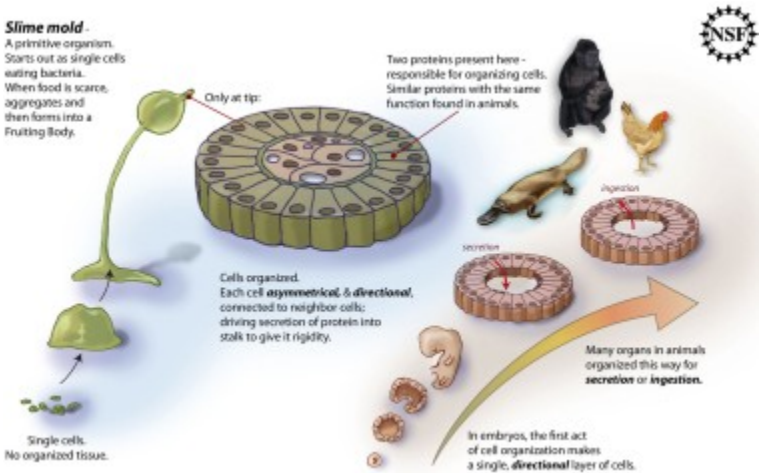
How the slime mold gets organized

Cells at the tip of the slime mold's fruiting body organize into an epithelial layer and secrete proteins as do some animals cells

The so-called cellular slime mold, a unicellular organism that may transition into a multicellular organism under stress, has just been found to have a tissue structure that was previously thought to exist only in more sophisticated animals. What's more, two proteins that are needed by the slime mold to form this structure are similar to those that perform the same function in more sophistical animals.

Shortly after an animal embryo forms, it develops a single layer of cells that, shaped like a hollow ball, is empty at its center. Acting as a kind of "man behind the curtain" that directs these cells to organize into this hollow formation are several proteins that help each cell touch its neighbors but keep its top surface exposed to the formation's empty interior.

Even after animals grow beyond the embryo stage, the cells in many organs of their bodies maintain this type of hollow structure. These organs include those in the digestive tracts of animals, which feature a layer of cells, called epithelial cells, that face inward to form a hollow structure and are shaped asymmetrically to give organs their directionality. For example, the asymmetric epithelial cells of animal intestines face inward to form a hollow structure through which nutrients are absorbed. Likewise, the asymmetric epithelial cells of animal glands, such as salivary and endocrine glands, also face inward to form a hollow structure. But instead of absorbing substances as do the epithelial cells of animal intestines, these glandular epithelial cells secrete into their hollow structure substances that they produce.



When food is scarce, the separate cells of the slime mold aggregate and form what is called a fruiting body. Cells at the tip of the fruiting body organize into a formation very similar to the epithelial layer of cells found in many organs of higher animals. Researchers found that the proteins responsible for organizing cells at the tip of the slime mold's fruiting body are genetically very similar to those that perform the same function in animal cells. **Zina Deretsky, National Science Foundation**

With funding from the National Science Foundation, Daniel Dickinson, W. James Nelson and William Weis - all of Stanford University - took a careful look at the final, mature stage of slime mold development under a high-powered microscope. They report their results in the journal Science, March 11, 2011.

The slime mold spends most of its life as a single-celled organism, living in soil and preying on bacteria. However when food runs short, thousands of slime mold cells aggregate to form a mound. They then grow into a fruiting body - which is a stalk, a few millimeters tall, whose top peeks over the surface of the ground and holds spores. The researchers found that the organization and directionality of cells in this top part of the extending stalk are surprisingly similar to those of the epithelial cells of some organs of higher animals.

Dickinson and his colleagues also discovered that in order for the cells in the top of the slime mold's stalk to organize into an epithelium, they need analogues to two of the many proteins that are needed by animal cells to organize into an epithelium. Called alpha-catenin and beta-catenin, these slime mold analogues are genetically and biochemically similar to their animal versions. And when the researchers removed these analogues from the cells of slime molds, they lost their ability to organize correctly.

In addition to requiring proteins that are similar to those required by some animal epithelial tissues, the slime mold's epithelium tissue behaves similarly to the epithelial tissue of some animals - it is secretory. It secretes proteins that coat the stalk of the fruiting body and give it the rigidity it needs to send its spores out onto the ground in search of new food.

"We don't know whether the ancient ancestor of slime molds and animals was actually able to form an epithelium," says Dickinson, "but it must have had alpha-catenin and beta-catenin, and we suspect that these proteins had some role in organizing cells."

http://www.eurekalert.org/pub_releases/2011-03/cmaj-tio030811.php

The impact of sex selection and abortion in China, India and South Korea

In the next 20 years in large parts of China and India, there will be a 10% to 20% excess of young men because of sex selection and this imbalance will have societal repercussions, states an analysis in CMAJ

In the next 20 years in large parts of China and India, there will be a 10% to 20% excess of young men because of sex selection and this imbalance will have societal repercussions, states an analysis in CMAJ (Canadian Medical Association Journal) (***pre-embargo link only***)

A preference for sons in China, India and South Korea combined with easy access to sex-selective abortions has led to a significant imbalance between the number of males and females born in these countries. The sex ratio at birth (SRB) - the number of boys born to every 100 girls - is consistent in human populations in which about 105 males are born to every 100 females. However, with the advent of ultrasounds that enable sex-selection, the sex ratio at birth in some cities in South Korea climbed to 125 by 1992 and is over 130 in several Chinese provinces from Henan in the north to Hainan in the south.

In 2005 in China, "it was estimated that 1.1 million excess males were born across the country and that the number of males under the age of 20 years exceeded the number of females by around 32 million," writes

Professor Therese Hesketh, UCL Centre for International Health and Development, London, United Kingdom with coauthors.

In India, similar disparities exist, with sex ratios as high as 125 in Punjab, Delhi and Gujarat in the north but normal sex ratios of 105 in the southern and eastern states of Kerala and Andhra Pradesh.

"A consistent pattern in all three countries is the marked trend related to birth order and the influence of the sex of the preceding child," state the authors. If the first or second born are girls, couples will often sex select to ensure the second or third child is a boy.

The societal implications mean that a significant percentage of the male population will not be able to marry or have children because of a scarcity of women.

In China, 94% of unmarried people aged 28 to 49 are male, 97% of whom have not completed high school, and there are worries the inability to marry will result in psychological issues and possibly increased violence and crime.

Policy makers in China, India and South Korea have taken some steps to address the issue, such as instituting laws forbidding fetal sex determination and selective abortion, but more can be done.

"To successfully address the underlying issue of son preference is hugely challenging and requires a multifaceted approach," state the authors.

The relaxation of China's one-child policy, especially in rural areas, could have some impact on sex ratios. But more important is to change underlying and long-standing attitudes towards son preference. Public awareness campaigns have had an impact. In South Korea and China, awareness campaigns have helped reduce the sex ratio at birth (for example, 118 in 1990 in South Korea to 109 in 2004).

"However, these incipient declines will not filter through to the reproductive age group for another two decades, and the SRBs in these countries remain high. It is likely to be several decades before the SRB in countries like India and China are within normal limits," conclude the authors.

http://www.physorg.com/news/2011-03-heavy-death-pancreatic-cancer.html

Heavy drinking associated with increased risk of death from pancreatic cancer

Heavy alcohol consumption, specifically three or more glasses of liquor a day, is associated with an increased risk of death from pancreatic cancer, according to a report in the March 14 issue of Archives of Internal Medicine.

"Alcoholic beverage consumption - a modifiable lifestyle factor - is causally related to several cancers, including oral cavity, pharynx, larynx, esophagus, liver, colorectum and female breast," the authors write as background information in the article. "Heavy alcohol consumption causes acute and chronic pancreatitis but has never been linked definitively to pancreatic cancer."

Using data from the Cancer Prevention Study II (CPS-II), Susan M. Gapstur, Ph.D., M.P.H., and colleagues from the American Cancer Society, Atlanta, examined the association between alcohol intake and pancreatic cancer. The CPS-II is a long-term prospective study of U.S. adults 30 years and older. Initial data on alcohol consumption was gathered in 1982, and based on follow-up through 2006, there were 6,847 pancreatic cancer deaths among one million participants.

Of the million participants (453,770 men and 576,697 women), 45.7 percent of men and 62.5 percent of women were non-drinkers. The analyses of men only and of men and women combined showed statistically significant increased risk of pancreatic cancer death for consumption of three drinks per day and four or more drinks per day, whereas for women only the estimated risk of death from pancreatic cancer was statistically significant for consumption of four or more drinks per day.

Compared with non-drinkers, consuming three or more drinks of liquor per day was associated with an increased risk of pancreatic cancer death in the total study population, and consumption of two or more drinks of liquor per day was associated with an increased risk in both never smokers and in those who had ever smoked. This association was observed for liquor consumption but not for beer or wine.

In never smokers, there was a 36 percent higher risk of pancreatic cancer death associated with consuming three or more drinks a day compared with non-drinkers for men and women combined. In those who had ever smoked, there was a 16 percent higher risk of death from pancreatic cancer after adjustment for smoking history and other variables.

"Findings from the prospective study presented herein strongly support the hypothesis that alcohol consumption, in particular heavy intake, also is an independent risk factor for pancreatic cancer, the fourth most common cause of cancer mortality [death] in the United States," the authors conclude.

More information: Arch Intern Med. 2011;171[5]:444-451

http://www.scientificamerican.com/article.cfm?id=friendly-bacteria-fight-flu

Friendly Bacteria Fight the Flu

Microbes trigger immune response that suppresses infections.

By Amy Maxmen

Helpful bacteria don't just aid digestion; they also fend off the flu, according to a report published March 14 in the Proceedings of the National Academy of Sciences.

A research team led by Akiko Iwasaki, an immunologist at Yale University in New Haven, Connecticut, found that mice treated with neomycin antibiotics were more susceptible than control mice to influenza viruses. It turned out that neomycin-sensitive bacteria naturally present in the mice's bodies provided a trigger that led to the production of T cells and antibodies that could fight an influenza infection in the lungs.

The bacteria kick-started the flu-fighting pathway by activating 'inflammasome' protein complexes in the immune system. The inflammasomes then pushed precursors of an immune protein - the cytokine interleukin 1-Beta - into a chemically mature state. Mature interleukin 1-Beta triggered dendritic immune cells to migrate to lymph nodes in the lungs, where they initiate a potent attack on influenza viruses. When antibiotics eliminated the bacteria, inflammasomes failed to launch and the virus multiplied.

"This is a landmark paper that opens up new avenues of research and suggests new possibilities for ways to treat and prevent viral infections," says Sarkis Mazmanian, a microbiologist at the California Institute of Technology in Pasadena.

Gut feeling

Microbiologists have known that microbes inhabiting mammals interact with the immune system since the 1950s, when they found that eliminating bacteria in newborn mice prevented them from developing a normal immune system.

In the past decade, research has focused on how bacteria regulate immune pathways relevant to the health of the host's gut, where the bulk of the body's roughly 100 trillion "commensal" - harmless or beneficial - bacteria reside. For example, an imbalance in the proportions of certain harmful and beneficial gut bacteria seems to over-activate inflammation-inducing cells, possibly fuelling inflammatory bowel disease.

A handful of detailed reports in the past five years have hinted that helpful microbial interactions don't stop at the gut, but Iwasaki's study is the first to pinpoint how bacteria combat infections in the lungs.

"This study contributes to a growing body of literature showing that signals from commensal bacteria can have an impact on immune cells in multiple tissues," says David Artis, an immunologist at the University of Pennsylvania in Philadelphia. "If certain antibiotics have an effect on our ability to mount a response against a viral infection, it means that people should be careful to only take antibiotics when they are absolutely needed - particularly in the flu season." In addition, says Artis, the findings "suggest that our diet might affect our ability to fight viruses by influencing the composition of our commensal bacteria."

But Iwasaki cautions that "we don't yet know enough about which bacteria trigger what pathways to make health recommendations". Her team has not identified the bacteria responsible for the immune response, but Iwasaki suspects that effect is caused by Lactobacillus species residing in the gut. After antibiotics, the populations of these bacteria were significantly diminished in the mice's guts but not in their nasal cavities.

Mazmanian says, "the question is, do bacteria intentionally induce this process in order to protect their hosts from flu infections? Or is the inflammasome non-specifically activated by the bacteria, and one consequence of inflammasome activation just happens to be flu control?" Either way, "it's become clear that our immune system has evolved to act like an interface for microorganisms to send signals to our body."

http://www.eurekalert.org/pub_releases/2011-03/plos-afb031011.php

Association found between industry funding and promotional pieces on menopausal hormone therapy

There may be a link between receiving industry funding for speaking, consulting, or research, and the publication of apparently promotional opinion pieces on menopausal hormone therapy.

Furthermore, such publications may encourage physicians to continue prescribing these therapies to women of menopausal age. These are the key findings of a study by Adriane Fugh-Berman from Georgetown University Medical Center, Washington D.C., USA, and colleagues, published in this week's PLoS Medicine.

Over the past three decades, menopausal hormones have been heavily promoted for preventing disease in women. However, the 2004 federally-funded Women's Health Initiative study that enrolled more than 26,000 women in the USA found that the most popular estrogen-progestin and estrogen-only formulations (often prescribed to women around the age of menopause) increased the risk of stroke, deep vein thrombosis, dementia, and incontinence; the combined therapy also increased breast cancer risk. Two years after the results of the Women's Health Initiative were published, a survey of more than 700 practicing gynecologists - the

specialists who prescribe the majority of hormone replacement therapies - in the USA found that almost half did not find the findings of the Women Health Initiative Study convincing. This current study investigated whether promotional tone could be identified in narrative review articles regarding menopausal hormone therapy.

