http://www.newscientist.com/article/mg20827885.400-skin-patch-could-offer-pain-relief-with-every-flinch.html

Skin patch could offer pain relief with every flinch

*** 26 November 2010 by Jon Evans**

A SKIN patch could soon provide efficient pain relief whenever you flex sore muscles. The system would work by synchronising the release of drugs with movement of the underlying inflamed tissue.

The system could synchronise the release of drugs with movement of the inflamed muscle

Unyong Jeong's team at Yonsei University in Seoul, South Korea, covered a flexible rubber film with a sheet of corrugated microporous polystyrene, with gutters around 3 micrometres wide and 1 micrometre deep. The gutters were then filled with a liquid and sealed with another rubber film. Finally, the first rubber film was peeled away to expose the underside of the liquid-filled polystyrene gutters. Flexing the patch distorts the polystyrene tunnels enough to reduce their volume, squeezing the solution out through the pores in the plastic. Once the strain is removed, the tunnels spring back into shape, ready for the next use (Angewandte Chemie, DOI: 10.1002/anie.201004838).

Jeong and his team demonstrated the mechanism with a dye solution, but they are now moving on to therapeutic applications.

He envisages the first practical use will be skin patches for treating muscle pain and rheumatism. "Current [skin patches] are designed to just continuously release the active agents," he says. "If we can control the release rate responding to the motion of our muscles, it will make the patches more effective and prolong the time of use." He is also hoping to develop biodegradable strain-release patches to heal organs and damaged muscles inside the body.

Mauro Ferrari of the Methodist Hospital Research Institute in Houston, Texas, says the idea is clever. "I've never seen anything like it," he adds.

http://www.eurekalert.org/pub_releases/2010-11/uog-scb112810.php

Superantigens could be behind several illnesses

Superantigens, the toxins produced by staphylococcus bacteria, are more complex than previously believed, reveals a team of researchers from the University of Gothenburg in an article published today in the scientific journal Nature Communications.

Their discovery shows that the body's immune system can cause more illnesses than realised.

"Superantigens have a real talent for disrupting the body's immune system," says Karin Lindkvist from the University of Gothenburg's Department of Cell- and Molecular Biology, one of the authors of the article. "If you're infected with bacteria that secrete superantigens, your immune system will respond so strongly that it'll make you ill. Our study shows that superantigens activate the immune system in more ways than previously thought."

We are all exposed daily to various types of foreign organism that can harm us. The human body has therefore developed cells whose role it is to "kill" and remove all foreign invaders that find their way in – the immune system.

Antibiotic-resistant bacteria have become increasingly common with the more widespread use of different types of antibiotics. Yellow staphylococci (Staphylococcus aureus) are one of the most common bacteria in the world around us, with most children and adults carrying them at some point. One strain, MRSA (methicillin-resistant Staphylococcus aureus), has developed resistance to penicillin and other penicillin-like antibiotics that are normally used to treat infections caused by staphylococci. Staphylococci can cause a variety of conditions such as long-term wound infections and abscesses, and can also lead to food poisoning.

The toxins produced by staphylococci are also known as superantigens. A normal viral infection will trigger the activation of around 0.0001% of the body's natural killer cells (T cells), which is enough to destroy the virus. However, contracting bacteria that secrete superantigens leads to the activation of 5-20% of the body's T cells. Such a strong immune response will often result in illness, which generally involves fever and extreme nausea. Superantigens are also well-known for causing toxic symptoms, as in toxic shock syndrome. There is also some speculation as to whether superantigens can cause autoimmune disorders such as rheumatoid arthritis.

"By investigating how superantigens activate the immune system via its T cells, we've been able to show that they bind to more than one part of the T cell receptor," says Lindkvist. "This is an important discovery for our understanding of superantigens' biological function, and for the future development of a vaccine against superantigens. We haven't yet looked at whether other superantigens can activate T cells in the same complex way, but it's reasonable to assume that they can."

In addition to Karin Lindkvist, the research team behind the discovery comprises Maria Saline, Karin Rödström, Gerhard Fischer, Vladislav Orekhov and Göran Karlsson, all from the University of Gothenburg.
The study The structure of superantigen complexed with TCR and MHC reveals novel insights into superantigenic T cell activation has been published in the scientific journal Nature Communications.
http://www.eurekalert.org/pub_releases/2010-11/uom-ccr112910.php

Cinnamon can replace harmful chemicals used to create nanoparticles

MU scientists make strides in green nanotechnology

COLUMBIA, Mo. Gold nanoparticles, tiny pieces of gold so small that they can't be seen by the naked eye, are used in electronics, healthcare products and as pharmaceuticals to fight cancer. Despite their positive uses, the process to make the nanoparticles requires dangerous and extremely toxic chemicals. While the nanotechnology industry is expected to produce large quantities of nanoparticles in the near future, researchers have been worried about the environmental impact of the global nanotechnological revolution.

Now, a study by a University of Missouri research team, led by MU scientist Kattesh Katti, curators' professor of radiology and physics in the School of Medicine and the College of Arts and Science, senior research scientist at the University of Missouri Research Reactor and director of the Cancer Nanotechnology Platform, has found a method that could replace nearly all of the toxic chemicals required to make gold nanoparticles. The missing ingredient can be found in nearly every kitchen's spice cabinet – cinnamon.

The usual method of creating gold nanoparticles utilizes harmful chemicals and acids that are not environmentally safe and contain toxic impurities. In the MU study, Katti and researchers Raghuraman Kannan, the Michael J and Sharon R. Bukstein Distinguished Faculty Scholar in Cancer Research, assistant professor of radiology and director of the Nanoparticle Production Core Facility; and Nripen Chanda, a research associate scientist, mixed gold salts with cinnamon and stirred the mixture in water to synthesize gold nanoparticles. The new process uses no electricity and utilizes no toxic agents.

"The procedure we have developed is non-toxic," Kannan said. "No chemicals are used in the generation of gold nanoparticles, except gold salts. It is a true 'green' process." "From our work in green nanotechnology, it is clear that cinnamon - and other species such as herbs, leaves and seeds - will serve as a reservoir of phytochemicals and has the capability to convert metals into nanoparticles," Katti said. "Therefore, our approach to 'green' nanotechnology creates a renaissance symbolizing the indispensable role of Mother Nature in all future nanotechnological developments."

During the study, the researchers found that active chemicals in cinnamon are released when the nanoparticles are created. When these chemicals, known as phytochemicals, are combined with the gold nanoparticles, they can be used for cancer treatment. The phytochemicals can enter into cancer cells and assist in the destruction or imaging of cancer cells, Katti said. "Our gold nanoparticles are not only ecologically and biologically benign, they also are biologically active against cancer cells," Katti said.

As the list of applications for nanotechnology grows in areas such as electronics, healthcare products and pharmaceuticals, the ecological implications of nanotechnology also grow. When considering the entire process from development to shipping to storage, creating gold nanoparticles with the current process can be incredibly harmful to the environment, Chanda said.

"On one hand, you are trying to create a new, useful technology. However, continuing to ignore the environmental effects is detrimental to the progress," Kannan said.

Katti, who is considered to be father of green nanotechnology, and Nobel prize winner Norman Borlaug have shared similar views on the potential of green nanotechnology in medicine, agricultural and life sciences. Borlaug predicted a connection between medical and agricultural sciences. Katti, who is the editor of The International Journal of Green Nanotechnology, said that as more uses for nanotechnology are created, scientists must develop ways to establish the connection between nanotechnology and green science. The study was published this fall in Pharmaceutical Research.
http://www.eurekalert.org/pub_releases/2010-11/bumc-las112910.php

In Lancet: Artesunate suppositories are cost-effective intervention for severe childhood malaria

Giving emergency artesunate suppositories to children with suspected severe malaria before referring them for treatment is a cost-effective intervention that can substantially improve the management of childhood malaria in remote African settings,

according to a new study led by Boston University School of Public Health [BUSPH] researcher Yesim Tozan, PhD, (link to profile: http://sph.bu.edu/tozan)

The study, which appears online Nov. 29 in The Lancet , builds on previous research that found that the administration of one dose of rectal artesunate by a community health worker to a child with suspected severe

malaria significantly reduced the risk of death and permanent disability. In addition to endangering the lives of young children, severe malaria has been associated with a range of developmental deficits.

Rectal artesunate interrupts disease progression by rapidly reducing parasite density, but should be followed by further anti-malarial treatment. Because of this, the team led by Tozan, assistant professor of international health at BUSPH, said: "The success of interventions in the community ultimately depends on whether formal health systems can provide front-line health workers with drugs and other necessary health commodities, regular monitoring and supervision, and linkages to referral systems" for follow-up treatment.

The research team studied a hypothetical cohort of 1,000 newborn babies through five years of age in high malaria transmission settings. The team assessed the costs and cost-effectiveness of artesunate treatment, followed by referral to a health facility, under a variety of intervention uptake and referral compliance scenarios.

The researchers estimated that the full uptake of artesunate treatment and full compliance with referral advice would avert 37 child deaths and 967 disability-adjusted life-years [DALYs] -- a measure which combines years of life lost because of premature death, with years of life lived with disability -- over five years . Across all intervention uptake and referral compliance scenarios, the study reported that the intervention could avert each DALY at a cost of $77 to $1,173.

"Compared with the interventions that target key childhood illnesses in sub-Saharan Africa, pre-referral artesunate treatment is among the most cost-effective, especially if the intervention uptake is moderate or higher," the researchers concluded.

In remote settings in which the start of anti-malarial treatment with injectable drugs is substantially delayed, the 2010 World Health Organization guidelines for treating malaria recommend the use of artesunate or artemisinin suppositories for emergency treatment of patients suspected to have severe malaria, before transfer to a health facility. The use of this intervention remains low, however, in part because of questions about costs and cost-effectiveness.

"This study shows that rectal artesunate is highly cost-effective for saving lives of severely ill patients with malaria living not only at the end of the road, but where there is no road," said Joel G. Breman, MD, senior scientific advisor at the Fogarty International Center of the National Institutes of Health and a co-author on the study. “There is now full justification to provide community health workers with life-saving rectal artesunate suppositories, training, and instructions for their use and referral follow-up, as part of the essential drug package," he said.

Tozan, who has done extensive research on the social and economic aspects of malaria, said artesunate suppositories are a needed addition to community health workers' arsenals in areas where malaria is a frequent childhood disease.