The authors conducted a comprehensive literature search that identified 340 relevant articles published between July 2002 and June 2006 - the 4 years following the cessation of the estrogen-progestin arm of the Women's health Initiative study. Ten authors had published 4-6 articles, 47 had published 2-3 articles, and 371 had published one article each. The researchers focused on authors who had published four or more articles in the four-year period under study. After author names and affiliations were removed, 50 articles were independently evaluated by three readers for scientific accuracy and for tone.

Although most of the articles were scientifically accurate, common themes in the 50 articles included arguments that clinical trial results should not guide treatment for individuals, and suggestions that the risks associated with hormone therapy have been exaggerated and that the benefits of hormone therapy have been, or will be, proven. Of the ten authors studied, eight were found to have received payment for speaking or consulting on behalf of menopause hormone manufacturers and 30 of 32 articles evaluated as promoting hormone therapy were written by those with such potential financial conflicts of interest. Articles promoting the use of menopausal hormone therapy were more than twice as likely to have been written by authors with potential conflicts of interest as by authors without such conflicts of interest.

The authors say: "There may be a connection between industry funding for research, speaking, or consulting and the publication of promotional pieces on menopausal hormone therapy." They add: "Health care providers should exercise caution if they choose to read such articles."

Funding: *This study received no external or internal funding, and none of the authors received any funds or salary support for conducting this study.*

Competing Interests: *Adriane Fugh-Berman directs PharmedOut (http://www.pharmedout.org/), a Georgetown University Medical Center project that educates physicians about inappropriate pharmaceutical marketing practices. Dr. Fugh-Berman is also a paid expert witness on behalf of women who developed breast cancer while taking menopausal hormone therapy. Alicia M. Bell was the paid project manager of PharmedOut during part of the time this study was conducted. Christina McDonald and Emily Catherine Bethards received graduate school credit for their work on this study while they were master's students in Physiology at Georgetown University Medical Center.*

Citation: Fugh-Berman A, McDonald CP, Bell AM, Bethards EC, Scialli AR (2011) Promotional Tone in Reviews of Menopausal Hormone Therapy After the Women's Health Initiative: An Analysis of Published Articles. PLoS Med 8(3): e1000425. doi:10.1371/journal.pmed.1000425

http://www.eurekalert.org/pub_releases/2011-03/w-nam031111.php

Newer antimalarials more effective than quinine against severe malaria

Quinine should no longer be the drug of choice for treating severe malaria, according to an updated systematic review by Cochrane researchers.

It is now evident that the antimalarial drug artesunate, which is derived from herbs used in Chinese medicine, is more effective at preventing death in patients with severe malaria.

Severe malaria occurs when the disease affects the function of vital organs. It is associated with rarer cerebral malaria, which affects the brain and can lead to long-term disability. More than a million people die each year from severe malaria, the majority in Sub-Saharan Africa. Artesunate was recommended as the preferred treatment for adults with severe malaria by the World Health Organization (WHO) in 2006, but there was insufficient evidence at the time to recommend a change from the standard treatment of quinine in children.

The researchers updated the review of artesunate by adding a new large multicentre trial of African children published in the Lancet in 2010 to the existing 8 trials. The review now includes a total of 1664 adults and 5765 children, from a variety of settings across Africa and Asia. According to the results, taking artesunate reduces the risk of death by 39% in adults and 24% in children compared to quinine. In adults, deaths caused by severe malaria were reduced from 241 per 1000 with quinine to 147 with artesunate. In children, deaths were reduced from 108 per 1000 with quinine to 83 with artesunate.

"There is now enough evidence to be confident of these results in adults and children," said Peter Olumese of the WHO's Global Malaria Programme. "Intravenous artesunate is now being recommended as the treatment of choice for adults and children with severe malaria anywhere in the world."

Although more children given artesunate suffered neurological problems compared to those given quinine, these were largely resolved within a month of treatment, and were outweighed by the increase in survival rates. "The balance of benefits and harms is in favour of treatment with artesunate," said David Sinclair of the Liverpool School of Tropical Medicine in Liverpool, UK, who led the review team.

http://www.eurekalert.org/pub_releases/2011-03/haog-sgd031511.php

Single gene defect causes brain tumor

Pilocytic astrocytoma, the most common brain tumor in children, is usually slow-growing and benign. However, surgeons often cannot completely remove the diffusely growing tumor.

This means that patients need further treatment in order to destroy remaining tumor tissue. Chemotherapy or radiation therapy can lead to severe side-effects and have only little effect on these slowly growing tumors. Affected children therefore urgently need new, targeted therapies.

A typical genetic defect in these brain tumors is already known: "From our own research we know that there is a defect in the BRAF gene in the great majority of pilocytic astrocytomas," says Professor Dr. Peter Lichter of the German Cancer Research Center. This defect causes a cellular signaling pathway, which in healthy cells is active only in case of acute need, to be permanently activated.

Jan Gronych from Lichter's department has now studied, jointly with colleagues of Heidelberg University Hospitals, the actual relevance of the BRAF defect for carcinogenesis. To this end, the investigators packed a defective BRAF gene into a virus and thus introduced it into neuronal precursor cells of mice. In 91 percent of animals thus treated, tumors developed around the injection site. These tumors corresponded to pilocytic astrocytoma in terms of their biology, growth characteristics and tissue structure.

Cells of these tumors all showed the typical symptom of a defective BRAF gene: a permanently activated MAP kinase enzyme. "This proves that a single gene defect is really sufficient to cause pilocytic astrocytoma," said Lichter, summarizing the results.

A permanently active MAP kinase constantly transmits growth signals in cancer cells, while it is also their Achilles' heel: In recent years, a number of drugs have been developed which inhibit the enzyme activity of kinases very specifically and, thus, can impede cancer growth. The Heidelberg researchers have shown that brain cells which are driven to permanent abnormal cell division by a defective BRAF gene slowed down growth after treatment with kinase inhibitor sorafenib.

"Up to now, we did not have a suitable model system for testing newly developed drugs against pilocytic astrocytoma," says Peter Lichter. "The BRAF mice open up the possibility to test new kinase inhibitors or other drugs specifically for their effectiveness against pilocytic astrocytoma."

Jan Gronych, Andrey Korshunov, Josephine Bageritz, Till Milde, Manfred Jugold, Dolores Hambardzumyan, Marc Remke, Christian Hartmann, Hendrik Witt, David T.W. Jones, Olaf Witt, Sabine Heiland, Martin Bendszus, Eric C. Holland, Stefan Pfister and Peter Lichter: An activated mutant BRAF kinase domain is sufficient to induce pilocytic astrocytoma in mice. The Journal of Clinical Investigations, 2011, DOI: 10.1172/JCI44656

http://www.newscientist.com/article/dn20245-japan-quake-shifts-antarctic-glacier.html

Japan quake shifts Antarctic glacier

*** 15:45 15 March 2011 by Anil Ananthaswamy**

The major earthquake that hit Japan on Friday caused a massive ice stream in Antarctica to momentarily speed up.

As the surface seismic waves generated by the quake travelled around the world, they appear to have given the Whillans ice stream in West Antarctica a nudge, causing it to slide by about half a metre.

The movement was picked up by Jake Walter of the University of California, Santa Cruz, and his colleagues, who monitor the glacier remotely from California. They say the event is an "interesting insight", but are not suggesting it will destabilise the ice stream in any way.

The Whillans ice stream drains ice from the West Antarctic Ice Sheet into the Ross Ice Shelf. Since 2007, Walter and colleagues have been using GPS field stations on the ice sheet to monitor its movements. They have shown that the ice stream speeds up twice a day in slip events which last about 30 minutes.

The glacier normally creeps along at an average speed of about 1 metre per day. But during a slip event, it slides almost half a metre in one go. The sudden slips are related to the tides, and are strong enough to generate seismic waves that are recorded by stations at the South Pole and the Antarctic Dry Valleys (Journal of Geophysical Research, DOI: 10.1029/2010JF001754).

Slipping glacier

Now it looks like the magnitude 9.0 earthquake that shook Japan last Friday caused the glacier to slip in a similar way. When Walter and his colleagues were analysing GPS data from the ice stream on Monday, they noticed that one slip event had happened earlier than expected. Further analysis revealed that it happened exactly when surface seismic waves generated by the Japanese earthquake would have hit Antarctica. Large earthquakes are known to create seismic waves which can circle the planet several times before dying down.

"The Chile earthquake from last year also had a similar effect" on the Whillans ice stream, Walter told New Scientist. "It's an interesting insight into how large earthquakes might affect glacier motion."

Walter and colleagues now want to examine data from other large earthquakes to see if any others are linked to slip events of the Whillans ice stream.

http://www.nytimes.com/2011/03/15/health/15pets.html?

Emotional Power Broker of the Modern Family

By BENEDICT CAREY

First, he tore up his dog toys. Then shredded the furniture, clothes, schoolbooks - and, finally, any semblance of family unity. James, a chocolate-brown pointer mix, turned from adorable pet to problem child in a matter of weeks.

"The big bone of contention was that my mom and my sister thought that he was too smart to be treated like a dog; they thought he was a person and should be treated as such - well, spoiled," said Danielle, a Florida woman who asked that her last name not be published to avoid more family pet strife. "The dog remains to this day, 10 years later, a source of contention and anger."

Psychologists long ago confirmed what most pet owners feel in their bones: that for some people bonds with animals are every bit as strong as those with other humans. And less complicated, for sure; a dog's devotion is without detectable irony, a lap cat's purring without artifice (if not disapproval).

Yet the nature of individual human-pet relationships varies widely, and only now are scientists beginning to characterize those differences, and their impact on the family. Pets alter not only a family's routines, after all, but also its hierarchy, its social rhythm, its web of relationships. Several new lines of research help explain why this overall effect can be so comforting in some families, and a source of tension in others. The answers have very little to do with the pet.

"The word 'pet' does not really capture what these animals mean in a family, first of all," said Froma Walsh, a psychologist at the University of Chicago and co-director of the Chicago Center for Family Health. The prevalent term among researchers is now "companion animal," she said, which is closer to the childlike role they so often play. "And in the way that children get caught up in the family system as peacekeepers, as go-betweens, as sources of disagreement, the same happens with pets."

People cast these roles in part based on the sensations and memories associated with their first Princess or Scooter, psychologists say - echoing Freud's idea of transference, in which early relationships provide a template for later ones. In many families, this means that Scruffy is the universal peacemaker, the fulcrum of shared affection.

In a family interview reviewed by Dr. Walsh in a recent paper, one mother said that the best way to end an argument between siblings was to bark, "Stop fighting, you're upsetting Barkley!" "This is always more effective than saying, 'Stop hitting your brother,' " the mother said. (Barkley made no comment.)

Animals often sense these expectations and act on them. In a video recording of another family discussed in the paper, the cat jumps on a woman's lap when it senses an impending argument with her husband. "And it works," Dr. Walsh said. "It reduces tension in both; you can see it happening." "She's my first child," said Adrienne Woods, a cellist in Los Angeles, of Bella, the Husky puppy that she and her fiancé just got. "The biggest upside is this sense of inner peace. I feel like a grandma, like I have a companion I've been wanting for 30 years."

Yet pets can also raise tension, as millions of couples learn the hard way. The Animal Planet show "It's Me or the Dog" is built on such cases. And Cesar Millan, a dog behavior specialist, has become a celebrity by helping people gain control over unruly hounds, bringing order into households with uncertain lines of authority.

Perhaps more often, pets become a psychological wedge not from lack of boundaries but because family members have diverging views of what a pet should be. And those views are shaped by cultural inheritance, more so than people may realize.

In a study of dog ownership, Elizabeth Terrien, a sociologist at the University of Chicago, conducted 90 in-depth interviews with families in Los Angeles, including Ms. Woods. One clear trend that has emerged is that people from rural backgrounds tend to see their dogs as guardians to be kept outside, whereas middle-class couples typically treat their hounds as children, often having them sleep in the master bedroom, or a special bed.

When asked to describe their pets without using the word "dog," people in more affluent neighborhoods "came up with things like child, companion, little friend, teenage son, brother, or partner in crime," Dr. Terrien said. In neighborhoods with a larger Latino immigrant population, owners were more likely to say "protector," or even "toy for the children," she found. "In those neighborhoods you'll sometimes see kids yanking around a dog on the leash, pushing and playing, the sort of behavior that some middle-class owners would think of as abuse," she said.

Such differences often emerge only after a family has adopted a pet, and they can exacerbate the more mundane disagreements about pet care, like how much to spend on vet bills, how often to walk the dog, how the animal should interact with young children. The fallout from such conflicts isn't hard to find: Most everyone knows of couples who have quarreled over pets, or even divorced, because her spaniel nipped at his Rottweiler.

And there are countless single people out there all but married to some hairy Frida or Diego - banishing any potential partner who doesn't fall quickly, and equally, in love.

The reason these feelings run so deep is that they are ideologies, as well as cultural and psychological dispositions. In the summer of 2007, David Blouin, a sociologist at Indiana University, South Bend, conducted extensive interviews with 35 dog owners around the state, chosen to represent a diverse mix of city, country and suburban dwellers.

He found that, as a rule, people fall into one of three broad categories of beliefs concerning pets. Members of one group, which he labels "dominionists," see pets as an appendage to the family, a useful helper ranking below humans that is beloved but, ultimately, replaceable. Many people from rural areas - like the immigrants Dr. Terrien interviewed - qualified.

Another group of owners, labeled by Dr. Blouin as "humanists," are the type who cherish their dog as a favored child or primary companion, to be pampered, allowed into bed, and mourned like a dying child at the end. These include the people who cook special meals for a pet, take it to exercise classes, to therapy - or leave it stock options in their will.

The third, called "protectionists," strive to be the animal's advocate. These owners have strong views about animal welfare, but their views on how a pet should be treated - whether it sleeps inside or outside, when it should be put down - vary depending on what they think is "best" for the animal. Its members include people who will "save" a dog tied to tree outside a store, usually delivering it home with a lecture about how to care for an animal.

"These are ideologies, and so protectionists are very critical of humanists, who are very critical of dominionists, and so on," Dr. Blouin said. "You can see where this can create problems if people in a family have different orientations. Every little decision about the pet is loaded."

Up until, and including, the end: Couples may not only disagree over when to put an animal down but also have vastly different emotional reactions to the loss. "For someone who's been treating the pet like a child, it can feel like the loss of a child - and of course children are not supposed to die before their parents," Dr. Terrien said. It's an end-of-life crisis, which often begins a lengthy period of grieving. Whereas for the partner who sees the pet differently, the death may bring relief.

None of which is to say that a resourceful pet - using the combined power of cuteness, doleful stares and episodes of getting stuck in boxes or eating crayons - cannot bridge such opposing religions. But family therapists say that, usually, four-legged diplomats need some help from the two-legged kind to succeed.

"Families either figure it out and manage these differences," Dr. Terrien said, "or they give up the pet - which happens far more often than people think."

http://www.eurekalert.org/pub_releases/2011-03/rson-toc030911.php

Tests on century-old equipment show how far X-rays have come

OAK BROOK, Ill. - *Researchers recently tested first-generation x-ray equipment from 1896 and found that it produced radiation doses and exposure times that were vastly higher than those of today's systems, according a study published online and in the May print edition of Radiology.*

"To my knowledge, nobody had ever done systematic measurements on this equipment, since by the time one had the tools, these systems had been replaced by more sophisticated ones," said the study's lead author, Gerrit J. Kemerink, Ph.D., from Maastricht University Medical Center in the Netherlands.

Wilhelm Roentgen reported his discovery of x-rays on Dec. 28, 1895. A few weeks later, H.J. Hoffmans, a physicist and high school director in Maastricht, the Netherlands, and L. Th. van Kleef, M.D., director of a local hospital, performed anatomical imaging experiments with an x-ray system built from equipment at Hoffmans' high school. Key elements of the system included a high-voltage transformer and a glass bulb with metal electrodes at each end.

Technology advanced rapidly, and the setup used by Hoffmans and Dr. van Kleef soon became obsolete. Eventually, the equipment ended up collecting dust in a Maastricht warehouse. A year ago, Jos M.A. van Engelshoven, M.D., Ph.D., former radiology head at the Maastricht University Medical Center, retrieved the equipment, most of which was still in working order, for a television program on the history of health care in the region. Dr. Kemerink then decided to analyze the setup in more detail.

The Maastricht researchers repeated some of the first imaging exams, using the equipment to image a hand specimen from a body that had been donated to science.

"We sometimes worked in a fully dark room that had black walls, with the only light coming from the flashing tube and from discharges in the spark gap," Dr. Kemerink said. "Together with the irregular buzz of the interrupter and the crackling sound of the discharges, this created a very special, kind of ghostly, ambiance."

The researchers compared the radiation dose, x-ray beam properties and electrical characteristics of the 1896 system with those from a modern x-ray system. Using the same exposure conditions used in 1896, the estimated skin dose needed to image the hand was nearly 1,500 times greater on the first-generation system than on the modern system - 74 milligrays (mGy) and 0.05 mGy, respectively. Corresponding exposure times were 90 minutes for the old system and 21 milliseconds for the modern system.

Pinhole images showed that the x-rays originated from an extended area of the glass wall in the system's construction, causing image blurring. Still, the 114-year-old system produced what Dr. Kemerink described as surprisingly good images in which anatomical details were clearly visible.

The high radiation doses and long exposures times of early x-ray equipment caused significant health problems for the technology's pioneers. Adverse effects, such as eye complaints, skin burns and loss of hair, were reported within weeks of Roentgen's discovery. "Many operators of the early x-ray systems experienced severe damage to hands over time, often necessitating amputations or other surgery," Dr. Kemerink said.

X-ray technology improved rapidly in the 20th century, with significantly lower radiation dose and exposure time and improved image quality, making it a convenient and safe imaging modality and an invaluable diagnostic tool.

"Characteristics of a First-Generation X-Ray System." Collaborating with Drs. Kemerink and van Engelshoven were Martijn Kemerink, Ph.D., Tom J. Dierichs, B.S., Julien Dierichs, B.S., Hubert J.M. Huynen, and Joachim E. Wildberger, M.D., Ph.D.

http://www.eurekalert.org/pub_releases/2011-03/nsij-fsd031611.php

First successful double-blind trial of gene therapy for advanced Parkinson's

MANHASSET, NY - *A multi-center gene therapy trial for patients with advanced Parkinson's disease demonstrated reduced symptoms of the progressive movement disorder, according to a new study published in Lancet Neurology.*

The study was designed to deliver the gene for glumatic acid decarboxylase (GAD) packaged in inert viral vectors into an area of the brain called the subthalamic nucleus. GAD makes an important inhibitory chemical called GABA. The subthalamic nucleus is abnormally activated in Parkinson's disease and this activity leads to the debilitating movement problems. The idea of the gene therapy is that the billions of AAV-2 GAD viral vectors delivered into the subthalamic nucleus will increase GABA, thereby quieting this brain region.

The lead investigator of the study was Andrew Feigin, MD, associate professor of neurology and molecular medicine at The Feinstein Institute for Medical Research in Manhasset, NY, and the trial was funded by Neurologix, Inc. Early development of the therapy was done Michael Kaplitt, MD, and Matthew During, MD, co-authors of the current study. The study was conducted at seven US medical centers.

A total of 45 patients were enrolled in the study. Roughly half of the patients (23) were randomized into the sham surgery arm of the study, which meant that they had a surgical procedure that did not penetrate the brain, and received infusions of saline under the skin rather than the active GAD-containing viral vectors. A dose-escalation safety study of the gene therapy technique was published in 2007 and paved the way to this expanded double-blind placebo study to test its effectiveness in reducing motor symptoms.

Everyone in the study had a positron emission tomography (PET) brain scan before the surgery to confirm the diagnosis of Parkinson's disease. Dr. Feigin and his colleagues found that 11 of 56 patients did not actually have Parkinson's and they were excluded from the study. Everyone was assessed at one month, three months and six months after the genes were infused. Each patient in the active treatment received about a billion viral vectors. It is not clear how long the genes will pump out GAD to make GABA.

The scientists only included patients who got bilateral infusions delivered to the correct area of the brain, the subthalamic nucleus. There were also a few cases where the pumps delivering the treatment (the real and the placebo) malfunctioned during surgery and those cases were taken out of the analysis as well. The final analysis included 16 patients who received active (AAV2-GAD) treatment and 21 who received the sham surgery.

The main outcome measure was a change on a rating scale that assesses motor symptoms. The treated group showed a 23 percent improvement on the United Parkinson's Disease Rating Scale, compared to a 12 percent improvement in those who received sham surgery. Normally over a six-month period patient scores remain stable or worsen. The 12 percent improvement among the sham treated group suggests a placebo response.

"This is a completely novel treatment for advanced Parkinson's disease," said Dr. Feigin. "The treatment was remarkably well tolerated, with mostly only mild adverse events in the AAV2-GAD treated group that

were felt to be unrelated to the treatment, and completely resolved," said Dr. Feigin. He added that other secondary clinical assessments also provided evidence for improvements from the gene therapy.
http://www.scientificamerican.com/article.cfm?id=rwanda-investigating-adult-male-circumcision-without-anesthesia

Rwanda Investigating Adult Male Circumcision sans Anesthesia

A new system is said to enable a bloodless procedure, in which an elastic mechanism is clamped on the penis foreskin, desiccating it for removal after a week

By Clementine Wallace | Wednesday, March 16, 2011 | 6

The African nation of Rwanda recently set a goal of circumcising an estimated two million adult men by the end of 2012 to fight the spread of HIV, and is investigating a new nonsurgical device that is said to allow practitioners to perform the procedure in less than four minutes - without anesthesia.

The patent pending PrePex device includes an elastic mechanism that fits around an inner ring, trapping the penis foreskin - the loose fold of skin that covers its glans - which cuts its blood supply. The foreskin thereby dries up and is removed after a week. Neither anesthetics nor sterile settings nor sutures are required - and no blood is lost, according to health authorities studying the device. After the procedure the Rwandan government guidelines suggest that patients abstain from having sex for six weeks, which is also the case after conventional surgery. This device, it is hoped, could help scale up Rwanda's mass circumcision initiative.

Since 2007 World Heath Organization and the Joint United Nations Programme on HIV/AIDS (UNAIDS) have promoted adult male circumcision as an additional means to fight HIV transmission in sub-Saharan countries with a high prevalence of the virus, low levels of male circumcision, and generalized heterosexual HIV epidemics. The rationale relies on studies suggesting that circumcised men reduce their own risk of HIV infection by about 60 percent.

Campaigns of mass circumcision have thus been launched in various countries, including Rwanda, where HIV prevalence is 3 percent but only 12 percent of adult males are currently circumcised. "If we only circumcise newborns, the effects will start in 15 years. We have to face the problem now," says Agnès Binagwaho, permanent secretary of Rwanda's Ministry of Health. "We are now offering, alongside counseling, testing and condom distribution an additional means of lowering transmission. It's a comprehensive approach."

The major obstacle to adult circumcision in most sub-Saharan countries remains the lack of medical infrastructures and trained health professionals to perform the operation. To overcome this, some countries such as Kenya now allow nurses to perform the surgical procedure. In others, like South Africa, the different stages are divided among nurses and physicians, to decrease physician time spent per procedure.

Now, the concept of a device that can bypass the need for any anesthesia or sutures is also raising interest. "There's absolutely no doubt that if one can perform male circumcision without anesthesia, you save time, money and it requires less expertise," says Kim Eva Dickson, senior adviser in WHO's HIV/AIDS department.

The price of the PrePex device, manufactured by Circ MedTech, incorporated in the Virgin Islands, has not yet been established. "The device was developed to be affordable for public health programs in Africa and is meant to be cost-saving for the government. The final price depends on quantities," said company CEO Tzameret Fuerst.

In March 2011 data on the first 40 patients from the safety and efficacy study was presented at the 18th Conference on Retroviruses and Opportunistic Infections in Boston. According to the researchers, all participants experienced excellent healing. "There was a 100 percent compliance rate, and the whole pain-management protocol in the study was two ibuprofens for the two to three hours of discomfort that follow the placement of the device," Binagwaho says. "It can be done anywhere - under a tent, in a classroom on the weekends - by a staff that is rapidly trained." The Rwandan government is currently training health care workers to perform the operation.

Dickson, who visited the site during the trial, agreed that initial results are encouraging. "We saw it done, and when we spoke to people who went through the procedure they seemed satisfied and the cosmetics looked good," she said. "I think there is potential, but we need more research evidence before we can approve of this method."

All external experts interviewed agreed that the device must be further investigated before it can be used systematically. "I've examined the PrePex. It's very promising in that it's very rapid to apply - two to three minutes, compared to the 20 minutes required for surgical circumcision," says Tim Farley, a scientist with WHO's Department of Reproductive Health and Research." One of the problems is that there could be rare events that occur but it's very difficult to detect those within this sort of limited studies. So the product needs to be studied in a larger number of men, and we will have to continue to monitor the safety and acceptability of the device."

Rwanda will present safety and efficacy data on 50 patients at the American Urology Association in May 2011, and a randomized, controlled trial with 150 participants, designed to compare PrePex with the conventional surgical method is currently ongoing. Today, clamping systems approved by the WHO are for use in infant circumcision. They include the Mogen clamp, the Gomco clamp and the Plastibell.

In 2004 the TaraKlamp (TK), a device that requires anesthesia, was tested among adults in South Africa. Despite initial enthusiasm, the study revealed high complication rates. Of 69 participants, 34 men were randomized to conventional surgery and 35 to the TK approach. Less favorable outcomes were systematically associated with the latter method.

Public sector facilities in some South African provinces, however, are using the device today.

Another apparatus currently being investigated among male adults in various sub-Saharan countries is the China-developed Shang Ring. This device, which requires local anesthesia, has proved safe, effective and acceptable in a small study involving 40 patients, published in the February 2011 issue of the Journal of Acquired Immune Deficiency Syndromes. A randomized control trial involving 400 male adults, comparing the Shang Ring with standard surgical methods, is expected to launch in Kenya and Zambia.

As the number of devices being tested is increasing, in January 2011 WHO set up an independent advisory committee. "The committee will systematically review new data on devices and advise on whether additional studies are needed before a device can be recommended for use in the scale-up of male circumcision programs," says Catherine Hankins, UNAIDS chief scientific adviser. "This is a minor operation, but on a major organ. We don't want to lose any penises."

http://www.physorg.com/news/2011-03-pepsico-unveils-percent-plant-based-bottle.html

PepsiCo unveils 100 percent plant-based bottle

(AP) - *Remember the Cola Wars? Get ready for the Bottle Wars. PepsiCo Inc. on Tuesday unveiled a bottle made entirely of plant material, which it says bests the technology of competitor Coca-Cola and reduces its potential carbon footprint.*

The bottle is made from switch grass, pine bark, corn husks and other materials. Ultimately, Pepsi plans to also use orange peels, oat hulls, potato scraps and other leftovers from its food business. The new bottle looks, feels and protects the drink inside exactly the same as its current bottles, Papalia said. "It's indistinguishable."

PepsiCo says it is the world's first bottle of a common type of plastic called PET made entirely of plant-based materials. Coca-Cola Co. currently produces a bottle using 30 per cent plant-based materials and recently estimated it would be several years before it has a 100 per cent plant bottle that's commercially viable.