"Pre-referral artesunate suppositories, if deployed appropriately in communities, address an important treatment gap, due to the weak state of the health-care systems in many malaria-endemic countries," she said.

She said the study's findings "provide strong economic evidence to policy makers who decide which interventions to adopt in resource-constrained areas. Pre-referral artesunate treatment has the potential to get us closer to child-survival targets set by the United Nations and other international agencies."

A 2010 report on the United Nations' Millennium Development Goals notes that "prompt and effective treatment" is critical for preventing life-threatening complications from malaria, particularly in children. The Millennium Development Goals set a target of halting and beginning to reverse the high incidence of malaria by 2015.

The report notes that in the last seven years, many countries have shifted their national drug policies to promote artemisinin-based combination therapies -- a more effective, but also more expensive, treatment course for malaria. Global procurement of these medicines has risen sharply since 2005.

But antimalarial treatment coverage varies widely across African countries, ranging from 67 percent in some areas, to just 1 percent of children under five with fevers receiving any type of antimalarial drug in other regions, the report says. In fact, the proportion of febrile children under five receiving any antimalarial medication exceeded 50 percent in just eight of 37 African countries that provided data from 2005 to 2009.

Half of the world's population is at risk of malaria, with an estimated 243 million cases leading to nearly 863,000 deaths in 2008. Of those, 767,000, or 89 percent, occurred in Africa.

Funding for the new study came from The Disease Control Priorities Project, Fogarty International Center, the US National Institutes of Health; and the Peter Paul Career Development Professorship at Boston University, awarded to Tozan in 2008 to pursue her research into the consequences and treatment of childhood malaria.

Besides Tozan and Breman, other authors of the study include: Eili Y. Klein, Sarah Darley, Rajashree Panicker and Ramanan Laxminarayan of the Center for Disease Dynamics, Economics and Policy.

More information on the study is available by contacting Tozan at tozan@bu.edu, or (617) 414-1209.
A link to the study is available here: http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(10)61460-2/abstract
http://www.eurekalert.org/pub_releases/2010-11/wuis-cfg112910.php

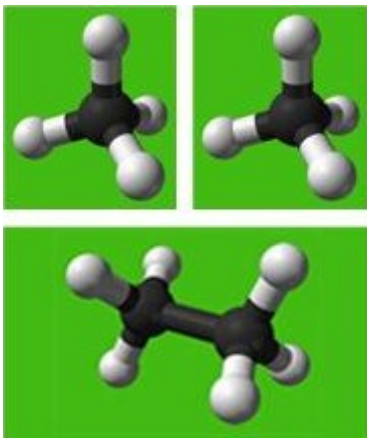
Chemistry for greenhouse gases

It sounds a bit like spinning straw into gold, but novel metal catalysts may be able to turn greenhouse gases like methane and carbon dioxide into liquid fuels without producing more carbon waste in the process

If fossil fuels burn completely, the end products are carbon dioxide and water. Today the carbon dioxide is a waste product, one that goes into the air - adding to global warming; or the oceans - acidifying them; or underground - with as yet unknown consequences.
But it's not impossible, says Liviu M. Mirica, PhD, assistant professor of chemistry at Washington University in St. Louis, to drive things the other way, turning carbon dioxide into fuels such as methanol or hydrocarbons.

Until now reversing combustion has been a loser's game, because making carbon dioxide into a fuel uses up more energy than combustion releases and produces more carbon dioxide than it reclaims.

But Mirica thinks catalysts might change everything. Catalysts might provide alternative reaction pathways with lower energy barriers. The reactants could then be bumped over those lower barriers with carbonless energy sources such as sunlight. Instead of being a polluting one-way street, hydrocarbon chemistry could circle back on itself and become a clean carbon-neutral cycle, although one that still consumed energy.



In the Journal of the American Chemical Society Mirica describes a new metal complex that can combine methyl groups (CH3) in the presence of oxygen to produce ethane (CH3-CH3). This is the second step in the conversation of methane (CH4), the main component of natural gas, into a longer-chain hydrocarbon, or liquid fuel.

Mirica's team is currently tweaking the complex so that it will be perform the firs step in the methane-to-ethane conversion as well.

One goal of Mirica's lab is to design a metal catalyst that can pull one hydrogen (white balls) off of each of two methane molecules (top) and then combine the resulting methyl groups to form the hydrocarbon ethane (bottom). Additional steps would add to the molecule's carbon backbone, converting a gas to a more easily transported liquid.

The energy problem

Fossil fuels are useful because they pack energy in their chemical bonds and release that energy when they are burned. So they're essentially convenient little energy suitcases. Reactions that release energy, however, are reluctant to reverse themselves and the more energy they release, the more reluctant they are to back up.

There's no way around this problem; if a reaction released energy both going forward and going backward, it could fuel a perpetual motion machine, which, of course, is an impossibility.
Still, it is possible to make hydrocarbon combustion reactions run backward - either by brute force or by finesse.

The brute force way is to pump in energy. That's how the Nazi turned coal into oil during World War II. Saddled with an abundance of coal but short on oil, Germany solved the problem by transmuting coal to oil by chemical means. But Nazi synthetic oil plants worked only at high temperatures and pressures and much more energy was used to drive the reactions than was ultimately stored in synthetic oil they produced.

The finesse is to devise a chemical compound, a catalyst, that takes the reactants up an alternative, lower energy pathway to the reaction products. In effect, instead of going straight up the energy hill, the reaction takes a more manageable - ideally the minimal-energy-- series of switchbacks to the top.

Like a ball in a glove

Last year Mirica's group was working with a palladium compound that they hoped could catalyze the splitting of water. "The catalyst we made for that reaction worked," says Mirica "but not as well as we hoped. But we noticed it was easily oxidized, even by the oxygen in air. "This was our first hint that this might be an interesting system. So then we asked what else we could use it for.

"One of our ideas was to use it to turn methane into ethane." Methane, the main component of natural gas, is released in large amounts when an oil well is tapped. Currently the methane from the oil fields is wasted; it is flared off on site, releasing even more carbon dioxide into the atmosphere.

Turning methane to ethane, says Mirica, could be the first step in a process of building longer-chain hydrocarbons such as butane and octane, which would be liquid at normal temperatures and pressures and so could easily be transported to distant users.

Mirica's metal complex solves half the problem of methane-to-ethane conversion. It takes two methyl groups (CH3) and, in the presence of oxygen and light, binds the carbon atoms to one another to form ethane.

The complex consists of an organic molecule that binds a central palladium atom through four nitrogen atoms, holding it like a ball in a glove.

The organic molecule is key to the metal complex's function, since it stabilizes it in the unusual +3 oxidation state (it has given up three electrons), which is responsible for its unprecedented chemical activity.

Once in the glove, the palladium atom still has two docking spots that can be occupied by chemical species whose reaction it might catalyze.

In the reported work, these sites are occupied by methyl groups, which the palladium atom joins to produce ethane. But, Mirica emphasizes, the sites could easily be occupied by other chemical species. What's more the reactions could be reducing ones (where electrons are donated to reactants) rather than the oxidizing ones (where electrons are removed from reactants) like the methyl-to-ethane conversion.

In short the complex opens up a whole new area of palladium chemistry.

The To-Do list

Mirica's lab is currently to tweak the metal complex so that it can perform the entire methane-to-ethane reaction.

The first part of that reaction is pulling methyl groups off methane molecules. That's a bit tricky, says Mirica, because it is hard to break one C-H bond of the methane molecule, which has four C-H bonds, without breaking all four. "The reaction wants to run straight down the energy hill all the way to the bottom (CO2)," Mirica says. "Our goal is to design a catalyst that stops the reaction part of the way down the hill (when only one hydrogen has been removed).

His lab is also testing the metal complex's ability to perform a reduction reaction, the conversion of CO2 into methanol (CH3OH). "Carbon dioxide is an exceptionally stable molecule, so anything you do with it is going to require energy, " Mirica says. "We're just trying to use the metal complex to minimize the energy input. "

Both the ethane and methanol reactions take greenhouse gases and transform them to liquid or easily liquefied compounds that could then be reused as fuels. If the energy penalty turns out to be low enough the carbon could be recycled in this way many times.

Chemistry for the Greenhouse

Ultimately Mirica's goal is a recycling carbon chemistry that requires so little energy that it can run off sunlight.

"If we're going to keep using these carbon-containing fuels that make CO2, we should be trying to make combustion carbon-neutral by using catalysts and the sun's energy to convert CO2 back into fuel," he says.

http://www.eurekalert.org/pub_releases/2010-11/uoc--cwd112910.php

Contact with dads drops when women ovulate

Evidence of evolutionary protection against inbreeding in women?

Through an innovative use of cell phone records, researchers at UCLA, the University of Miami and Cal State, Fullerton, have found that women appear to avoid contact with their fathers during ovulation.

"Women call their dads less frequently on these high-fertility days and they hang up with them sooner if their dads initiate a call," said Martie Haselton, a UCLA associate professor of communication in whose lab the research was conducted.

Because they did not have access to the content of the calls, the researchers are not able to say for sure why ovulating women appear to avoid father-daughter talks. They say the behavior may be motivated by an unconscious motive to avoid male control at a time when the women are most fertile. But a more primal impulse may be at work: an evolutionary adaptation to avoid inbreeding.

Whatever the case, the researchers know that the findings are consistent with past research on the behavior of other animals when they are at their most fertile.

"Evolutionary biologists have found that females in other species avoid social interactions with male kin during periods of high fertility," said the study's lead author Debra Lieberman, a University of Miami assistant professor of psychology. "The behavior has long been explained as a means of avoiding inbreeding and the negative consequences associated with it. But until we conducted our study, nobody knew whether a similar pattern occurred in women."

The findings appear in the latest issue of "Psychological Science," a prominent peer-reviewed scholarly journal.

The study builds on a mounting body of evidence of subtle and significant ways in which women's behavior is unconsciously affected by the approach and achievement of ovulation - a physical change that in humans has no outward manifestation of its own. Research has found that women tend to dress more attractively, to alter the pitch of their voices ways that are perceived as more attractive by men, and to contemplate more frequently the possibility of straying from their mates during high as opposed to low fertility periods of their menstrual cycle.

Research has also shown that women are more attracted during high-fertility periods to men whose physique and behavior are consistent with virility, especially if they're not already mated to men with these characteristics.