"We've cracked the code," said Rocco Papalia, senior vice-president of advanced research of PepsiCo.

The discovery potentially changes the industry standard for plastic packaging. Traditional plastic, called PET, is used in beverage bottles, food pouches, coatings and other common products.

The plastic is the go-to because it's lightweight and shatter-resistant, its safety is well-researched and it doesn't affect flavours. It is not biodegradable or compostable. But it is fully recyclable, a characteristic both companies maintain in their new creations. Traditional PET plastic is made using fossil fuels, like petroleum, a limited resource that's rising in price. By using plant material instead, companies reduce their environmental impact. Pepsi says the new plastic will cost about the same as traditional plastic.

The company, based in Purchase, N.Y., said it has had dozens of people working on the process for years. While PepsiCo wouldn't specify the cost to research and design the new bottle, Papalia said it is in the millions of dollars.

It's one of several steps PepsiCo has taken recently to reduce its environmental impact. The company created a fully compostable bag for its SunChips line. It cut the amount of plastic in its Aqua-Fina bottle in 2009. And its Naked Juice line is in the midst of switching to a bottle made entirely of recycled plastic bottles.

PepsiCo says of its 19 biggest brands, those that generate more than $1 billion (dollar figures U.S.) in revenue, 11 are beverage brands that use PET. The company says the packaging will cost roughly the same as it does today. PepsiCo plans to test the product in 2012 in a few hundred thousand bottles. Once the company is sure it can successfully produce the bottle at that scale, it will begin converting all its products.

http://www.scientificamerican.com/article.cfm?id=female-hormone-key-male-contraceptive

Female Hormone Could Be Key to Male Contraceptive

Progesterone-sensing molecule that guides sperm to egg offers fertility solution.

By Ewen Callaway

A sperm's path to an egg is more a deadly obstacle course than a track sprint. The one ejaculated sperm cell in a million that is lucky enough to reach the fallopian tubes, where eggs await fertilization, must conquer thick, gelatinous layers of mucus and cells surrounding the egg to reach its prize.

Fortunately for the sperm, there is help. Two studies published today in Nature show how sperm sense progesterone, a female sex hormone, that has been released by cells surrounding the egg. The hormone may guide the sperm towards the egg as well as giving it a final push to get there, the research suggests. The findings could be used to design a new class of contraceptive drug.

"It really is a significant step forward in terms of how we understand what regulates sperm," says Steven Publicover, a reproductive biologist at the University of Birmingham, UK, who was not involved in either study.

In some previous experiments, ejaculated human sperm have been shown to swim towards areas with high levels of progesterone. The hormone also causes the cells to beat their whip-like tails more powerfully to make it through to the egg, a condition called hyperactivity. "We've got good reason to think that the response to progesterone matters, but it's bloody difficult to pin it down," says Publicover.

Changing channel

The latest studies, led by independent teams in Germany and the United States who agreed to publish their findings simultaneously, show that progesterone activates a molecular channel called CatSper, which floods sperm cells with calcium. Mice without the channel are infertile, as are some men with mutations in the genes that make it, says Polina Lishko, a reproductive biologist at the University of California, San Francisco, who led one of the studies2. Sperm that don't make CatSper cannot become hyperactive.

Lishko and Kirichok's team developed a way of measuring the electrical currents within sperm that are created by ions like calcium, similar to how neuroscientists record the electrical activity of neurons. They found that adding progesterone to ejaculated human sperm boosts the current, and that treating sperm with drugs that block CatSper reduces it. Putting the cells into high-pH environments, like those found around the egg, also activated CatSper. A combination of high pH and high progesterone had an even stronger effect.

A second team, led by Benjamin Kaupp, a biophysicist at the Center of Advanced European Studies and Research in Bonn, Germany, came to the same conclusion in their own experiments. They also measured calcium levels within human sperm, and found that the effects of administering progesterone are almost instantaneous. Kaupp says that this quick action leaves little time for traditional molecular-signaling pathways to act, and suggests that CatSper itself detects the sex hormone and causes calcium levels to rise.

Problems with progesterone sensing could explain some cases of infertility, says Kaupp. "It could be that some eggs do not produce enough progesterone, or that some sperm are not as sensitive to progesterone as others."

Yet there would be little demand for infertility drugs that activate CatSper, says Kaupp, because infertility is already well-addressed by in vitro fertilization. More promising, say researchers, are drugs that stymie conception by hindering the channel's ability to sense progesterone - or to work at all.

"The consequence for humans is that if you could block CatSper it would be an ideal contraceptive," says David Clapham, a biochemist at Children's Hospital Boston in Massachusetts, whose team discovered the channel and are looking for drugs that inhibit it. Sperm are the only cells known to make CatSper, so such a drug is unlikely to have many side effects. It would also, presumably, work regardless of whether it is men or women who take it because it could act on sperm regardless of their location, adds Lishko.

http://www.physorg.com/news/2011-03-gene-therapy-reverses-symptoms-parkinson.html

Gene therapy reverses symptoms of Parkinson's disease

A gene therapy called NLX-P101 dramatically reduces movement impairment in Parkinson's patients, according to results of a Phase 2 study published today in the journal Lancet Neurology.

The approach introduces a gene into the brain to normalize chemical signaling. The study is the first successful randomized, double-blind clinical trial of a gene therapy for Parkinson's or any neurologic disorder, and it represents the culmination of 20 years of research by study co-authors Dr. Michael Kaplitt, vice chairman for research in the Department of Neurological Surgery at Weill Cornell Medical College and a neurosurgeon at NewYork-Presbyterian Hospital/Weill Cornell Medical Center, and Dr. Matthew During, originally at Yale University and now professor of molecular virology, immunology and medical genetics, neuroscience and neurological surgery at the Ohio State University.

"Patients who received NLX-P101 showed a significant reduction in the motor symptoms of Parkinson's, including tremor, rigidity and difficulty initiating movement," says Dr. Kaplitt, who pioneered the approach and helped design the clinical trial. "This not only confirms the results of our Phase 1 trial performed at NewYork-Presbyterian/Weill Cornell but also represents a major milestone in the development of gene therapy for a wide range of neurological diseases."

"This is great news for the 1.5 million Americans living with Parkinson's disease," adds Dr. During, who is the co-inventor, with Dr. Kaplitt, of the gene therapy procedure. "Since this is also the first gene therapy study for a neurological disease to achieve success in a rigorous randomized, double-blind design compared with a sham group, this is also a crucial step forward toward finally bringing gene therapy into clinical practice for patients with debilitating brain disorders."

Although medical therapy is usually effective for most symptoms of Parkinson's early in the disease, over time many patients become resistant to treatment or develop disabling side effects. An alternative treatment is electrical deep brain stimulation, which requires the implantation of permanent medical devices in the brain.

In the current study, 45 patients with moderate to advanced Parkinson's disease who were not adequately controlled with current therapies were enrolled in the double-blind trial, with half randomized to receive the gene therapy and the other half to a "sham surgery" - a mock procedure designed to make patients think they could have received the experimental approach.

The results were significant. Half of patients receiving gene therapy achieved dramatic symptom improvements, compared with just 14 percent in the control group. Overall, patients receiving gene therapy had a 23.1 percent improvement in motor score, compared to a 12.7 percent improvement in the control group. This greater improvement in the gene therapy patients compared with the sham patients was statistically significant over the entire six-month blinded study period. (Dr. Kaplitt explains that the improvements in the control group were likely a chimera, the result of placebo effect or a similar phenomenon called regression to the mean.)

"Improved motor control was seen at one month and continued virtually unchanged throughout the six-month study period," says Dr. Kaplitt, who also serves as associate professor of neurological surgery and director of the Laboratory of Molecular Neurosurgery at Weill Cornell Medical College. "Patients also reported better control of their medication and no worsening of non-motor symptoms."

How NLX-P101 Gene Therapy Works

Gene therapy is the use of a gene to change the function of cells or organs to improve or prevent disease. To transfer genes into cells, an inert virus is used to deliver the gene into a target cell. In this case, the glutamic acid decarboxylase (GAD) gene was used because GAD makes a chemical called GABA, a major inhibitory neurotransmitter in the brain that helps "quiet" excessive neuronal firing related to Parkinson's disease.

"In Parkinson's disease, not only do patients lose many dopamine-producing brain cells, but they also develop substantial reductions in the activity and amount of GABA in their brains. This causes a dysfunction in brain circuitry responsible for coordinating movement," explains Dr. During.

In the Phase 2 study, each patient in the experimental group received an infusion of the genetic material directly into their subthalamic nucleus, a key brain region involved in motor function. The GAD gene instructed cells in that area to begin making GABA neurotransmitters in order to re-establish the normal chemical balance which becomes dysfunctional within circuits that control movement.

While patients in the Phase 1 study only received the therapy on one side of their brain, patients in the Phase 2 were infused on both sides. And while the infusion happened entirely in the operating room in the previous phase, the current study made use of a novel delivery system conceived by Drs. Kaplitt and During that allowed for the infusion to take place outside of the OR - at the hospital bedside - something Dr. Kaplitt says makes for a more comfortable patient experience.

Drs. Kaplitt and During also designed the sham surgery, one of the most complex of its kind. The challenge was especially great because patients were required to remain awake to enable surgeons to locate the targeted brain area. In the sham procedure, a small indentation was drilled partway into their skull. Pre-recorded audio of a subthalamic nucleus mapping procedure was played while patients were asked to move various body parts, leading them to believe that an actual brain procedure was being performed. Lastly patients were attached to an infusion system that appeared identical to the system used in the gene therapy group but were subcutaneously injected with saline solution instead of the gene therapy.

The NLX-P101 gene therapy was pioneered by Neurologix Inc. scientific founders Drs. Kaplitt and During. The two researchers have been at the forefront of gene therapy research since 1989. They were the first to demonstrate that the viral vector AAV could be an effective gene therapy agent in the brain, which they reported in a landmark Nature Genetics paper in 1994. Drs. During, Kaplitt and colleagues subsequently published additional research demonstrating the beneficial effects of AAV-GAD gene therapy for Parkinson's in the journal Science in 2002. The Phase 1 clinical trial, performed at NewYork-Presbyterian/Weill Cornell, was the first ever clinical gene therapy trial for Parkinson's or any other adult neurological disorder. Results of that study appeared in 2007 as a cover article in The Lancet and in a second article in the Proceedings of the National Academy of Sciences. *Provided by New York- Presbyterian Hospital*

http://www.eurekalert.org/pub_releases/2011-03/yu-031711.php

Human prejudice has ancient evolutionary roots

The tendency to perceive others as "us versus them" isn't exclusively human but appears to be shared by our primate cousins, a new study led by Yale researchers has found.

In a series of ingenious experiments, Yale researchers led by psychologist Laurie Santos showed that monkeys treat individuals from outside their groups with the same suspicion and dislike as their human cousins tend to treat outsiders, suggesting that the roots of human intergroup conflict may be evolutionarily quite ancient. The findings are reported in the March issue of the Journal of Personality and Social Psychology.

"One of the more troubling aspects of human nature is that we evaluate people differently depending on whether they're a member of our 'ingroup' or 'outgroup,'" Santos said. "Pretty much every conflict in human history has involved people making distinctions on the basis of who is a member of their own race, religion, social class, and so on. The question we were interested in is: Where do these types of group distinctions come from?" The answer, she adds, is that such biases have apparently been shaped by 25 million years of evolution and not just by human culture.

Santos and her lab studied the rhesus macaques living on an island off the coast of Puerto Rico. Like humans, monkeys in this population naturally form different social groups on the basis of family history. In order to assess whether monkeys made the same distinctions between ingroup and outgroup individuals, the researchers used a well-known tendency of animals to stare longer at novel or frightening things than at familiar or friendly things. They presented subject monkeys with pictures of monkeys who were either in their social group or members of a different group. They found that monkeys stared longer at pictures of other monkeys who were outside their group, suggesting that monkeys spontaneously detect who is a stranger and who is a group member.

"What made this result even more remarkable" noted Neha Mahajan, a Yale graduate student who headed up this project, "is that monkeys in this population move around from group to group, so some of the monkeys who were 'outgroup' were previously 'ingroup.' And yet, the result holds just as strongly for monkeys who have transferred groups only weeks earlier, suggesting that these monkeys are sensitive to who is currently to be thought of as an insider or an outsider. In other words, although monkeys divide the world into 'us' versus 'them,' they do so in a way that is flexible and is updated in real time."

Santos and colleagues then asked whether monkeys evaluated ingroup and outgroup members differently - did they associate these individuals automatically with "good" and "bad" respectively? To study this, they developed a monkey version of a test of implicit attitudes known as the IAT (see http://implicit.harvard.edu). In humans, this test measures the extent to which people show implicit biases against members of other groups. To look at the same capacity in monkeys, the researchers showed monkeys a sequence of photos in which photos of ingroup or outgroup monkey faces were paired with photos of either good things, such as fruits, or bad things, such as spiders. The researchers then recorded the time monkeys spent looking at both kinds of sequences. The monkeys spent little time looking at sequences that included ingroup faces paired with good stuff like fruits or outgroup faces paired with bad stuff like spiders, suggesting that the monkeys treated these two kinds of stimuli as being similar. On the other hand, the monkeys stared longer at sequences in which outgroup individuals were paired with positive objects like fruit suggesting that this association was unnatural to the monkeys. Like humans, monkeys tend to spontaneously view ingroup members positively and outgroup members negatively.

The Yale team's results suggest that the distinctions humans make between "us" and "them" - and therefore the roots of human prejudice - may date back at least 25 million years, when humans and rhesus macaques shared a common ancestor.