For the latest study, the researchers examined the cell phone records of 48 women between the ages of 18 and 22 - or near the height of a woman's reproductive years. Over the course of one cell phone billing period, the researchers noted the date and duration of calls with two different people: the subjects' fathers and their mothers. They then identified the span of days comprising each woman's high and low fertility days within that billing period.

Women were about half as likely to call their fathers during the high fertility days of their cycle as they were to call them during low fertility days. Women's fertility had no impact, however, on the likelihood of their fathers calling them. Women also talked to their fathers for less time at high fertility, regardless of who initiated the call, talking only an average of 1.7 minutes per day at high fertility compared to 3.4 minutes per day at low fertility.

The researchers concede that the high-fertile women might simply be avoiding their fathers because fathers might be keeping too close an eye on potential male suitors. But their data cast some doubt on this possibility. It is more likely, they conclude, that like females in other species, women have built-in psychological mechanisms that help protect against the risk of producing less healthy children, which tends to occur when close genetic relatives mate.

"In humans, women are only fertile for a short window of time within their menstrual cycle," Lieberman said. "Sexual decisions during this time are critical as they could lead to pregnancy and the long-term commitment of raising a child. For this reason, it makes sense that women would reduce their interactions with male genetic relatives, who are undesirable mates."

The reluctance to engage in conversations with fathers could not be attributed to an impulse to avoid all parental control during ovulation. In fact, the researchers found that women actually increased their phone calls to their mothers during this period of their cycle, and that this pattern was strongest for women who felt emotionally closer to their moms. At high fertility, women proved to be four times as likely to call their mothers as they were to phone their fathers, a difference that did not exist during the low fertility days. In addition, women spent an average of 4.7 minutes per day on the phone with their mothers during high fertility days, compared to 4.2 minutes per day during low-fertility.

One possible explanation is that women call their moms for relationship advice, said Elizabeth Pillsworth, who also contributed to the study.

"They might be using mothers as sounding boards for possible mating decisions they're contemplating at this time of their cycle," said Pillsworth, an assistant professor of evolutionary anthropology at California State University, Fullerton. "Moms have a lot more experience than they do. Particularly for those women who are close to their mothers, we can imagine them saying, 'Hey Mom, I just met this cute guy, what do you think?'"

Either way, the findings show that women are unconsciously driven during their most fertile periods to behavior that increases the odds of reproducing as well as potentially doing so with a genetically appropriate mate, said Haselton.

"We think of ourselves as being emancipated from the biological forces that drive animal behavior," she said. "But this suggests that our every day decisions are often still tied to ancient factors that for millennia have affected survival and reproduction."

http://www.bbc.co.uk/news/health-11850041

Gene therapy 'memory boost hope'

Brain Protein 'plaques' build up in the brains of people with Alzheimer's

A gene therapy technique which aims to ease memory problems linked to Alzheimer's Disease has been successfully tested in mice. US scientists used it to increase levels of a chemical which helps brain cells signal to each other. This signalling is hindered in Alzheimer's Disease, the journal Nature reported.
The Alzheimer's Research Trust said the study suggested a way to keep nerve cells in the brain communicating.

Ageing populations in many countries around the world mean that Alzheimer's disease and other forms of dementia are set to increase.

Researchers at the Gladstone Institute of Neurological Disease in San Francisco believe that boosting the brain chemical, a neurotransmitter called EphB2, could help reduce or even prevent some of the worst effects of the condition. Their research suggests that the chemical plays an important role in memory, and is depleted in Alzheimer's patients.

One of the most noticeable features about the brains of Alzheimer's patients is the build-up of "plaques" of a toxic protein called amyloid. Over time this leads to the death of brain cells.

'Thrilled'

However, another characteristic of amyloid is its apparent ability to bind directly to EphB2, reducing the amount available to brain cells, which could in part explain the memory symptoms involved.

To test this idea, they used gene therapy experiments to artificially reduce and increase the amount of available EphB2 in the brains of mice.

When levels of the chemical were reduced, healthy mice developed memory symptoms similar to those seen in mice bred to have a condition similar to Alzheimer's.

Conversely, when the "Alzheimer's" mice were given gene therapy which boosted levels of EphB2, their memory symptoms disappeared.

Dr Lennart Mucke, who led the study, said that his team had been "thrilled" to find this.

"We think that blocking amyloid proteins from binding to EphB2, and enhancing EphB2 levels or functions with drugs might be of benefit in Alzheimer's Disease."

However UK researchers said that the find, while interesting, did not offer a swift answer to Alzheimer's patients.

Rebecca Wood, chief executive of the Alzheimer's Research Trust, said: "Our brains are hugely complex and understanding how they work and become damaged by diseases like Alzheimer's is a massive task.

"This research adds a piece to the Alzheimer's puzzle and provides new leads for researchers.

"It suggests a way to keep nerve cells in the brain communicating, which is vital for thinking and memory."

But she added: "We don't know yet if these findings will lead to a new treatment for Alzheimer's - that's some way off."

http://www.scientificamerican.com/article.cfm?id=worst-case-study-global-temp-up-72f

Worst case study: global temp up 7.2F degrees by 2060s

World temperatures could soar by 4 degrees Celsius (7.2 degrees Fahrenheit) by the 2060s in the worst case of global climate change and require an annual investment of $270 billion just to contain rising sea levels, studies suggested on Sunday.

By Alister Doyle, Environment Correspondent

CANCUN, Mexico (Reuters) - World temperatures could soar by 4 degrees Celsius (7.2 degrees Fahrenheit) by the 2060s in the worst case of global climate change and require an annual investment of $270 billion just to contain rising sea levels, studies suggested on Sunday.

Such a rapid rise, within the lifetimes of many young people today, is double the 2 degrees C (3.6 degrees Fahrenheit) ceiling set by 140 governments at a U.N. climate summit in Copenhagen last year and would disrupt food and water supplies in many parts of the globe.

Rising greenhouse gas emissions this decade meant the 2 degree goal was "extremely difficult, arguably impossible, raising the likelihood of global temperature rises of 3 or 4 degrees C within this century," an international team wrote.

The studies, published to coincide with annual U.N. climate talks in Mexico starting on Monday, said few researchers had examined in detail the possible impact of a 4 degrees C rise above pre-industrial levels.

"Across many sectors -- coastal cities, farming, water stress, ecosystems or migration, the impacts will be greater," than at 2 degrees, wrote Mark New of Oxford University in England, who led the international team.

One study, published in the British journal Philosophical Transactions of the Royal Society A, said temperatures could rise by 4 degrees C in the worst case by the early 2060s.

Other scenarios showed the threshold breached later in the century or not at all by 2100, raising risks of abrupt changes such as a loss of Arctic sea ice in summer, a thaw in permafrost or a drying out of the Amazon rainforest.

MIGRATION

One of the papers gave what it called a "pragmatic estimate" that sea levels might rise by between 0.5 and 2 meters (1.64 to 6.56 feet) by 2100 if temperatures rose 4 degrees Celsius.

Containing a sea level rise of 2 meters, mostly building Dutch-style sea walls, would require annual investments of up to $270 billion a year by 2100.

That sum might limit migration to perhaps 305,000 people from the most vulnerable areas, wrote Robert Nicholls of the University of Southampton. Lack of protective measures could mean the forced resettlement of 187 million people.

People living on small islands, in Asia, Africa or river deltas were most at risk.

The studies concluded that governments should do more both to cut greenhouse gas emissions and research back-up methods such as "geo-engineering" programs that could dim sunlight or seek to suck greenhouse gases from the air. *(Editing by Todd Eastham)*

http://www.newscientist.com/article/dn19778-royal-society-paints-picture-of-a-world-4-c-warmer.html

Royal Society paints picture of a world 4 °C warmer

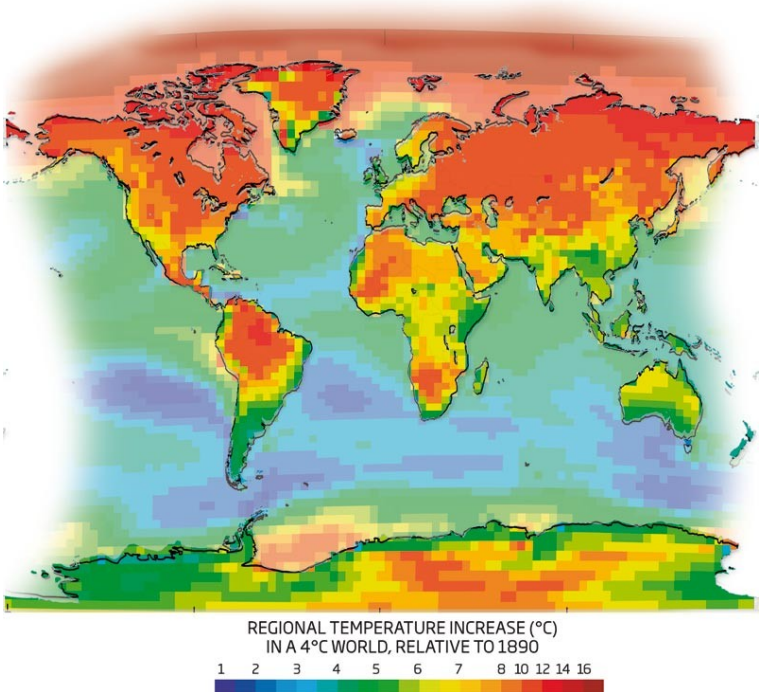
*** 11:44 29 November 2010 by Michael Marshall**

As reported by New Scientist last year, UK Met Office researchers have shown that the world could warm by 4 °C by 2060, devastating much of the Amazon rainforest and disrupting the monsoon cycle. Now the UK's Royal Society has published detailed study of how the world will look when it is 4 °C warmer.

Water shortages will become more severe, says Fai Fung of the University of Oxford, and colleagues. The extent of the warming depends in large part on our actions. If, by cutting emissions we limit global warming to 2 °C, projections suggest water supplies will dwindle because of demand from the growing population. But at 4 °C, a warmer, drier climate will become the biggest threat to water availability.

Most of sub-Saharan Africa will see shorter growing seasons, according to Philip Thornton of the International Livestock Research Institute in Nairobi, Kenya, and colleagues. As a result, average maize production will drop 19 per cent and bean production by 47 per cent compared with current levels.

Extreme weather, sea-level rise and water shortages will drive many people to migrate, says François Gemenne of the Institute for Sustainable Development and International Relations in Paris, France. But the poorest may be unable to move. Gemenne says we should make it easier for people to move country.



The average global temperature is likely to be 4 °C higher than in pre-industrial times by 2055 if greenhouse gas emissions are not slowed – that means a 16 °C rise in the Arctic **(Source: Met Office Hadley Centre)**

Journal reference: Philosophical Transactions of the Royal Society A

http://www.eurekalert.org/pub_releases/2010-11/ip-sse113010.php

Study suggests earliest brain changes associated with the genetic risk of Alzheimer's disease

May have implications for the development of prevention therapies

GLENDALE, Arizona (November 30, 2010) - What are the earliest brain changes associated with the risk of developing Alzheimer's disease? A scientific report published in the October Journal of Alzheimer's Disease finds reduced activity of an energy-generating enzyme in deceased young adult brain donors who carry a common genetic risk factor for Alzheimer's disease - before the protein changes or microscopic abnormalities commonly associated with the disease and almost five decades before the age at which they might have developed memory and thinking problems.

Arizona researchers studied tissue from a vulnerable part of the brain in 40 young adults who had died and donated their brains for research. 15 of the brain donors carried a common genetic risk factor for Alzheimer's disease, known as APOE4, and 25 of the brain donors did not. With the exception of a person with two copies of the APOE4 gene, none of the deceased young adults had the microscopic abnormalities or elevated amyloid protein levels long associated with Alzheimer's disease. However, the activity of an enzyme known as cytochrome oxidase, an energy-making enzyme found in the power-packs of the brain cells, was slightly reduced in the group at increased genetic risk for Alzheimer's disease.

A team of researchers from several institutions in the Arizona Alzheimer's Consortium had previously used a brain imaging technique called PET to detect reduced brain activity in living young adults at genetic risk for Alzheimer's disease. They had also shown reductions in cytochrome oxidase activity and the expression of energy-making genes in deceased brain donors with Alzheimer's symptoms. Based on these findings, they had proposed that individuals at genetic risk for Alzheimer's disease might have alterations in energy utilization, or some other abnormality in the mitochondria (the power packs inside each cell) long before the progressive brain changes associated with Alzheimer's disease had even started.

"Our findings suggest that mitochondrial brain changes contribute to the risk of Alzheimer's disease," said Jon Valla, Assistant Professor of Biochemistry at Midwestern University and the study's lead author. He conducted the cytochrome oxidase activity analysis at the Barrow Neurological Institute. "While our findings do not suggest ways in which to predict or reduce a person's risk at this time, they provide a foundation for studies seeking to do just that."

This study was supported by the State of Arizona, the Barrow Neurological Foundation, and the National Institute on Aging. The study authors include Eric Reiman and Roy Yaari (Banner Alzheimer's Institute and University of Arizona), Andrew Wolf and Yael Kusne (Arizona State University and Barrow Neurological Institute), Thomas Beach and Alex Roher (Banner Sun Health Research Institute), Jason Corneveaux and Matthew Huentelman (Translational Genomics Research Institute), and Richard Caselli (Mayo Clinic in Arizona). Brain samples were provided by the National Institute for Childhood Disorders-supported Tissue Bank for Developmental Disorders at the University of Maryland in Baltimore.

http://www.eurekalert.org/pub_releases/2010-11/jdc-dmc113010.php

Diabetes may clamp down on brain cholesterol

Joslin research could help to explain changes in brain function among people with diabetes - including greater risk of Alzheimer's disease

BOSTON – The brain contains more cholesterol than any other organ in the body, has to produce its own cholesterol and won't function normally if it doesn't churn out enough. Defects in cholesterol metabolism have been linked with Alzheimer's disease and other neurodegenerative conditions. Now researchers at Joslin Diabetes Center have discovered that diabetes can affect how much cholesterol the brain can make.

Scientists in the laboratory of C. Ronald Kahn, M.D., head of Joslin's Integrative Physiology and Metabolism research section, found that brain cholesterol synthesis, the only source of cholesterol for the brain, drops in several mouse models of diabetes. Their work was reported online in the journal Cell Metabolism on November 30.

"Since cholesterol is required by neurons to form synapses (connections) with other cells, this decrease in cholesterol could affect how nerves function for appetite regulation, behavior, memory and even pain and motor activity," says Dr. Kahn, who is also Mary K. Iacocca Professor of Medicine at Harvard Medical School. "Thus, this has broad implications for people with diabetes." Other investigations have gathered strong evidence that people with diabetes may display varying types of alterations in brain function or ways of responding to stress, he points out.

"It is well known that insulin and diabetes play an important role in regulating cholesterol synthesis in the liver, where most of the cholesterol circulating in blood comes from," Dr. Kahn adds. "But nobody had ever suspected that insulin and diabetes would play an important role in cholesterol synthesis in the brain."

In addition to its potential role in Alzheimer's disease and other forms of neurological dysfunction, the newly discovered mechanism may play a role in diabetic neuropathy, which remains a large challenge for therapy.

People with diabetes are also known to be more prone to depression, memory loss and eating disorders than people without diabetes, and imaging studies have shown that people with diabetes have altered brain function compared to those without. Additionally, the finding raises a question about potential interactions between anti-cholesterol drugs and diabetes.

In the Joslin study, scientists first examined gene expression in the hypothalamus of a mouse model of insulin-deficient (type 1) diabetes. They found decreased expression for almost all of the genes of cholesterol synthesis, including a gene called SREBP-2, which acts as a master regulator for cholesterol production. Similar findings were present in the cerebral cortex and other regions of the brain in these animals and also found in several other mouse models of diabetes. In the insulin-deficient animals, this phenomenon was associated with decreased cholesterol synthesis. Treatment of the mice with insulin, either by normal injection or injection into the fluid surrounding the brain, reversed the process.

"Our studies showed that these effects occurred in both the neurons and supporting 'glial' cells that help provide some nutrients to the neurons," says Kahn. "Ultimately this affects the amount of cholesterol that can get into the membranes of the neuron, which form the synapses and the synaptic vesicles - the small structures that contain neurotransmitters."

Additionally, the Joslin work showed a connection between the decrease in brain cholesterol synthesis and appetite. When the scientists took normal mice and temporarily reduced cholesterol creation in the hypothalamus with a technique known as RNA interference, the animals started eating more and gained significant weight. Previous studies by other labs have demonstrated that diabetes may affect brain hormones involved in appetite regulation.

Ryo Suzuki, Ph.D., a postdoctoral researcher in the Kahn lab, is first author on the paper. Other Joslin contributors include Kevin Lee and Enxuan Jing. Other co-authors include Sudha B. Biddinger of Children's Hospital Boston, Jeffrey G. McDonald

of the University of Texas Southwestern Medical Center, and Thomas J. Montine and Suzanne Craft of the University of Washington in Seattle. The work was supported by the National Institutes for Health, the Iacocca Foundation and the Manpei Suzuki Diabetes Foundation.

http://www.eurekalert.org/pub_releases/2010-11/thc-rio113010.php

Recommendations issued on controversial 'Ashley' procedure for disabled children

(Garrison, NY) ***Should parents be able to use medical means to restrict the growth of profoundly disabled children to make them easier to care for at home?***

A working group convened to discuss the ethical and policy considerations of "growth attenuation" proposes some guidelines in an article in the Hastings Center Report. Personal essays – including those of parents whose children cannot walk or speak -- accompany the article

Growth attenuation is the use of estrogen supplements to restrict a child's growth. Debate has raged since 2006, when the first case of the procedure came to light involving Ashley, a 6-year-old girl with profound developmental disabilities who underwent growth attenuation in Seattle Children's Hospital at the request of her parents.

The justification was that growth attenuation would enable Ashley's parents to more easily move her, dress her, and involve her in family gatherings. But the intervention drew strong criticisms, particularly from disability rights and family support groups, who compared it to involuntary sterilization and other horrific treatments inflicted on disabled people throughout history, ostensibly for both individual and social benefit.

The Seattle Growth Attenuation and Ethics Working Group consisted of 20 people, including Erik Parens, senior research scholar at The Hastings Center, as well as pediatricians, lawyers, and philosophers with diverse perspectives and experiences on disability issues. A few were directly involved in the Ashley case, and nearly half either have severely disabled family members or are severely disabled themselves.

The group could not reach consensus, but it did reach a compromise: "growth attenuation can be an ethically acceptable decision because the benefits and risks are similar to those associated with other decisions that parents make for their profoundly disabled children and about which reasonable people disagree."

The group stressed the importance of having safeguards in place, such as eligibility criteria, a thorough decision-making process, and the involvement of ethics consultants or committees. Growth attenuation should be considered only for children who are nonambulatory and have persistent, profound developmental disabilities – about 4,000 such children are born each year in the United States. The decision-making process should begin with a competent evaluation of the child's condition by general pediatricians and various specialists, who can also assess the prospects for improvement.

In addition, clinicians should give parents information about the anticipated benefits and risks to the child, and about alternative options for including the child in family activities. As part of the information-gathering process, the group agreed "that parents should be given the opportunity to talk with other parents of profoundly disabled children in order to dispel any myths or assumptions about what life with a maturing child with profound developmental disabilities would be like."

http://www.eurekalert.org/pub_releases/2010-11/w-sfa113010.php

Study finds anti-microbials a common cause of drug-induced liver injury and failure

Disproportionate number of women and minorities affected

New research shows that anti-microbial medications are a common cause of drug-induced liver injury (DILI) leading to acute liver failure (ALF), with women and minorities disproportionately affected. While ALF evolves slowly, once it does occur a spontaneous recovery is unlikely; however liver transplantation offers an excellent survival rate. Full findings of this ten-year prospective study are published in the December issue of Hepatology, a journal of the American Association for the Study of Liver Diseases.

Patients with liver failure resulting from DILI may experience deep jaundice, fluid retention, advanced coagulopathy and coma. More than 1100 drugs, herbal remedies, natural products, vitamins, minerals, dietary supplements, and recreational and illicit compounds are known to cause liver injury, which reportedly affect 1 in 100,000 to 1 in 10,000 patients. Prior research shows DILI is a frequent cause of hepatitis, and accounts for 5%-10% of hospitalizations for jaundice and 12% of all cases of ALF (excluding acetaminophen).