"Social psychologists introduced the world to the idea that the immediate situation is hugely powerful in determining behavior, even intergroup feelings," said Mahzarin Banaji, of the Department of Psychology at Harvard University and a co-author of the paper. "Evolutionary theorists have made us aware of our ancestral past. In this work, we weave the two together to show the importance of both of these influences at work"

"The bad news is that the tendency to dislike outgroup members appears to be evolutionarily quite old, and therefore may be less simple to eliminate than we'd like to think," Santos said. "The good news, though, is that even monkeys seem to be flexible about who counts as a group member. If we humans can find ways to harness this evolved flexibility, it might allow us to become an even more tolerant species."

Other Yale authors of the paper are Margaret A. Martinez and Natashya Gutierrez. Researchers from Bar-Ilan University and Harvard also contributed to the study.

The work was funded the National Center for Research Resources, part of the National Institutes of Health.

http://www.eurekalert.org/pub_releases/2011-03/uoa-cso031711.php

Cassini spacecraft observes seasonal rains on Titan

This is the first time scientists have obtained current evidence of rain soaking Titan's surface at low latitudes.

As spring continues to unfold on Saturn, April showers on the planet's largest moon, Titan, have brought methane rain to its equatorial deserts, as revealed in images captured by NASA's Cassini spacecraft.

This is the first time scientists have obtained current evidence of rain soaking Titan's surface at low latitudes. The observations are released today in the journal Science.

"Titan continues to surprise and amaze us," said Alfred McEwen, a planetary scientist at the UA's Lunar and Planetary Lab and a co-author on the paper. "After years of dry weather in the tropics, an area the size of Arizona and New Mexico combined was darkened by methane rain over a period of just a few weeks."

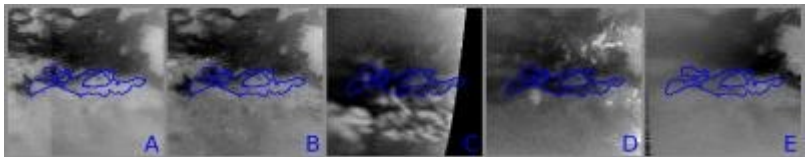
Extensive rain from large cloud systems, spotted by Cassini's cameras in late 2010, has apparently darkened the surface of the moon. The best explanation is these areas remained wet after methane rainstorms.

The new findings, combined with earlier results reported in Geophysical Research Letters last month, show the weather systems of Titan's thick atmosphere and the changes wrought on the moon's surface are affected by the changing seasons.

"It's amazing to be watching such familiar activity as rainstorms and seasonal changes in weather patterns on a distant, icy satellite," said Elizabeth Turtle, a Cassini imaging team associate at the Johns Hopkins University Applied Physics Lab in Laurel, Md., and lead author of today's publication. "These observations are helping us to understand how Titan works as a system, as well as similar processes on our own planet."

The Saturn system experienced equinox, when the sun lies directly over a planet's equator and seasons change, in August 2009. Years of Cassini observations suggest Titan's global atmospheric circulation pattern responds to the changes in solar illumination, influenced by the atmosphere and the surface, as detailed in the Geophysical Research Letters paper.

Cassini found the surface temperature responds more rapidly to sunlight changes than does the thick atmosphere. The changing circulation pattern produced clouds in Titan's equatorial region.



Titanic Deluge: The storm created large effects in the form of dark - likely wet - areas on the surface of the moon. After it dissipated, Cassini observed significant changes on Titan's surface at the southern boundary of the dune field named Belet. Those changes covered an area of roughly Arizona and Utah. Scientists interpret the changes seen in these images (blue outlines) to be evidence of methane rain wetting the surface. **NASA/JPL/SSI**

Clouds on Titan are formed of methane as part of an Earth-like cycle that uses methane instead of water. On Titan, methane fills lakes on the surface, saturates clouds in the atmosphere, and falls as rain.

Though there is evidence that liquids have flowed on the surface at Titan's equator in the past, liquid hydrocarbons, such as methane and ethane, had only been observed on the surface in lakes at polar latitudes. The vast expanses of dunes that dominate Titan's equatorial regions require a predominantly arid climate.

Scientists suspected that clouds might appear at Titan's equatorial latitudes as spring in the northern hemisphere progressed. But they were not sure if dry channels previously observed were cut by seasonal rains or remained from an earlier, wetter climate. An arrow-shaped storm appeared in the equatorial regions on Sept. 27, 2010 - the equivalent of early April in Titan's year - and a broad band of clouds appeared the next month.

As described in the Science paper, over the next few months, Cassini's imaging science subsystem captured short-lived surface changes visible in images of Titan's surface. A 193,000-square-mile (500,000-square-kilometer) region along the southern boundary of Titan's Belet dune field, as well as smaller areas nearby, had become darker. Scientists compared the imaging data to data obtained by other instruments and ruled out other possible causes for surface changes. They concluded this change in brightness is most likely the result of surface wetting by methane rain. These observations suggest that recent weather on Titan is similar to that over Earth's tropics. In tropical regions, Earth receives its most direct sunlight, creating a band of rising motion and rain clouds that encircle the planet.

"These outbreaks may be the Titan equivalent of what creates Earth's tropical rainforest climates, even though the delayed reaction to the change of seasons and the apparently sudden shift is more reminiscent of Earth's behavior over the tropical oceans than over tropical land areas," said Tony Del Genio of NASA's Goddard Institute for Space Studies, New York, a co-author and a member of the Cassini imaging team.

On Earth, the tropical bands of rain clouds shift slightly with the seasons but are present within the tropics year-round. On Titan, such extensive bands of clouds may only be prevalent in the tropics near the equinoxes and move to much higher latitudes as the planet approaches the solstices.

The imaging team intends to watch whether Titan evolves in this fashion as the seasons progress from spring toward northern summer. "It is patently clear that there is so much more to learn from Cassini about seasonal forcing of a complex surface-atmosphere system like Titan's and, in turn, how it is similar to, or differs from, the Earth's," said Carolyn Porco, Cassini imaging team lead at the Space Science Institute, Boulder, Colo. "We are eager to see what the rest of Cassini's Solstice Mission will bring."

The Cassini-Huygens mission is a cooperative project of NASA, the European Space Agency and the Italian Space Agency. The Jet Propulsion Laboratory, a division of the California Institute of Technology in Pasadena, manages the Cassini-Huygens mission for NASA's Science Mission Directorate, Washington.

http://www.newscientist.com/article/dn20256-memory-may-be-built-with-standard-building-blocks.html

Memory may be built with standard building blocks

*** 13:47 17 March 2011 by Ferris Jabr**

Many neuroscientists would agree that the human brain is like Silly Putty, that incredibly malleable children's plaything, in that learning can constantly reshape the ways in which neurons connect with one another.

But Henry Markram at the Swiss Federal Institute of Technology in Lausanne thinks the brain may be more like another children's toy: Lego bricks. A Lego set can be used to build all kinds of structures, but you cannot change the bricks themselves. Similarly, our brains may create new memories by rearranging discrete and fundamental building blocks of knowledge, Markram says.

"We have repeatedly observed how synapses change in response to stimulation and experience," he says, "but the question we were trying to answer was whether this is happening on top of a clean slate or on top of some kind of prearranged organisation."

Markram and his team devised a method of listening to the electrical activity in individual brain cells simultaneously using very fine needles threaded with wire. In over 200 experiments with brain tissue from two-week-old rats, the researchers recorded chatter in groups of 12 neurons, exciting one cell at a time and waiting for responses in the others, in order to map the connections between them.

Common neighbours

If the brain is like putty and can be flexibly moulded by experience, then any one neuron in the group should have an equal probability of being connected to any other neuron, Markram says. But that is not what he found. Instead, Markram's analysis revealed what he calls the "common-neighbour rule": the chance that any two neurons are linked, and the strength of the bridge between them, is directly proportional to number of neighbours they share.

The researchers constructed a computer simulation of 2000 neurons and applied the rule to determine how the virtual brain cells would hook up. When they used the simulation to replicate their experiments on rat brains, they got almost exactly the same results. They also found that the common-neighbour rule created functional groups of 40 to 50 neurons, which Markram thinks are the "Lego blocks" of memory.

"We're all given the same building blocks, but it's how they are connected that matters," he says. "We think of them as elementary processing units. Because of these units, we can all perceive the same things but have unique memories."

Placeholders for knowledge

Markram says this is the first experimental evidence that basic blocks of knowledge are built into the brain's neuronal architecture. He also says it is possible that these Lego blocks act as placeholders or vessels for knowledge that will be gained throughout life. "These are the smallest units of the brain that can hold knowledge," he says. "What we need to know now is what kind of knowledge they contain.

Journal reference: Proceedings of the National Academy of Sciences, DOI: 10.1073/pnas.1016051108

http://www.newscientist.com/blogs/shortsharpscience/2011/03/american-scramble-for-radiatio.html

American radiation pill scramble a 'waste of time'

Bob Holmes, consultant

The possibility of exposure to nuclear radiation can trigger public fear far out of proportion to the actual risk, and the Japanese reactor crisis is no exception.

In particular, people living near the Pacific coast of the US and Canada are quickly buying up stocks of potassium iodide, news agencies are reporting. That is almost certainly a complete waste of time and money.

For people immediately downwind of a reactor accident, potassium iodide, or KI, can be a lifesaver. Ingesting a daily dose of KI keeps the body from absorbing dangerous doses of radioactive iodine released from

the damaged reactor, and its use in nearby residents after the Chernobyl accident could have helped prevent thousands of cases of thyroid cancer in the decades since

The US Nuclear Regulatory Commission now recommends that disaster planners consider giving KI to anyone within 16 km of a serious reactor accident.

Residents of North America, thousands of kilometres from the failing Japanese reactors, live much too far away - and will receive far too little radiation exposure - to need KI pills.

In an interview with CNN, Nolan Hertel, nuclear engineering researcher at Georgia Institute of Technology said:

The United States is thousands of miles from the leaks and once the radiation gets into the air, it disperses and dilutes as the wind blows it

The only benefit they will get is the vague sense that they're doing something to protect themselves, says Kenneth Mossman, a radiation safety expert at Arizona State University in Tempe. In an interview with CNN he says that in return, they run some slight risk of side effects:

Some people shouldn't take potassium iodide because they may be allergic to it. Other people may experience gastrointestinal distress, and in a small number of people, there may actually be salivary gland irritation as well

Meanwhile, the Associated Press reports that Beijing supermarkets have seen shoppers panic-buying iodised salt in the mistaken belief that it protects against radiation.

http://www.nytimes.com/2011/03/17/science/17plume.html

Scientists Project Path of Radiation Plume

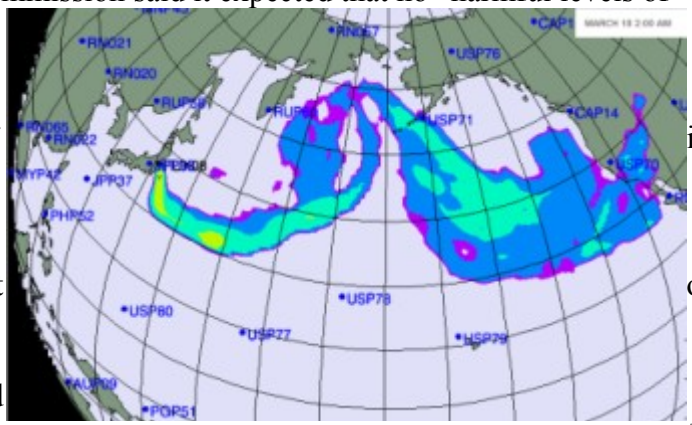
By WILLIAM J. BROAD

A United Nations forecast of the possible movement of the radioactive plume coming from crippled Japanese reactors shows it churning across the Pacific, and touching the Aleutian Islands on Thursday before hitting Southern California late Friday.

Health and nuclear experts emphasize that radiation in the plume will be diluted as it travels and, at worst, would have extremely minor health consequences in the United States, even if hints of it are ultimately detectable. In a similar way, radiation from the Chernobyl disaster in 1986 spread around the globe and reached the West Coast of the United States in 10 days, its levels measurable but minuscule.

The projection, by the Comprehensive Test Ban Treaty Organization, an arm of the United Nations in Vienna, gives no information about actual radiation levels but only shows how a radioactive plume would probably move and disperse. The forecast, calculated Tuesday, is based on patterns of Pacific winds at that time and the predicted path is likely to change as weather patterns shift.

On Sunday, the United States Nuclear Regulatory Commission said it expected that no “harmful levels of radioactivity” would travel from Japan to the United States “given the thousands of miles between the two countries.” The test ban treaty group routinely does radiation projections in an effort to understand which of its global stations to activate for monitoring the worldwide ban on nuclear arms testing. It has more than 60 stations that sniff the air for radiation spikes and uses weather forecasts and powerful computers to model the transport of radiation on the winds.



On Wednesday, the agency declined to release its Japanese forecast, which The New York Times obtained from other sources. The forecast was distributed widely to the agency’s member states.

A forecast by the Comprehensive Nuclear Test Ban Treaty Organization shows how weather patterns this week might disperse radiation from a continuous source in Fukushima, Japan. The forecast does not show actual levels of radiation, but it does allow the organization to estimate when different monitoring stations, marked with small dots, might be able to detect extremely low levels of radiation. Health and nuclear experts emphasize that any plume will be diluted as it travels and, at worst, would have extremely minor health consequences in the United States.

But in interviews, the technical specialists of the agency did address how and why the forecast had been drawn up. “It’s simply an indication,” said Lassina Zerbo, head of the agency’s International Data Center. “We have global coverage. So when something happens, it’s important for us to know which station can pick up the event.” For instance, the Japan forecast shows that the radioactive plume will probably miss the agency’s

monitoring stations at Midway and in the Hawaiian Islands but is likely to be detected in the Aleutians and at a monitoring station in Sacramento.