In the current study, researchers investigated liver injury and failure caused by drugs other than acetaminophen. Detailed case reports were collected from 1,198 subjects with ALF enrolled at 23 sites participating in the National Institutes of Health-funded Acute Liver Failure Study Group, led by Principal Investigator, William M. Lee, M.D., from the University of Texas Southwestern Medical Center in Dallas, TX. Researchers identified 133 patients with DILI with 71% of those cases in women.

"Our findings confirm prior medical evidence that found a high female predominance in DILI ALF, suggesting that women may be more susceptible to liver injury or use more prescription drugs than men," said Dr. Adrian Reuben, Professor of Medicine at the Medical University of South Carolina and lead study author.

Furthermore, the research team documented a disproportionately high number of minorities with DILI ALF, including African-American (16%), Hispanic (15%) and other minority groups (12%). "We observed inexplicably high numbers of minority patients with DILI ALF. This racial disparity is atypical for acetaminophen-induced ALF in the U.S. and further studies should explore this discrepancy," commented Dr. Reuben.

Researchers identified 61 different agents that, alone or in combination, could cause liver injury and failure in the study population. Anti-microbial agents were found to be the most common cause of DILI ALF cases and included anti-tuberculosis drugs (25), sulphur-containing drugs (12), nitrofurantoin (12), other antibiotics (7), antifungal agents (6), and anti-retroviral drugs (4). Patients who develop ALF after taking these drugs typically do not experience a spontaneous recovery - the transplant-free survival rate in this study was 27%.

There were 56 eligible subjects who underwent liver transplantation of whom all but four survived, giving an overall survival for the entire cohort 66.2%. The authors highlight that the 23.3% of transplantation waitlist deaths attest to the urgent need for donor organs in this setting. "Liver transplantation offers excellent survival for ALF patients, however further investigation should include more detail on drug use duration, and the impact of alcohol use and diabetes, to provide additional understanding of idiosyncratic drug-induced liver injury and failure," Dr. Reuben concluded.

Article: "Drug-Induced Acute Liver Failure: Results of a United States Multicenter, Prospective Study." Adrian Reuben, David G. Koch, William M. Lee and the Acute Liver Failure Study Group. Hepatology; Published Online: October 14, 2010 (DOI: 10.1002/hep.23937); Print Issue Date: December 2010. http://doi.wiley.com/10.1002/hep.23937.

http://www.eurekalert.org/pub_releases/2010-11/bmj-jcf112910.php

Joined-up care for people with low back pain saves money

Research: Effect of integrated care for sick listed patients with chronic low back pain: economic evaluation alongside a randomized controled trial

An integrated approach to care for people on long term sick leave because of chronic low back pain has substantially lower costs than usual care, finds a study published on bmj.com today. Researchers in the Netherlands found that an integrated care approach has significant benefits for patients, society and employers.

Chronic low back pain is one of the most common health problems in industrialised countries and places a huge economic burden on individuals, health care systems, and society as a whole. Most (93%) of this burden is related to costs of productivity losses.

The researchers identified 134 patients aged 18 to 65 years who were on sick leave from work because of chronic low back pain. Sixty-six patients received an integrated care programme, while 68 patients received usual care according to Dutch guidelines.

Integrated care consisted of workplace assessments, treatment with graded exercise, and reassurance that despite pain, moving can be safe while increasing activity levels (for full details of the intervention see http://www.bmj.com/content/340/bmj.c1035/suppl/DC1). The main aims of the programme were to achieve lasting return to work and improved quality of life, and these results were published in the BMJ in March 2010.

The patients were surveyed at regular intervals over 12 months to assess their use of health care resources and absenteeism from work.

Usual care patients consulted health care professionals more often than patients who received integrated care, and they used more informal care and had longer stays in hospital. Sustainable return to work and quality of life gained were also significantly more favourable in the integrated care group compared with usual care.

After 12 months, total costs in the integrated care group (£13,165) were significantly lower than in the usual care group (£18,475). Integrated care was therefore more cost effective than usual care. Cost-benefit analyses showed that every £1 invested in integrated care will return an estimated £26. For society, the net benefit of integrated care compared with usual care was £5,744.

Limited health care budgets are making economic evaluations increasingly important, say the authors. The integrated care programme has large potential to significantly reduce societal costs and improve quality of life and function. They conclude: "The success and failures of implementing the integrated care programme need to be investigated to determine the boundary conditions for nationwide application."

http://www.washingtonpost.com/wp-dyn/content/article/2010/11/22/AR2010112203503.html

Stem cells in fat may help repair damaged hearts

By Laura Ungar Special to The Washington Post

You might think fat is bad for your heart. But a growing group of scientists says that's not always true. The same stuff that can make you pudgy around the middle and clog your arteries, they say, might also heal your damaged heart.

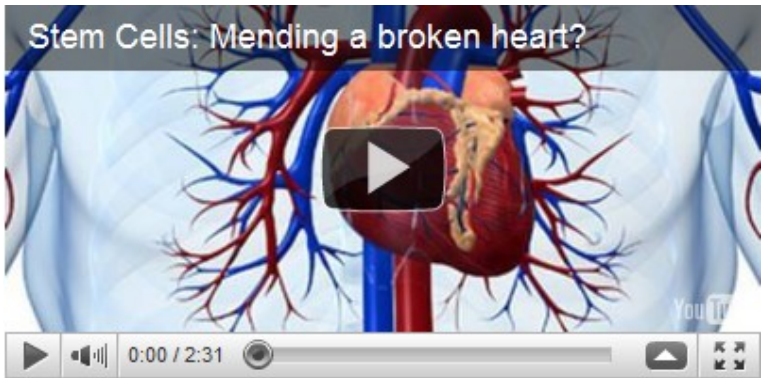
Inside a person's own fat are stem cells that they say can limit the loss of heart function after a heart attack and repair heart failure damage. These cells could someday become a new weapon in the fight against heart disease, which kills more than 400,000 Americans a year.

"For eons, fat has been considered something that is bad," said Stuart Williams, scientific director of the Cardiovascular Innovation Institute, a partnership between the University of Louisville and Jewish Hospital & St. Mary's HealthCare, and one of the leading researchers in the field. "But God made love handles for a reason."

More than 300 scientists from around the world, including in Virginia, are studying the fat-derived stem cells for various applications. About eight years ago, researchers began sharing their knowledge by forming the International Federation of Adipose Therapeutics and Science Society, or IFATS.

Fat-derived stem cells are now being tested on cardiac patients in Europe.

Six-month results from a 14-patient heart attack trial in the Netherlands and Spain showed not only a reduction in the size of the heart injury but also improvements in the amount of blood supplied to the heart muscle and the amount of blood the heart can pump.



Data from a second trial, a 27-patient chronic heart disease study in Spain, showed a reduction in the amount of damage in the left ventricle. It also showed that patients receiving stem cells had better oxygen consumption and improved ability to perform physical activity.

Williams and other U.S. researchers have shown success in mice and plan human trials in the next couple of years. But even if those trials are successful, they say it will be several years before treatments based on fat-derived stem cells are widely available.

Erin Peiffer of Eldersburg, Md., said she's excited about the possibilities. In 2001, she received a diagnosis of congestive heart failure after feeling a rattling sensation in her chest while doing water aerobics. She learned that her heart's left main artery was 99 percent blocked. She was 39 at the time, with no risk factors for heart disease except high cholesterol.

She had a heart catheterization and now takes several medications. Her two teenage sons share her genes for sky-high cholesterol and have been on statin medications since they were 10 years old. She worries about their future heart health.

"I have lots of hopes pinned on the up-and-coming research. . . . I'm counting on it," said Peiffer, 49. "I would love to have the option of stem cells from fat. I've got plenty of fat they can take. Sign me up."

Apolitical stem cells

Scientists say getting fat-derived cells into a patient is fairly easy.

Doctors perform liposuction to remove a chunk of fat about the size of a golf ball from, for example, the abdomen. They then extract the stem cells, and then inject them into diseased tissue. (To reach the heart, the cells are delivered via a device inserted into a blood vessel in the leg.) There's no chance of rejection since the cells come from the patient.

"Everyone has an easily sufficient reservoir of fat, even thin people," said Keith March, director of the Vascular and Cardiac Center for Adult Stem Cell Therapy at Indiana University. "You can readily harvest the stem cells." Scientists point out that fat is filled with tiny blood vessels and say its stem cells can stimulate new vessels to grow. "This is the most promising technique to rebuild blood vessels in the heart," Williams said.

"Many people did not expect fat to be so useful," added March.

Adam Katz, an associate professor of plastic surgery and biomedical engineering at the University of Virginia, said that when research began, scientists thought the fat-derived stem cells would just replace dead heart cells. But he said there's little evidence that happens on a significant scale. Instead, he posits, the replacement cells release growth factors and wrap around new blood vessels, stabilizing them. Katz likened the process to bolstering a road that an army builds to get to a remote place.

When the heart is injured, he said, the body responds by forming small blood vessels to provide blood flow to the injured area. If they are not stabilized, they get pruned back.

Adding the fat-derived stem cells stops this loss of blood vessels, he said, making the "roads" more permanent. And that helps salvage tissue that otherwise has a 50-50 chance of dying.

"More vessels mean more life," he said.

Katz and other scientists said that because fat-derived cells come from the patients themselves and not from embryos that are destroyed in the process of extracting their stem cells, their use sidesteps the ethical dilemmas that bitterly divide many Americans. Katz said it also avoids the scientific pitfalls of embryonic stem cells, which can prompt the growth of tumors when implanted.

"Clearly," he said, "the embryonic stem cells have several issues to overcome."

Caution amid optimism

While many researchers are optimistic about fat-derived cells, some experts urge caution, saying it's too early to know whether these cells will be as good as cardiac and other types of stem cells, or other treatments such as new medications.

One concern is that fat-derived stem cells may cause fat to develop in the heart. Another is that there's no assurance that the cells will respond as heart cells would, said Julio Panza, director of the division of cardiology at Washington Hospital Center.

Panza said he has been hearing about the fat-based research for about five years, and although it sounds promising, he's not convinced it will revolutionize heart care anytime soon.

"It's kind of been around the corner for a while," he said. "But it's still not viewed as something that's ready for prime time."

Williams and others said they are aware of concerns regarding the research and are cautiously testing the treatment in animals before trying it in people. But they said the cells seem to be safe and helpful for heart attack victims, judging from initial results from the European trials.

San Diego-based Cytori Therapeutics, which sponsored the two European trials, said they plan to begin the process of seeking regulatory approvals in Europe early next year for the treatment tested in the 27-patient trial.

Cytori provided video interviews with two participants in the chronic heart disease trial who were identified only by one name. One of them, Vistoriano, recalled having had several heart attacks and five bypass surgeries that forced him to retire from work and made him weak, pale and unable to climb stairs. Since the stem-cell procedure, he said he walks more, climbs stairs and feels "strong," "happier and better." He spoke in Spanish, with English subtitles on the video.

The other, Cilfredo, said he feels less fatigued than he did before the procedure and no longer needs someone to hold his arm when he walks. "My life has gotten better," he said, "because I find myself more alive, with more strength, and more will to live as well."

Hope abounds among those touched by heart disease.

"Research is critical when you have a family history," said Gail Mates of Haymarket, whose parents and grandparents suffered from heart problems and who was worried she was heading toward a heart attack herself before she started exercising more and eating healthful foods. "I'm excited at the fact something like this could be so helpful."

So is Annie Lawler of Lutherville, Md.

A 53-year-old swim instructor, Lawler last year felt intense chest pain and pressure while in a swimming pool; she was having a heart attack. She is now living with six stents in her heart's left anterior descending artery and takes five medications a day. She said it would be "a great thing" to see the promise of fat-derived stem cells realized.

"If we can use our own tissue to heal ourselves," she asked, "why not?"

Ungar, the medical writer at the Courier-Journal in Louisville, has been a journalist for 20 years.

http://www.nytimes.com/2010/11/30/health/research/30diet.html

Diet: Good-for-You Things Come in Orange

By RONI CARYN RABIN

Eat your carrots. And have some leftover pumpkin pie.

People with high blood levels of alpha-carotene - an antioxidant found in orange fruits and vegetables - live longer and are less likely to die of heart disease and cancer than people who have little or none of it in their bloodstream, a new study reports.

The study does not prove a cause-and-effect relationship, only an association.

Still, its results are intriguing. Researchers from the Centers for Disease Control and Prevention analyzed alpha-carotene levels in blood samples from more than 15,000 adults who participated in a follow-up study of the third National Health and Nutrition Examination Survey from 1988 to 1994. By 2006, researchers determined, 3,810 of the participants had died. Those with the highest levels of alpha-carotene were more likely to have survived, even after the scientists controlled for variables like age and smoking.

Those with the highest concentrations of the antioxidant were almost 40 percent less likely to have died than those with the lowest; those with midrange levels were 27 percent less likely to die than those with the lowest levels.

“It’s pretty dramatic,” said the lead author, Dr. Chaoyang Li, a C.D.C. epidemiologist. The study was published online Nov. 22 in Archives of Internal Medicine.

http://news.nationalgeographic.com/news/2010/11/101130-new-planets-found-solar-system-twin-science-space/

New Planet System May Be Most Populated Yet Found

Densely packed worlds likely survivors of "demolition derby," expert says.

Andrew Fazekas for National Geographic News

A densely packed set of planets around a sunlike star may be the closest match yet found to our solar system, at least by the numbers, astronomers say. At least five Neptune-like planets have been spotted orbiting the star HD 10180 - and there's evidence of two more worlds, one farther from the star and another closer in.

If the latter observations can be confirmed, the innermost planet may hold the record for the lowest-mass extrasolar planet, or exoplanet, seen to date.

"We remain cautious about the existence of the innermost and outermost planets," said study lead author Christophe Lovis, an astronomer with the Observatory of Geneva in Switzerland.

"But I am confident that at least one of them will be definitively confirmed soon, thus making this system the most populous known so far."

Super-Earth Likely a "Lava Planet"

The packed planetary system, located 127 light-years from Earth in the southern constellation Hydrus, was first announced at a conference in France in August. The system is described in a new study published online last week on the Cornell University website arXiv.org and now accepted for publication in the journal Astronomy and Astrophysics.

The five established planets are between 12 and 25 times the mass of Earth and are all roughly around the sizes of Uranus or Neptune, meaning the newfound worlds are most likely icy gas giants.

The five planets are huddled close to their star, with orbits ranging from 0.06 to 1.4 times the distance between Earth and the sun. A sixth, yet to be confirmed planet that's 65 times the mass of Earth is thought to be orbiting farther beyond the group, at about 3.4 times the distance between Earth and the sun.

But it's the seventh planet that has astronomers most excited.

At only 1.4 times the mass of our home world, this exoplanet is what astronomers call a super-Earth. The planet hugs its star at just 0.02 times the distance between Earth and the sun, likely giving the world - if it exists - a hellish environment. "It's so close to the star and has such a low mass that it's likely to be a 'lava' planet made of molten rocks," Lovis said. "Temperatures at the surface will be extremely high - measured in thousands of degrees - so this is for sure a nonhabitable world, in spite of the similar size to our Earth."

"Only 99 Percent Sure"

The planets are too far from Earth to be seen directly, so astronomers found them by looking at the host star and measuring the gravitational tug of its planets. In all, the team collected six years' worth of data from the European Southern Observatory's 3.6-meter telescope at La Silla, Chile.

Because the signal from the candidate super-Earth is very weak, Lovis and his team are looking to get more measurements to confirm that the seventh planet exists. "At this point we are 'only' 99 percent sure that this signal is real," Lovis said. "In astronomy, 99 percent is often just not enough - we would prefer something like 99.9 percent to be really sure ... But such uncertainties are fully part of the scientific discovery process."

The team is right to be guarded in announcing the discovery of a super-Earth, said planet hunter Jaymie Matthews, principal investigator for Canada's Microvariability and Oscillations of Stars, or MOST, space telescope. Caution is especially warranted after the confusion surrounding the announcement in October of a potentially habitable Earth-mass planet around the star Gliese 581, said Matthews, who was not involved in the new research.

Dubbed a Goldilocks planet (not too hot, not too cold), that find - made by teams at the University of California, Santa Cruz, and the Carnegie Institution for Science in Washington - was later questioned when astronomers at the Observatory of Geneva were unable to confirm the Gliese planet exists.

Lovis and colleagues "are being cautious, as they should be and as they must be after their public comments on Goldilocks world, which is a similarly weak signal," Matthews said.

"But if [HD 10180's super-Earth] is real, it's almost certainly a terrestrial world with a metal core and rocky mantle," based on the estimated size and mass, he said.

Star System Played Pool?

Astronomers are also intrigued by the overall configuration of the planetary system, which the study authors describe as a "packed orbital architecture with little or no space left for additional planets" around the star.

Planets are thought to form from disks of debris that surround young stars. In this case, the planets probably didn't form where they are now, Lovis said, because there wouldn't have been enough solid material in the inner regions of HD 10180's protoplanetary disk.

"More likely, they originated from the outer, colder regions of the disk, where they could accumulate large quantities of ice and rocks to grow," and then the planets migrated inward, Lovis added.

The big question is how did seven planets migrate together in an orderly fashion without colliding with or ejecting each other? (Related: "New Planets Found; Have Backward Orbits.")

"We can imagine that there may actually have been many more, smaller bodies around HD 10180 when the [primordial] disk disappeared, and then a big pool game started, with many agglomerations and ejections, until a gravitationally stable configuration was reached - the one we see today," Lovis said.

Studying the current planetary motions in this complex system may therefore give astronomers insight into the long-term evolution of star systems. "Seeing the outcomes of earlier interactions is an important clue in the puzzle of planet formation and evolution," MOST's Matthews said. "These planets may be the survivors of a gravitational game of demolition derby."

http://www.eurekalert.org/pub_releases/2010-12/rson-crf112410.php

Cancer risk from medical radiation may have been overestimated

CHICAGO – ***The risk of developing radiation-induced cancer from computed tomography (CT) may be lower than previously thought, according to a study presented today at the annual meeting of the Radiological Society of North America (RSNA).***

"Radiation from medical imaging has gotten a tremendous amount of attention in recent years," said Aabed Meer, an M.D. candidate at Stanford University in Palo Alto, Calif. "This is one of the first studies to track CT utilization in such a large population."

The researchers conducted a retrospective study using Medicare claims from 1998 through 2005 to analyze the distribution of CT scans, determine the ionizing radiation exposure associated with the exams and estimate the associated cancer risk in a population of older adults.

"The study focused on the elderly Medicare population, which receives the highest amount of per capita radiation," Meer said. "We analyzed more than 10 million records from the Medicare claims database."

The data were studied in two groups, including 5,267,230 records from 1998 through 2001 and 5,555,345 records from 2002 through 2005. For each group, the researchers analyzed the number and types of CT scans that each patient received to determine the percentage of patients exposed to "low" radiation doses of 50 millisieverts (mSv) to 100mSv and "high" radiation doses, in excess of 100mSv. They then used standard cancer risk models to estimate the number of cancers induced.

CT scans of the head were the most common examinations, representing 25 percent of the first group and 30 percent of the second group. However, abdominal CT delivered the greatest proportion of radiation, accounting for approximately 40 percent of the total radiation exposure in each group. Imaging of the pelvis and chest represented the second and third largest sources of radiation.

From 1998 to 2001, 42 percent of patients underwent CT scans. From 2002 to 2005, 49 percent of patients underwent CT scans. The percentage of patients exposed to radiation doses in both the low and high ranges approximately doubled from the first group to the second group. The researchers found this to be consistent with the increasing use of high-speed CT in patient diagnosis and management. Cancer incidences related to ionizing radiation from CT were estimated to be 0.02 percent and 0.04 percent of the two groups, respectively.

"Our findings indicate a significantly lower risk of developing cancer from CT than previous estimates of 1.5 percent to 2.0 percent of the population," said coauthor Scott Atlas, M.D., chief of neuroradiology at the Stanford University Medical Center. "Regardless, the increasing reliance on CT scans underscores the importance of monitoring CT utilization and its consequences."

Other coauthors are Laurence Baker, Ph.D., and Pat A. Basu, M.D.

http://www.eurekalert.org/pub_releases/2010-12/yu-dtn112910.php

Discovery triples number of stars in universe

New Haven, Conn. - *Astronomers have discovered that small, dim stars known as red dwarfs are much more prolific than previously thought - so much so that the total number of stars in the universe is likely three times bigger than realized.*

Because red dwarfs are relatively small and dim compared to stars like our Sun, astronomers hadn't been able to detect them in galaxies other than our own Milky Way and its nearest neighbors before now. As such, they did not know how much of the total stellar population of the universe is made up of red dwarfs.