The forecast assumes that radioactivity in Japan is released continuously and forms a rising plume. It ends with the plume heading into Southern California and the American Southwest, including Nevada, Utah and Arizona. The plume would have continued eastward if the United Nations scientists had run the projection forward.

Earlier this week, the leading edge of the tangible plume was detected by the Navy's Seventh Fleet when it was operating about 100 miles northeast of the Japanese reactor complex. On Monday, the Navy said it had repositioned its ships and aircraft off Japan "as a precautionary measure."

The United Nations agency has also detected radiation from the stricken reactor complex at its detector station in Gunma, Japan, which lies about 130 miles to the southwest.

The chairman of the Nuclear Regulatory Commission, Gregory B. Jaczko, said Monday that the plume posed no danger to the United States. "You just aren't going to have any radiological material that, by the time it traveled those large distances, could present any risk to the American public," he said in a White House briefing. Mr. Jaczko was asked if the meltdown of a core of one of the reactors would increase the chance of harmful radiation reaching Hawaii or the West Coast. "I don't want to speculate on various scenarios. But based on the design and the distances involved, it is very unlikely that there would be any harmful impacts."

The likely path of the main Japanese plume across the Pacific has also caught the attention of Europeans, many of whom recall how the much closer Chernobyl reactor in Ukraine began spewing radiation.

In Germany on Wednesday, the Federal Office for Radiation Protection held a news conference that described the threat from the Japanese plume as trifling and said there was no need for people to take iodine tablets. The pills can prevent poisoning from the atmospheric release of iodine-131, a radioactive byproduct of nuclear plants. The United States is also carefully monitoring and forecasting the plume's movements. The agencies include the Federal Aviation Administration, the National Oceanic and Atmospheric Administration, the Department of Defense, and the Department of Energy.

On Wednesday, Steven Chu, the energy secretary, told Congress that the United States was planning to deploy equipment in Japan that could detect radiation exposure on the ground and in the air. In total, the department's team includes 39 people and more than eight tons of equipment.

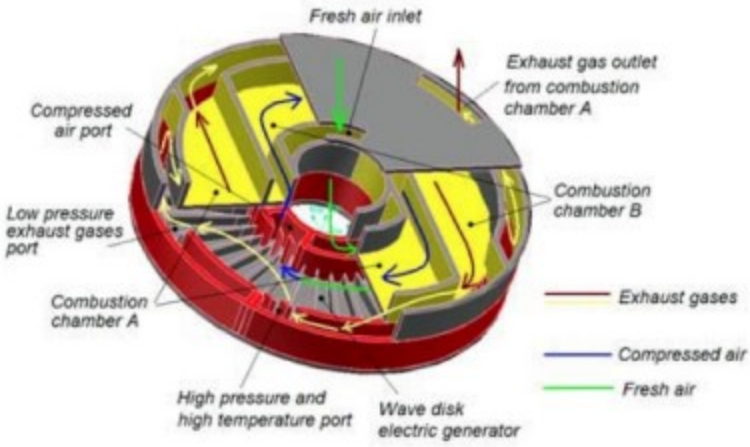
"We continue to offer assistance in any way we can," Dr. Chu said at a hearing, "as well as informing ourselves of what the situation is."

http://www.physorg.com/news/2011-03-msu-prototype-video.html

MSU researchers create a new engine prototype (w/ video)

(PhysOrg.com) -- ***Researchers at Michigan State University have built a prototype, based on the research first released in 2009, of the Wave Disk Generator -- an engine that does not have pistons, crankshafts or valves.***

This new model, which does away with the internal combustion engine of the past, has the potential to reduce auto emissions up to 90 percent, when compared to the current emissions level. This is because the engine uses roughly 60 percent of its fuel for propulsion, when you compare this to the typical cars engine that uses only 15 percent of fuel for propulsion, we can see how the increase is possible.



The new engine prototype is built with a disc-shaped shock wave generator that is about the size of a sauce pan, and will require no transmission system, cooling system, emissions regulation or fluids, which means that you will end up not only doing something good for the planet, but you will end up with less in maintenance costs, if this new prototype ever comes to the market.

The engine works like this: a rotor, with a wave-like pattern carved into channels. The fuel and air enter and mix through the central inlets. The rotor then spins, blocking the exit of gasses. As the pressure builds it will generate a shock wave that will compress the mixture. Once it is ignited an outlet opens to let the hot gases escape, and your car can move as usual.

The engine prototype was shown off by Norbert Müller and other colleagues at Michigan State University at a meeting with the Department of Energy's Advanced Research Projects Agency.

http://www.bbc.co.uk/news/health-12771188

Actos is 'alternative' to banned diabetes drug Avandia

A drug to treat diabetes, Actos, would be a "sensible alternative" to one which was banned last year, researchers have said.

Avandia, also known as rosiglitazone, was suspended by authorities in Europe, but is still available in the United States and Canada. The study published on the BMJ website said patients taking Actos had fewer heart problems. Diabetes UK said Actos was a very effective treatment.

Rosiglitazone and pioglitazone, which has the trade name Actos, are used to control blood sugar levels in patients with type-2 diabetes and both are known to increase the risk of heart failure.

The research team at the University of East Anglia compared the risks associated with each drug by analysing 16 studies of more 800,000 patients. Rosiglitazone increased the risk of heart attack by 16%, heart failure by 23%, and death by 14% compared with pioglitazone.

Alternative

The report says: "For patients who need thiazolidinedione treatment, continued use of rosiglitazone may lead to excess heart attacks, heart failure and mortality, compared with pioglitazone, the effect on public health may be considerable."

Dr Yoon Loke, from the University of East Anglia, told the BBC: "For patients who have come off rosiglitazone, pioglitazone would be a sensible alternative." "Although it's like jumping out of the frying pan and into the fire in some ways, pioglitazone can lead to fractures in women, is being evaluated for risk in bladder cancer and increases the risk of heart failure."

Deepa Khatri, clinical advisor at Diabetes UK, said people with diabetes should have as much choice as possible. "Actos (pioglitazone) is still available on the European market for people with diabetes. For many people, Actos is a very effective treatment to help control blood glucose levels and Diabetes UK believes this drug should continue to be made available to ensure people with diabetes have as much choice as possible.

"Alternatives to Actos are available, however is it very important that people discuss treatment options with their healthcare team to assess the most appropriate form of medication to suit their individual needs."

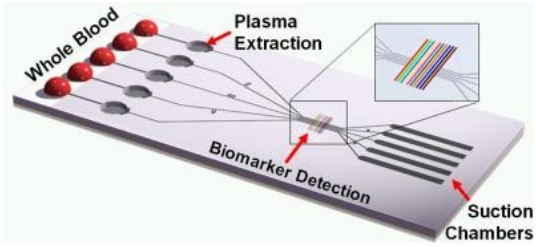
http://www.eurekalert.org/pub_releases/2011-03/uoc--nba031811.php

New blood analysis chip could lead to disease diagnosis in minutes

Berkeley - ***A major milestone in microfluidics could soon lead to stand-alone, self-powered chips that can diagnose diseases within minutes.***

The device, developed by an international team of researchers from the University of California, Berkeley, Dublin City University in Ireland and Universidad de Valparaíso Chile, is able to process whole blood samples without the use of external tubing and extra components. The researchers have dubbed the device SIMBAS, which stands for Self-powered Integrated Microfluidic Blood Analysis System. SIMBAS appeared as the cover story March 7 in the peer-reviewed journal Lab on a Chip.

"The dream of a true lab-on-a-chip has been around for a while, but most systems developed thus far have not been truly autonomous," said Ivan Dimov, UC Berkeley post-doctoral researcher in bioengineering and co-lead author of the study. "By the time you add tubing and sample prep setup components required to make previous chips function, they lose their characteristic of being small, portable and cheap. In our device, there are no external connections or tubing required, so this can truly become a point-of-care system."



This schematic of the tether-free SIMBAS chip shows some of the functional elements, such as the blood loading area, the plasma separation microtrenches, detection sites and the suction flow structures. **Ivan Dimov image**

Dimov works in the lab of the study's principal investigator, Luke Lee, UC Berkeley professor of bioengineering and co-director of the Berkeley Sensor and Actuator Center.

"This is a very important development for global healthcare diagnostics," said Lee. "Field workers would be able to use this device to detect diseases such as HIV or tuberculosis in a matter of minutes. The fact that we reduced the complexity of the biochip and used plastic components makes it much easier to manufacture in high volume at low cost. Our goal is to address global health care needs with diagnostic devices that are functional, cheap and truly portable."

For the new SIMBAS biochip, the researchers took advantage of the laws of microscale physics to speed up processes that may take hours or days in a traditional lab. They note, for example, that the sediment in red wine that usually takes days to years to settle can occur in mere seconds on the microscale.

The SIMBAS biochip uses trenches patterned underneath microfluidic channels that are about the width of a human hair. When whole blood is dropped onto the chip's inlets, the relatively heavy red and white blood cells settle down into the trenches, separating from the clear blood plasma. The blood moves through the chip in a process called degas-driven flow.

For degas-driven flow, air molecules inside the porous polymeric device are removed by placing the device in a vacuum-sealed package. When the seal is broken, the device is brought to atmospheric conditions, and air molecules are reabsorbed into the device material. This generates a pressure difference, which drives the blood fluid flow in the chip. In experiments, the researchers were able to capture more than 99 percent of the blood cells in the trenches and selectively separate plasma using this method.

"This prep work of separating the blood components for analysis is done with gravity, so samples are naturally absorbed and propelled into the chip without the need for external power," said Dimov.

The team demonstrated the proof-of-concept of SIMBAS by placing into the chip's inlet a 5-microliter sample of whole blood that contained biotin (vitamin B7) at a concentration of about 1 part per 40 billion.

"That can be roughly thought of as finding a fine grain of sand in a 1700-gallon sand pile," said Dimov.

The biodetectors in the SIMBAS chip provided a readout of the biotin levels in 10 minutes.

"Imagine if you had something as cheap and as easy to use as a pregnancy test, but that could quickly diagnose HIV and TB," said Benjamin Ross, a UC Berkeley graduate student in bioengineering and study co-author. "That would be a real game-changer. It could save millions of lives."

"The SIMBAS platform may create an effective molecular diagnostic biochip platform for cancer, cardiac disease, sepsis and other diseases in developed countries as well," said Lee.

Other co-lead authors of the study are Lourdes Basabe-Desmonts, senior scientist at Dublin City University's Biomedical Diagnostics Institute, and Jose L. Garcia-Cordero, currently post-doctoral scientist at École Polytechnique Fédérale de Lausanne (EPFL Switzerland). Antonio J. Ricco, adjunct professor at the Biomedical Diagnostics Institute at Dublin City University, also co-authored the study.

The work was funded by the Science Foundation Ireland and the U.S. National Institutes of Health.

http://www.eurekalert.org/pub_releases/2011-03/aga-dse031811.php

Doctors should evaluate liver disease patients for cognitive impairment, address driving safety

In liver-disease patients, cognitive impairment may not be fully reversible

There are potential legal ramifications for physicians of patients who drive with cognitive impairment, according to a study in Clinical Gastroenterology and Hepatology, the official journal of the American Gastroenterological Association (AGA) Institute.

Between 20 and 60 percent of patients with cirrhosis (a condition in which the liver is permanently scarred or injured by chronic conditions and diseases) are affected by a peculiar kind of cognitive impairment, also known as hepatic encephalopathy (HE), which can range from mild to overt. This impairment can include cognitive alterations with selective attention, visuomotor ability, psychomotor speed and the ability to suppress behavior. Mild HE has also been associated with an increased number of car accidents and traffic violations.

Doctors studied state requirements for reporting HE, and investigated whether lawsuits have been completed against physicians or patients for motor vehicle accidents that were related to HE.

"We found that hepatic encephalopathy is not specifically addressed in any state vehicle code," said Stanley Martin Cohen, MD, of Loyola University Medical Center and lead author of this study. "In the absence of definite laws, the responsibility for identifying potentially hazardous drivers, and the associated liability, might still lie with the physician."

Dr. Cohen and colleagues contacted motor vehicle departments from all 50 states and examined motor vehicle codes and legal databases to search for HE-related lawsuits. They found that definitions of a medically impaired driver varied considerably. No state specifically mentioned HE or patients with advanced liver disease.

Only six of the states had mandatory reporting laws for drivers who have medical impairments, and 25 of the remaining 44 states provided legal immunity to physicians for reporting such patients. In addition, there were no completed lawsuits against physicians or patients for motor vehicle accidents associated with driving impairment from HE.

"At minimum, physicians and other health-care workers should carefully evaluate their cirrhotic patients for any degree of hepatic encephalopathy and address driving issues with them," added Dr. Cohen.

HE not only affects driving performance, but it is also associated with a reduced quality of life. Even a single episode of overt HE is accompanied by a persistent cognitive defect. In a second study, researchers found that HE is not a fully reversible condition. They evaluated 106 cirrhotic patients for the presence of mild cognitive

deficit using a standardized test battery known as the Psychometric Hepatic Encephalopathy Score (PHES), which includes five different psychometric tests.

"Patients with a history of overt hepatic encephalopathy have a persistent cognitive defect despite normal mental status and, in some cases, even despite normal intelligence, aptitude and personality performance evaluated by the Psychometric Hepatic Encephalopathy Score," said Oliviero Riggio, of the Sapienza University of Rome and lead author of this study. "This suggests that the residual cognitive impairment should be examined by specific tests based on the patients' learning capacity."

At clinical examination, all patients were free of overt HE; a total of 27 out of 106 patients had previously experienced at least one episode of overt HE. Based on PHES, patients without prior overt HE were further characterized as affected by mild HE or completely normal.