Now astronomers have used powerful instruments on the Keck Observatory in Hawaii to detect the faint signature of red dwarfs in eight massive, relatively nearby galaxies called elliptical galaxies, which are located between about 50 million and 300 million light years away. They discovered that the red dwarfs, which are only between 10 and 20 percent as massive as the Sun, were much more bountiful than expected.

"No one knew how many of these stars there were," said Pieter van Dokkum, a Yale University astronomer who led the research, which is described in Nature's Dec.1 Advanced Online Publication. "Different theoretical models predicted a wide range of possibilities, so this answers a longstanding question about just how abundant these stars are."

The team discovered that there are about 20 times more red dwarfs in elliptical galaxies than in the Milky Way, said Charlie Conroy of the Harvard-Smithsonian Center for Astrophysics, who was also involved in the research. "We usually assume other galaxies look like our own. But this suggests other conditions are possible in other galaxies," Conroy said. "So this discovery could have a major impact on our understanding of galaxy formation and evolution."

For instance, Conroy said, galaxies might contain less dark matter - a mysterious substance that has mass but cannot be directly observed - than previous measurements of their masses might have indicated. Instead, the abundant red dwarfs could contribute more mass than realized.

In addition to boosting the total number of stars in the universe, the discovery also increases the number of planets orbiting those stars, which in turn elevates the number of planets that might harbor life, van Dokkum said. In fact, a recently discovered exoplanet that astronomers believe could potentially support life orbits a red dwarf star, called Gliese 581.

"There are possibly trillions of Earths orbiting these stars," van Dokkum said, adding that the red dwarfs they discovered, which are typically more than 10 billion years old, have been around long enough for complex life to evolve. "It's one reason why people are interested in this type of star."

Citation: DOI: 10.1038/nature09578

http://www.eurekalert.org/pub_releases/2010-12/e-fsa112910.php

First super-Earth atmosphere analyzed

The planet GJ 1214b was discovered in 2009 using the HARPS instrument on ESO's 3.6-metre telescope in Chile (eso0950 - http://www.eso.org/public/news/eso0950/) [1]. Initial findings suggested that this planet had an atmosphere, which has now been confirmed and studied in detail by an international team of astronomers, led by Jacob Bean (Harvard–Smithsonian Center for Astrophysics), using the FORS instrument on ESO's Very Large Telescope.

"This is the first super-Earth to have its atmosphere analysed. We've reached a real milestone on the road toward characterising these worlds," said Bean.

GJ 1214b has a radius of about 2.6 times that of the Earth and is about 6.5 times as massive, putting it squarely into the class of exoplanets known as super-Earths. Its host star lies about 40 light-years from Earth in the constellation of Ophiuchus (the Serpent Bearer). It is a faint star [2], but it is also small, which means that the size of the planet is large compared to the stellar disc, making it relatively easy to study [3]. The planet travels across the disc of its parent star once every 38 hours as it orbits at a distance of only two million kilometres: about seventy times closer than the Earth orbits the Sun.

To study the atmosphere, the team observed the light coming from the star as the planet passed in front of it [4]. During these transits, some of the starlight passes through the planet's atmosphere and, depending on the chemical composition and weather on the planet, specific wavelengths of light are absorbed. The team then compared these precise new measurements with what they would expect to see for several possible atmospheric compositions.

Before the new observations, astronomers had suggested three possible atmospheres for GJ 1214b. The first was the intriguing possibility that the planet was shrouded by water, which, given the close proximity to the star, would be in the form of steam. The second possibility was that this is a rocky world with an atmosphere

consisting mostly of hydrogen, but with high clouds or hazes obscuring the view. The third option was that this exoplanet was like a mini-Neptune, with a small rocky core and a deep hydrogen-rich atmosphere.

The new measurements do not show the telltale signs of hydrogen and hence rule out the third option. Therefore, the atmosphere is either rich in steam, or it is blanketed by clouds or hazes, similar to those seen in the atmospheres of Venus and Titan in our Solar System, which hide the signature of hydrogen.

"Although we can't yet say exactly what that atmosphere is made of, it is an exciting step forward to be able to narrow down the options for such a distant world to either steamy or hazy," says Bean. "Follow-up observations in longer wavelength infrared light are now needed to determine which of these atmospheres exists on GJ 1214b."

Notes

[1] The number of confirmed exoplanets reached 500 on 19 November 2010. Since then, more exoplanets have been confirmed. For the latest count, please visit: http://exoplanet.eu/catalog.php

[2] If GJ 1214 were seen at the same distance from us as our Sun, it would appear 300 times fainter.

[3] Because the star GJ1214 itself is quite faint - more than 100 times fainter in visible light than the host stars of the two most widely studied hot Jupiter exoplanets - the large collecting area of the Very Large Telescope was critical for acquiring enough signal for these measurements.

[4] GJ 1214b's atmospheric composition was studied using the FORS instrument on the Very Large Telescope, which can perform very sensitive spectroscopy of multiple objects in the near-infrared part of the spectrum. FORS was one of the first instruments installed on the Very Large Telescope.

More information

This research is presented in a paper to appear in Nature on 2 December 2010.

The team is composed of Jacob Bean (Harvard–Smithsonian Center for Astrophysics, USA), Eliza Miller-Ricci Kempton (University of California, Santa Cruz, USA) and Derek Homeier (Institute for Astrophysics, Göttingen, Germany).

http://www.eurekalert.org/pub_releases/2010-12/uom-iam120110.php

Insomnia after myocardial infarction

New study published in journal Sleep

Montreal, December 1st, 2010 – The heart and the brain appear to be even more closely connected than previously imagined. The damaging effects of myocardial infarction are apparently not confined to the heart, but also affect the brain.

In fact, infarction seems to cause neuron loss at the level of the brainstem, which leads to insomnia, notably paradoxical insomnia. Sleep plays a crucial role in post-infarction remission, as demonstrated by the team of Roger Godbout, Ph.D., his colleague Guy Rousseau and their student Thierno Madjou Bah, investigators at the Research Center of the Hôpital du Sacré-Cœur de Montréal, in a new study published today in the scientific journal SLEEP.

Although insomnia has long been observed following infarction, to date there have been no studies explaining the phenomenon in scientific terms, apart from the stress that is doubtless brought on by the heart attack. "Thanks to this study, we have been able to show that there is indeed a physiological explanation – the death of cells that play a key role in sleep," says the researcher, who is also a full professor in the Department of Psychiatry at the Université de Montréal.

In the two weeks following a myocardial infarction, not only have periods of paradoxical sleep been observed to be less frequent and of shorter duration, but there are fewer cholinergic neurons in the brainstem, which control paradoxical sleep, due to the phenomenon of self-destruction of cells, known as apoptosis.

Treating insomnia to help the heart heal

A previous study also conducted by the team of Godbout and Rousseau demonstrated that myocardial infarction affected the limbic system, a region of the brain that is responsible for mood, which explains the depression frequently observed after heart attacks. "Since depression is frequently accompanied by insomnia, we wanted to verify whether the neurons in the brainstem were also affected," the investigator explained.

As demonstrated in this study, myocardial infarction, in addition to causing depression, is also associated with the release of factors that provoke the inflammation of tissues, including the brain, and specifically the regions that control sleep, notably the paradoxical sleep phase. The particular function of that phase is to activate regions in the brain that are responsible for integrating our emotions. If that is affected, the risk of depression also increases.

Poor-quality sleep is a known risk factor for cardiovascular disease. Since it can affect remission after an infarction, the risk of complications and recidivism rises and a vicious circle may be set in motion.

Godbout says this study illustrates the importance of rapid intervention in the days following the infarction, before the first signs of insomnia and depression are even apparent. He notes that "any preventive, pharmacological or behavioural treatment is certainly a pathway that should be considered."

About the study

The authors of the article Paradoxical sleep insomnia and decreased cholinergic neurons after myocardial infarction in rats, published in SLEEP, are Thierno Madjou Bah, François Laplante, Ron Sullivan, Guy Rousseau and Roger Godbout, researchers at the Research Center of the Hôpital du Sacré-Cœur de Montréal and at the Université de Montréal.

http://www.eurekalert.org/pub_releases/2010-12/foas-npd120110.php

New prion discovery reveals drug target for mad cow disease and related illnesses

New research in the FASEB Journal suggests that plasminogen, which helps break down blood clots, puts rogue prion proteins into overdrive, causing devastating brain diseases

The joy of a juicy hamburger could make a comeback thanks a new discovery by scientists from the University of Kentucky. In a new research report in the December 2010 print issue of The FASEB Journal (http://www.fasebj.org), scientists found that a protein our body uses to break up blood clots speeds up the progress of prion diseases. This substance, called plasminogen, is a new drug target for prion diseases in both humans and animals.

"I hope that our study will aid in developing therapy for prion diseases, which will ultimately improve the quality of life of patients suffering from prion diseases," said Chongsuk Ryou, Ph.D., a researcher involved in the work from the University of Kentucky in Lexington. "Since prion diseases can lay undetected for decades, delaying the ability of the disease-associated prion protein to replicate by targeting the cofactor of the process could be a monumental implication for treatment."

To make this discovery, the researchers used simple test tube reactions to multiply disease-associated prion proteins. The reactions were conducted in the presence or absence of plasminogen. They found that the natural replication of the prions was stimulated by plasminogen in both human and animal cells.

"Rogue prions are one of nature's most interesting, deadly and least understood biological freakshows," said Gerald Weissmann, M.D., Editor-in-Chief of The FASEB Journal. "They are neither virus nor bacteria, but they kill or harm you just the same. By showing how prions hijack our own clot-busting machinery, this work points to a new target for anti-prion therapy."

According to the U.S. National Institute of Allergy and Infectious Diseases, prion diseases are a related group of rare, fatal brain diseases that affect animals and humans. The diseases are characterized by certain misshapen protein molecules that appear in brain tissue. Normal forms of these prion protein molecules reside on the surface of many types of cells, including brain cells, but scientists do not understand what normal prion protein does. On the other hand, scientists believe that abnormal prion protein, which clumps together and accumulates in brain tissue, is the likely cause of the brain damage that occurs. Scientists do not have a good understanding of what causes the normal prion protein to take on the misshapen abnormal form. Prion diseases are also known as transmissible spongiform encephalopathies, and include bovine spongiform encephalopathy ("mad cow" disease) in cattle; Creutzfeldt-Jakob disease in humans; scrapie in sheep; and chronic wasting disease in deer and elk. These proteins may be spread through certain types of contact with infected tissue, body fluids, and possibly, contaminated medical instruments.