Patients who previously experienced episodes of overt HE lost their learning capacity when the PHES battery was repeated. On the contrary, in the patients without previous HE, most of the tests and the PHES significantly improved at the second examination. In the group of 27 patients with previous overt HE, there were 19 patients with mild HE and eight with normal PHES. However, in the eight patients without mild HE in whom complete recovery of overt HE may be thought, the repetition of the tests showed the lack of any learning capacity. To view Dr. Cohen further discuss his research findings, go to ***http://www.youtube.com/watch?v=eJdkbQvCE_Y***.

For more information on cirrhosis, please read the AGA brochure "Understanding Cirrhosis of the Liver" at http://www.gastro.org/patient-center/digestive-conditions/cirrhosis-of-the-liver.

http://www.newscientist.com/article/mg20928043.400-how-human-eggs-woo-sperm.html

How human eggs woo sperm

*** 18 March 2011 by Ferris Jabr**

WHEN a human egg is ready to be fertilised, it releases a chemical that signals "come hither" to nearby sperm.

Now we know how this signal whips sperm into shape, which might make it possible to develop non-hormonal contraceptives that turn the signal off.

Although biologists have known for decades that egg cells provide sperm with a little chemical encouragement to reel them in, the molecular nature of this interaction has remained elusive.

To investigate, Polina Lishko at the University of California, San Francisco, and colleagues refined a technique to measure the electrical currents that drive the sinuous movements of a sperm's tail. Lishko's team found that when the sperm get a boost of progesterone - a hormone released by follicular cells surrounding the egg - the electric current increases in strength and their tails move faster.

It also turns out that progesterone binds to an ion channel on the sperm cell called CatSper, and that this causes an influx of calcium ions to propel the sperm forward (Nature, DOI: 10.1038/nature09767).

"This is one of the first times that people have figured out at the molecular level how an egg signals to a sperm," says Dejian Ren, a physiologist at the University of Pennsylvania in Philadelphia.

The discovery offers an opportunity to create non-hormonal birth control in the form of a drug that prevents progesterone from binding to CatSper, effectively preventing the egg wooing the sperm. Current hormonal contraceptives may increase the risk of certain cancers and cardiovascular disease.

"We've finally solved the question of what progesterone does to human sperm," Lishko says. "Now we need to find the exact binding site on CatSper to move forward with drug therapy."

http://www.scientificamerican.com/podcast/episode.cfm?id=fewer-nurses-means-higher-patient-d-11-03-18

Fewer Nurses Means Higher Patient Death Risk

Researchers found a 2 percent increase in a patient's risk of death for each nursing work shift that was understaffed. Steve Mirsky reports

Wanna get out of the hospital alive? Well, the nursing staff has a lot to do with it. Now a study finds that a patient's risk of dying goes up along with the number of work shifts that a hospital is understaffed in nurses. The research was published in The New England Journal of Medicine. [Jack Needleman et al., "***Nurse Staffing and Inpatient Hospital Mortality***"]

The study included almost 198,000 patients, during nearly 177,000 eight-hour nursing shifts.

The research team originally reported that hospital nurse staffing was tied to patients' outcomes a decade ago. That study was challenged because data were collected at several institutions, and thus had numerous possibly confounding variables. In the current study, all data were collected at a single, large academic medical center in the U.S. The researchers found that a patient's risk of death increased by about two percent for each work shift that was what the researchers categorized as understaffed. Patients in the study averaged three such shifts, which meant that their risk of dying increased by more than six percent compared with patients with access to fully staffed nursing teams. So when it comes to nurses it's about quality - and quantity.

http://www.newscientist.com/article/dn20265-biologys-dark-matter-hints-at-fourth-domain-of-life.html

Biology's 'dark matter' hints at fourth domain of life

*** 21:00 18 March 2011 by Colin Barras**

Step far enough back from the tree of life and it begins to look quite simple. At its heart are just three stout branches, representing the three domains of life: bacteria, archaea and eukaryotes.

But that's too simple, according to a band of biologists who believe we may be on the verge of discovering the fourth domain of life.

The bold statement is the result of an analysis of water samples collected from the world's seas. Jonathan Eisen at the University of California, Davis, Genome Center has identified gene sequences hidden within these samples that are so unusual they seem to have come from organisms that are only distantly related to cellular life as we know it. So distantly related, in fact, that they may belong to an organism that sits in an entirely new domain.

Most species on the planet look like tiny single cells, and to work out where they fit on the tree of life biologists need to be able to grow them in the lab. Colonies like this give them enough DNA to run their genetic analyses. The problem is, the vast majority of these cells species - 99 per cent of them is a reasonable bet - refuse to be cultured in this way. "They really are the dark matter of the biological universe," says Eisen.

Life's dark matter

To probe life's dark matter, Eisen, Craig Venter of the J. Craig Venter Institute in Rockville, Maryland, and their colleagues have resorted to a relatively new technique called metagenomics. This can "sequence the crap out of any DNA samples", whether they are collected from the environment or come from lab cultures, says Eisen. When Eisen and Venter used the technique on samples collected from the Global Ocean Sampling Expedition, they found that some sequences belonging to two superfamilies of genes - recA and rpoB - were unlike any seen before.

"The question is, what are they from?" says Eisen. Because the team has no idea what organism the genes belong to, the question remains unanswered. There are two possibilities, he says. "They could represent an unusual virus, which is interesting enough. More interestingly still, they could represent a totally new branch in the tree of life."

The exciting but controversial idea has met with mixed reactions. "It's a very good piece of careful work," says Eugene Koonin at the National Center for Biotechnology Information in Bethesda, Maryland.

Younger than they look?

But some think any talk of a fourth domain of cellular life is premature. Radhey Gupta at McMaster University in Hamilton, Ontario, Canada, calls the finding "very exciting", but cautions that there are other explanations. For instance, the sequences could be from cellular organisms living in unique habitats that caused their genes to undergo rapid evolution. That would give the false impression that the "new" life forms diverged from all others a very long time ago.

"There is still debate [over] how to clearly distinguish the three proposed domains of life, and how they are interrelated," Gupta says. "The suggestion [of] a fourth domain will only add to the confusion."

Eric Bapteste at Pierre and Marie Curie University in Paris, France, is far more receptive. "The facts are that there is lots of genetic diversity, and unquestionably most of it is unknown to us," he says. "It's legitimate to consider that there's genuinely new stuff out there."

Further analysis of the samples could determine whether the two gene families studied have evolved unusually rapidly or are from a cellular organism with a universally bizarre genome, he says.

Parent organism

Looking at the actual samples could also help pin down exactly which organism the strange genetic sequences belong to, says Eisen.

If Eisen's gene sequences did turn out to belong to a new domain of life, it wouldn't be the first time the tree of life has had to be redrawn. Until the 1990s, it had just two branches: one for eukaryotes - animals, plants, fungi and some other strange forms, including the slime moulds - and one for everything else. Then, gene analysis revealed that the "everything else" branch could be divided into two domains: bacteria and archaea.

Not only that, some believe that mimivirus, the largest known virus, may also represent a new domain of life: despite being recognised as a virus, it contains many genes found only in cellular organisms. "People have suggested they might be a fourth branch themselves," says Eisen. "If you think of those mimiviruses as a fourth branch, maybe our sequences represent a fifth branch - we just don't know yet."

***Journal reference**: PLoS One, DOI: 10.1371/journal.pone.0018011*

http://www.physorg.com/news/2011-03-disaster-related-apps-worst.html

Disaster-related apps can help you prepare for worst

While working as a programmer for Disney Animation Studios in Burbank, Calif., two years ago, Terence Worley felt the ground rumble and shake beneath his feet.

"I reached for my phone to see how close the quake was, and how big. But there wasn't an easy way to get this information," he says. That night, he wrote his first application for the iPhone, called QuakeWatch, designed to track and send warnings about earthquakes based on U.S. Geological Survey data and other feeds.

The App Store download, now with an average user rating of 4.5 stars out of 5, also uses the smartphone's GPS to calculate the user's distance from the epicenter. Users can share this information with their social network on Facebook or Twitter, right from within the app.

"At any given time you can have a wealth of information at your fingertips, which can be incredibly useful during a time of crisis," says Worley, 46, now living in the Washington, D.C., area.

Not surprisingly, since Japan's devastating earthquake and tsunami a week ago, the 99-cent QuakeWatch app (also available for the iPad) has rocketed to the top of the paid news apps chart, now No. 1 in the U.S., United Kingdom, Canada and other countries.

Other apps are experiencing the same surge in downloads. Disaster Alert, a free app for iOS devices (iPhone, iPod Touch and iPad) and Google's Android platform, sees about 3,500 downloads a week on average, but that number tripled after the events in Japan, along with an additional 12,000 downloads for the new Android version.

Disaster Alert provides instant access to global "active hazards," including weather-related disasters-such as tsunamis, cyclones, hurricanes and typhoons-as well as earthquakes and volcanoes. The app serves as a mobile version of the Pacific Disaster Center (PDC), a government-funded organization that develops and applies information and technology solutions to foster disaster-resilient communities.

Because Disaster Alert monitors multiple agencies in real time, PDC's executive director Ray Shirkhodai in Maui says information about events can be seen in the app up to 30 minutes before mainstream media can broadcast the message. "Last Friday, for example, we received a thank-you from someone in Hawaii who was able to fill up their tank before anyone else knew about the tsunami," recalls Shirkhodai.

A few other apps that can help smartphone or tablet users stay informed, prepared or in touch:

-Disaster Readiness ($1.99; for iPhone, Android): Developed by Phoneflips, this app is designed to help smartphone and tablet users prepare for and manage through a number of emergency situations-be it natural disasters, nuclear radiation, house fires or terrorist attacks. Sections cover checklists, shelters, supplies, evacuation procedures, electricity shortages, water purification , and more.

-Disaster Alert ($24.99 for lifetime access; for BlackBerry): Available at BlackBerry App World, Disaster Alert lets you access information about worldwide natural disasters, such as earthquakes and tsunamis, and displays your geographical location on a map in relation to the disaster area. Skylab Mobilesystems' app provides up-to-date information and features a color- and image-coded system to give BlackBerry users a sense of magnitude for each disaster.

-American Red Cross: Shelter View (free; for iPhone): Should disaster strike, know when and where shelters have been opened to provide assistance to you or loved ones. The app provides map location and relevant details of open shelters from the Red Cross National Shelter System, which contains information about 60,000 potential disaster facilities around the world. Shelter information is updated every 30 minutes.

-Emergency Radio (99 cents; for iPhone): This police-scanner app delivers thousands of live radio feeds, such as police, fire, EMS and air traffic. EdgeRift's popular app lets you organize all frequencies by location, most listened-to, recently added and favorites. Each listing provides information, number of listeners, map view and more.

http://www.eurekalert.org/pub_releases/2011-03/bu-mph031611.php

Mutant prions help cells foil harmful protein misfolding

PROVIDENCE, R.I. [Brown University] - ***Romping clumps of misfolded proteins are prime suspects in many neurological disorders including Alzheimer's, Parkinson's, and Creutzfeld-Jakob Disease.***

Those diseases are devastating and incurable, but a team of biologists at Brown University reports that cells can fix the problems themselves with only a little bit of help. The insight suggests that there are more opportunities to develop a therapy for protein misfolding than scientists had thought.

"There are multiple steps that you could target," said Susanne DiSalvo, a Brown biology graduate student and lead author of a paper published in advance online March 20 in Nature Structural and Molecular Biology.

In the study, the research team, led by Tricia Serio, associate professor of medical science, explains how two different beneficial mutant prions managed to foil the amplification of harmful clumps of misfolded proteins in

yeast. Cells have an internal quality assurance system to break up and refold misfolded proteins, but that system can be overwhelmed by diseases. DiSalvo was the first to observe that the mutants act at distinct stages to tip the balance back in favor of the cells, allowing them to overcome the problem.

Serio says the molecular mechanisms appear to explain how similar mutants solve protein misfolding in mammals, including people. The phenomenon had been poorly understood and has never been exploited to develop a successful therapy.

Misfolding is a vulnerable process

Until now most scientists guessed that the only way to stop the runaway misfolding was right at the beginning and assumed the mutants must be blocking that first step to keep the protein in a harmless form. DiSalvo's work instead suggests that there are many opportunities throughout the process where even a mild intervention could give cells what they need to gain the upper hand, Serio said.

"That's one of the biggest outcomes of Susanne's work: that if you just even slightly interfere with this process, the cell can deal with it and get rid of it," Serio said. "The dogma in the field is that these conformations were so abnormal the cell couldn't resolve them. But what we've found is that this process of misfolding is so efficient the cells can't keep up with it. If you make it even just a little bit less efficient the cell can get rid of the pathological state."

One mutant prion, Q24R, hinders the ability of misfolded proteins to aggregate into harmful clumps. It's like a dryer sheet that cuts down on static cling and makes it easier to fold laundry. Another helpful mutant prion known as G58D, assists the cell by speeding up its ability to unfold and refold misfolded proteins. That's more like a friend who helps untangle strings of holiday lights when they come out of storage.

DiSalvo's experiments showed how the mutants and cells work together. Cells would only be cured when she both added a mutant and allowed the cells' own quality assurance system to work. Adding the mutant G58D, for example, could cure a cell of infection by the Sup35 prion, but if she perturbed the cell's quality assurance system then G58D would not work.

The results show the importance of delving deeply into molecular networks, said Stefan Maas, who oversees Serio's and other cellular signaling grants at the National Institutes of Health.

"These results are a great example of the power of system-level studies," Maas said. "By showing how two beneficial mutants cure the cell of prions, this study has revealed that small changes applied to distinct components of a molecular network can dramatically alter the outcome for the cell. These new insights may lead to new strategies for preventing or treating disorders that involve protein deposits."

But those strategies may require turning proteins into pills. Serio noted that while beneficial mutant prions confer resistance to prion infection in nature, they haven't been successful in reversing an established infection because sustained delivery into the body is too challenging. However, a small molecule drug mimic, if developed, could target infected tissues more effectively over a longer period to slow or perhaps even reverse disease progression.

In the paper the researchers conclude, "A system-based approach to prion intervention represents a potentially promising direction in which to explore future therapies."

Other authors on the paper include Brown researchers Aaron Derdowski and John Pezza.

http://www.eurekalert.org/pub_releases/2011-03/uhn-prc031711.php

PMH researchers create an organic nanoparticle that uses sound and heat to find and treat tumors

A team of scientists from Princess Margaret Hospital have created an organic nanoparticle that is completely non-toxic, biodegradable and nimble in the way it uses light and heat to treat cancer and deliver drugs. (A nanoparticle is a minute molecule with novel properties).

The findings, published online today in Nature Materials (DOI: 10.1038/NMAT2986) are significant because unlike other nanoparticles, the new nanoparticle has a unique and versatile structure that could potentially change the way tumors are treated, says principal investigator Dr. Gang Zheng, Senior Scientist, Ontario Cancer Institute (OCI), Princess Margaret Hospital at University Health Network.

Dr. Zheng says: "In the lab, we combined two naturally occurring molecules (chlorophyll and lipid) to create a unique nanoparticle that shows promise for numerous diverse light-based (biophotonic) applications. The structure of the nanoparticle, which is like a miniature and colorful water balloon, means it can also be filled with drugs to treat the tumor it is targeting."

It works this way, explains first author Jonathan Lovell, a doctoral student at OCI: "Photothermal therapy uses light and heat to destroy tumors. With the nanoparticle's ability to absorb so much light and accumulate in tumors, a laser can rapidly heat the tumor to a temperature of 60 degrees and destroy it. The nanoparticle can also be used for photoacoustic imaging, which combines light and sound to produce a very high-resolution

image that can be used to find and target tumors." He adds that once the nanoparticle hits its tumor target, it becomes fluorescent to signal "mission accomplished".

"There are many nanoparticles out there, but this one is the complete package, a kind of one-stop shopping for various types of cancer imaging and treatment options that can now be mixed and matched in ways previously unimaginable. The unprecedented safety of this nanoparticle in the body is the icing on the cake. We are excited by the possibilities for its use in the clinic," says Dr. Zheng.

The research was financially supported by grants and fellowships from the Ontario Institute for Cancer Research, the Canadian Cancer Society, the Natural Sciences and Engineering Research Council of Canada, the Canadian Institutes of Health Research, the Joey and Toby Tanenbaum/Brazilian Ball Chair in Prostate Cancer Research, and in part from the Campbell Family Institute for Cancer Research and the Ministry of Health and Long-Term Care , and The Princess Margaret Hospital Foundation.

http://www.eurekalert.org/pub_releases/2011-03/uoia-bcq031711.php

Batteries charge quickly and retain capacity, thanks to new structure

CHAMPAIGN, Ill. - ***The batteries in Illinois professor Paul Braun's lab look like any others, but they pack a surprise inside.***

Braun's group developed a three-dimensional nanostructure for battery cathodes that allows for dramatically faster charging and discharging without sacrificing energy storage capacity. The researchers' findings will be published in the March 20 advance online edition of the journal Nature Nanotechnology.

Aside from quick-charge consumer electronics, batteries that can store a lot of energy, release it fast and recharge quickly are desirable for electric vehicles, medical devices, lasers and military applications.

"This system that we have gives you capacitor-like power with battery-like energy," said Braun, a professor of materials science and engineering. "Most capacitors store very little energy. They can release it very fast, but they can't hold much. Most batteries store a reasonably large amount of energy, but they can't provide or receive energy rapidly. This does both." The performance of typical lithium-ion (Li-ion) or nickel metal hydride (NiMH) rechargeable batteries degrades significantly when they are rapidly charged or discharged. Making the active material in the battery a thin film allows for very fast charging and discharging, but reduces the capacity to nearly zero because the active material lacks volume to store energy.

Braun's group wraps a thin film into three-dimensional structure, achieving both high active volume (high capacity) and large current. They have demonstrated battery electrodes that can charge or discharge in a few seconds, 10 to 100 times faster than equivalent bulk electrodes, yet can perform normally in existing devices.

This kind of performance could lead to phones that charge in seconds or laptops that charge in minutes, as well as high-power lasers and defibrillators that don't need time to power up before or between pulses.

Braun is particularly optimistic for the batteries' potential in electric vehicles. Battery life and recharging time are major limitations of electric vehicles. Long-distance road trips can be their own form of start-and-stop driving if the battery only lasts for 100 miles and then requires an hour to recharge.

"If you had the ability to charge rapidly, instead of taking hours to charge the vehicle you could potentially have vehicles that would charge in similar times as needed to refuel a car with gasoline," Braun said. "If you had five-minute charge capability, you would think of this the same way you do an internal combustion engine. You would just pull up to a charging station and fill up."

All of the processes the group used are also used at large scales in industry so the technique could be scaled up for manufacturing. They key to the group's novel 3-D structure is self-assembly. They begin by coating a surface with tiny spheres, packing them tightly together to form a lattice. Trying to create such a uniform lattice by other means is time-consuming and impractical, but the inexpensive spheres settle into place automatically.

Then the researchers fill the space between and around the spheres with metal. The spheres are melted or dissolved, leaving a porous 3-D metal scaffolding, like a sponge. Next, a process called electropolishing uniformly etches away the surface of the scaffold to enlarge the pores and make an open framework. Finally, the researchers coat the frame with a thin film of the active material. The result is a bicontinuous electrode structure with small interconnects, so the lithium ions can move rapidly; a thin-film active material, so the diffusion kinetics are rapid; and a metal framework with good electrical conductivity.

The group demonstrated both NiMH and Li-ion batteries, but the structure is general, so any battery material that can be deposited on the metal frame could be used.

"We like that it's very universal, so if someone comes up with a better battery chemistry, this concept applies," said Braun, who is also affiliated with the Materials Research Laboratory and the Beckman Institute for Advanced Science and Technology at Illinois. "This is not linked to one very specific kind of battery, but rather it's a new paradigm in thinking about a battery in three dimensions for enhancing properties."

The U.S. Army Research Laboratory and the Department of Energy supported this work. Visiting scholar Huigang Zhang and former graduate student Xindi Yu were co-authors of the paper.

http://www.bbc.co.uk/news/health-12759587

Protein found in brain cells may be key to autism

Scientists have shown how a single protein may trigger autistic spectrum disorders by stopping effective communication between brain cells.

The team from Duke University in North Carolina created autistic mice by mutating the gene which controls production of the protein, Shank3. The animals exhibited social problems, and repetitive behaviour - both classic signs of autism and related conditions. The Nature study raises hopes of the first effective drug treatments.

Autism is a disorder which, to varying degrees, affects the ability of children and adults to communicate and interact socially. While hundreds of genes linked to the condition have been found, the precise combination of genetics, biochemistry and other environmental factors which produce autism is still unclear. Each patient has only one or a handful of those mutations, making it difficult to develop drugs to treat the disorder.

Shank3 is found in the synapses - the junctions between brain cells (neurons) that allow them to communicate with each other.

The researchers created mice which had a mutated form of Shank3, and found that these animals avoided social interactions with other mice. They also engaged in repetitious and self-injurious grooming behaviour.

Brain circuits

When the MIT team analysed the animals' brains they found defects in the circuits that connect two different areas of the brain, the cortex and the striatum. Healthy connections between these areas are thought to be key to effective regulation of social behaviours and social interaction. The researchers say their work underscores just what an important role Shank3 plays in the establishment of circuits in the brain which underlie all our behaviours.

Lead researcher Dr Guoping Feng said: "Our study demonstrated that Shank3 mutation in mice lead to defects in neuron-neuron communications. "These findings and the mouse model now allow us to figure out the precise neural circuit defects responsible for these abnormal behaviours, which could lead to novel strategies and targets for developing treatment."

It is thought that only a small percentage of people with autism have mutations in Shank3, but Dr Feng believes many other cases may be linked to disruptions to other proteins that control synaptic function.

If true he believes it should be possible to develop treatments that restore synaptic function, regardless of which protein is defective in a specific individual.

Carol Povey, director of the National Autistic Society's Centre for Autism, said: "Animal research can help advance our understanding or the role of genetics and their influence on behaviour, however it is only a small part of the picture when it comes to understanding autism. "Human brains are far more complex than those of other mammals, and it is believed that a variety of factors are responsible for the development of the condition."

http://www.bbc.co.uk/news/health-12776222

Breakthrough in delivering drugs to the brain

By James Gallagher Health reporter, BBC News

A new way of delivering drugs to the brain has been developed by scientists at the University of Oxford.

They used the body's own transporters - exosomes - to deliver drugs in an experiment on mice. The authors say the study, in Nature Biotechnology, could be vital for treating diseases such as Alzheimer's, Parkinson's and Muscular Dystrophy. The Alzheimer's Society said the study was "exciting" and could lead to more effective treatments.

Research barrier

One of the medical challenges with diseases of the brain is getting any treatment to cross the blood-brain barrier. The barrier exists to protect the brain, preventing bacteria from crossing over from the blood, while letting oxygen through. However, this has also produced problems for medicine, as drugs can also be blocked.

In this study the researchers used exosomes to cross that barrier. Exosomes are like the body's own fleet of incredibly small vans, transporting materials between cells.

The team at Oxford harvested exosomes from mouse dendritic cells, part of the immune system, which naturally produce large numbers of exosomes. They then fused the exosomes with targeting proteins from the rabies virus, which binds to acetylcholine receptors in brain cells, so the exosome would target the brain. They filled the exosomes with a piece of genetic code, siRNA, and injected them back into the mice. The siRNA was delivered to the brain cells and turned off a gene, BACE1, which is involved in Alzheimer's disease.

The authors reported a 60% reduction in the gene's activity.

"These are dramatic and exciting results" said the lead researcher Dr Matthew Wood.

"This is the first time this natural system has been exploited for drug delivery."

Customised

The research group believes that the method could modified to treat other conditions and other parts of the body.

Dr Wood said: "We are working on sending exosomes to muscle, but you can envisage targeting any tissue.

"It can also be made specific by changing the drug used."

The researchers are now going to test the treatment on mice with Alzheimer's disease to see if their condition changes. The team expect to begin trials in human patients within five years.

Dr Susanne Sorensen, head of research at the Alzheimer's Society, said: "In this exciting study, researchers may have overcome a major barrier to the delivery of potential new drugs for many neurological diseases including Alzheimer's. She said the blood-brain barrier had been an "enormous issue as many potential drugs have not been properly tested because you couldn't get enough of them into the brain."

She added: "If this delivery method proves safe in humans, then we may see more effective drugs being made available for people with Alzheimer's in the future."

Dr Simon Ridley, head of research at Alzheimer's Research UK, said: "This is innovative research, but at such an early stage it's still a long way from becoming a treatment for patients.

"Designing drugs that cross the blood brain barrier is a key goal of research that holds the promise of improving the effectiveness of Alzheimer's treatments in the future."

http://www.nytimes.com/2011/03/21/science/21birds.html

Tweety Was Right: Cats Are a Bird's No. 1 Enemy

By ELISABETH ROSENTHAL

While public attention has focused on wind turbines as a menace to birds, a new study shows that a far greater threat may be posed by a more familiar antagonist: the pet house cat.

A new study in The Journal of Ornithology on the mortality of baby gray catbirds in the Washington suburbs found that cats were the No. 1 killer in the area, by a large margin.

Nearly 80 percent of the birds were killed by predators, and cats were responsible for 47 percent of those deaths, according to the researchers, from the Smithsonian Institution and Towson University in Maryland. Death rates were particularly high in neighborhoods with large cat populations.

Predation was so serious in some areas that the catbirds could not replace their numbers for the next generation, according to the researchers, who affixed tiny radio transmitters to the birds to follow them. It is the first scientific study to calculate what fraction of bird deaths during the vulnerable fledgling stage can be attributed to cats.

“Cats are way up there in terms of threats to birds - they are a formidable force in driving out native species,” said Peter Marra of the Smithsonian Conservation Biology Institute, one of the authors of the study.

The American Bird Conservancy estimates that up to 500 million birds are killed each year by cats - about half by pets and half by feral felines. “I hope we can now stop minimizing and trivializing the impacts that outdoor cats have on the environment and start addressing the serious problem of cat predation,” said Darin Schroeder, the group’s vice president for conservation advocacy.

By contrast, 440,000 birds are killed by wind turbines each year, according to the United States Fish and Wildlife Service, although that number is expected to exceed one million by 2030 as the number of wind farms grows to meet increased demand.

The American Bird Conservancy generally supports the development of wind energy, but it argues that wind farms should be “bird smart” - for example, positioned so that they do not interfere with major migration paths or disturb breeding grounds, with their power lines buried to prevent collisions.

“I’m excited about wind; we just have to be careful where and how we put the turbines,” said Dr. Marra, who studies threats to birds, including from climate change and habitat loss. He said the leading cause of bird deaths over all, as opposed to the catbird fledglings in the study, remained collisions with buildings, windows and towers, followed by predators.

Yet wind turbines often provoke greater outrage than cats do, said Gavin Shire, vice president of the Bird Conservancy. “The idea of a man-made machine chopping a bird in half creates a visceral reaction,” he said, “while the idea of a predator with its prey in its mouth - well we’ve seen that on the Nature Channel. People’s reaction is that it is normal for cats to kill birds.”

Household cats were introduced in North America by European colonists; they are regarded as an invasive species and have few natural enemies to check their numbers. “They are like gypsy moths and kudzu - they cause major ecological disruption,” Dr. Marra said.