Details: Charles E. Mays and Chongsuk Ryou. Plasminogen stimulates propagation of protease-resistant prion protein in vitro. FASEB J. December 2010 24:5102-5112; doi:10.1096/fj.10-163600 ; http://www.fasebj.org/content/24/12/5102.abstract

http://www.eurekalert.org/pub_releases/2010-12/nci-nsi120110.php

NIH study identifies ideal body mass index

Overweight and obesity associated with increased risk of death

A study looking at deaths from any cause found that a body mass index (BMI) between 20.0 and 24.9 is associated with the lowest risk of death in healthy non-smoking adults. Investigators also provided precise estimates of the increased risk of death among people who are overweight and obese. Previous studies that examined the risks from being overweight were inconclusive, with some reporting only modestly increased risks of death and others showing a reduced risk. Also, the precise risks for different levels of obesity were uncertain. The research team included investigators from the National Cancer Institute (NCI), part of the National Institutes of Health, and collaborators from a dozen other major research institutions worldwide. The results appear in the Dec. 2, 2010, issue of the New England Journal of Medicine.

BMI, the most commonly used measure for body fat, is calculated by dividing a person's weight in kilograms by the square of his/her height in meters (kg/m2). Current guidelines from the U.S. Centers for Disease Control and Prevention, and the World Health Organization define a normal BMI range as 18.5 to 24.9. Overweight is defined as a BMI of 25.0 to 29.9; obesity is defined as a BMI over 30.0; and severe obesity is defined as BMI 35 or higher. For a BMI calculator, go to http://www.nhlbisupport.com/bmi/bmicalc.htm.

Obesity has emerged as a leading public health concern in the United States. It has been well-established that people who are obese face increased risks of death from heart disease, stroke, and certain cancers. Currently,

two-thirds of U.S. adults are overweight or obese. Even more worrisome, 17 percent of women and 11 percent of men are severely obese.

In this large analysis, investigators pooled data from 19 long-term studies designed to follow participants over time, from 5 to 28 years, depending on the study.

They found that healthy women who had never smoked and who were overweight were 13 percent more likely to die during the study follow-up period than those with a BMI between 22.5 and 24.9. Women categorized as obese or severely obese had a dramatically higher risk of death. As compared with a BMI of 22.5 to 24.9, the researchers report a 44 percent increase in risk of death for participants with a BMI of 30.0 to 34.9; an 88 percent increase in risk for those with a BMI of 35.0 to 39.9; and a 2.5 times (250 percent) higher risk of death for participants whose BMI was 40.0 to 49.9. Results were broadly similar for men. Overall for men and women combined, for every five unit increase in BMI, the researchers observed a 31 percent increase in risk of death.

"By combining data on nearly 1.5 million participants from 19 studies we were able to evaluate a wide range of BMI levels and other characteristics that may influence the relationship between excess weight and risk of death," said NCI's Amy Berrington de Gonzalez, D.Phil., lead author of the study. "Smoking and pre-existing illness or disease are strongly associated with the risk of death and with obesity. A paramount aspect of the study was our ability to minimize the impact of these factors by excluding those participants from the analysis." The investigators observed similar patterns of risk even after accounting for differences in alcohol consumption, physical activity, and education level. The increased risk of death for a BMI of 25 or greater was also seen in all age groups, although it was more prominent for those who were overweight or obese before age 50.

The investigators gathered information about BMI and other characteristics from questionnaires participants completed at the beginning of each study. Causes of death were obtained from death certificates or medical records. This analysis was restricted to non-Hispanic whites aged 19 to 84. The investigators noted the relationship between BMI and mortality may differ across racial and ethnic groups. Other efforts are underway to study the effect of BMI on mortality in other racial and ethnic groups.

The full list of research institutions and studies participating in NCI's BMI and All-Cause Mortality Pooling Project is available at http://epi.grants.cancer.gov/bmi/. To learn more about the Division of Cancer Epidemiology and Genetics, please visit: http://dceg.cancer.gov

http://www.eurekalert.org/pub_releases/2010-12/nesc-pam120110.php

Primates are more resilient than other animals to environmental ups and downs

Durham, NC - *What sets mankind's closest relatives - monkeys, apes, and other primates - apart from other animals? According to a new study, one answer is that primates are less susceptible to the seasonal ups and downs - particularly rainfall - that take their toll on other animals. The findings may also help explain the evolutionary success of early humans, scientists say.*

The study appeared online in the November 30 issue of American Naturalist.

"Wild animals deal with a world that's unpredictable from year to year," said study lead author Bill Morris, a biologist at Duke University. "The weather can change a lot; there can be years with plenty of food and years of famine," he explained.

To find out how well primates cope with this unpredictability compared with other animals, researchers working at the National Evolutionary Synthesis Center (NESCent) in Durham, N.C. analyzed decades of birth and survival data for seven species of wild primates: muriqui monkeys and capuchin monkeys in Central and South America, yellow baboons, blue monkeys, chimpanzees and gorillas in Africa, and sifakas (lemurs) in Madagascar.

Collecting this data was no small effort. Nearly every day for more than 25 years, seven research teams working around the world have monitored the births, lives, and deaths of thousands of individual primates.

Thanks to a new database developed at NESCent, the scientists were able to pool their painstakingly-collected data and look for similarities across species. When they compared year-to-year fluctuations in primate survival to similar data for other animals - namely, two dozen species of birds, reptiles, and mammals - they found that primate survival remained more stable despite seasonal variation in rainfall.

"Primates appear to be well buffered against fluctuations in weather and food availability relative to a lot of other animals," said co-author Susan Alberts, a biologist at Duke University and associate director at NESCent.

A number of traits may help shield primates from seasonal ups and downs. "For one thing, they're social," said co-author Karen Strier, an anthropologist at the University of Wisconsin-Madison. Primates live in groups and share information with each other, so they're better able to find food and water in times of scarcity, Strier explained.

Primates also owe their adaptability to broad, flexible diets that enable them to adjust to seasonal shortages of their favorite foods. "Primates will eat leaves, grasses, fruits, flowers, bark, and seeds. They're generalists," said Alberts. In the distant past, similar traits may have also buffered other primates - namely, humans - against environmental ebbs and flows, scientists say.

"Modern humans have all the same traits these primate species have: we're smart, we have social networks, and we have a broad diet," said Morris. "Modern humans also arose during a period when Africa's climate was changing," Morris added. "So the same traits that allow non-human primates to deal with unpredictable environments today may have contributed to the success of early humans as well."

are good at coping with environmental ups and downs, then why are so many of them now endangered? Despite being well buffered from changing weather, human activities still take their toll, the scientists say. With nearly half of the world's primates now in danger of becoming extinct due to hunting and habitat loss, continued monitoring will be key, Strier added.

"Everything we can learn about them now will help prevent their extinction in the future."

Study authors (in alphabetical order) and their areas of expertise are:	
Susan Alberts (Duke University) - baboons, Kenya	*Linda Fedigan (University of Calgary) - capuchin monkeys, Costa Rica*
Jeanne Altmann (Princeton University) - baboons, Kenya	*William Morris (Duke University) - demographic and ecological analysis*
Diane Brockman (University of North Carolina-Charlotte) - lemurs, Madagascar	*Tara Stoinski (Dian Fossey Gorilla Fund International and Zoo Atlanta) - gorillas, Rwanda*
Anne Bronikowski (Iowa State University) - demography and life history	*Karen Strier (University of Wisconsin-Madison) - muriqui monkeys, Brazil*
Marina Cords (Columbia University) - blue monkeys, Kenya	
Anne Pusey (Duke University) - chimpanzees, Tanzania	

Additional images of the seven primate species included in this study are available through the Eurekalert! Multimedia Gallery.

CITATION: Morris, W., J. Altmann, et al. (2010). "Low demographic variability in wild primate populations: fitness impacts of variation, covariation, and serial correlation in vital rates." American Naturalist 177: http://www.journals.uchicago.edu/doi/full/10.1086/657443.

http://www.nytimes.com/2010/11/30/health/30life.html

Inefficiency Hurts U.S. in Longevity Rankings

By NICHOLAS BAKALAR

By any measure, the United States spends more on health care than any other nation. Yet according to the World Fact Book (published by the Central Intelligence Agency), it ranks 49th in life expectancy.

Why?

Researchers writing in the November issue of the journal Health Affairs say they know the answer. After citing statistical evidence showing that American patterns of obesity, smoking, traffic accidents and homicide are not the cause of lower life expectancy, they conclude that the problem is the health care system.

Peter A. Muennig and Sherry A. Glied, researchers at the Mailman School of Public Health at Columbia University, compared the performance of the United States and 12 other industrialized nations: Australia, Austria, Belgium, Britain, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden and Switzerland. In addition to health care expenditures in each country, they focused on two other important statistics: 15-year survival for people at 45 years and for those at 65 years.

The researchers say those numbers present an accurate picture of public health because they measure a country's success in preventing and treating the most common causes of death - cardiovascular disease, stroke and diabetes - which are more likely to occur at these ages. Their data come from the World Health Organization and cover 1975 to 2005.

Life expectancy increased over those years in all 13 countries, and so did health care costs. But the United States had the lowest increase in life expectancy and the highest increase in costs.

In 1975 the United States was close to the average in health care costs, and last in 15-year survival for 45-year-old men. By 2005 its costs had more than tripled, far surpassing increases elsewhere, but the survival number was still last - a little over 90 percent, compared with more than 94 percent for Swedes, Swiss and Australians. For women, it was 94 percent in the United States, versus 97 percent in Switzerland, Australia and Japan.

The numbers for 65-year-olds in 2005 were similar: about 58 percent of American men could be expected to survive 15 years, compared with more than 65 percent of Australians, Japanese and Swiss. While more than 80 percent of 65-year-old women in France, Switzerland, and Japan would survive 15 years, only about 70 percent of American women could be expected to live that long.

In narrowing the blame to the American health care system, the researchers first eliminated several other factors. Obesity and smoking are the most important behavior-related causes of death, but obesity increased more slowly in the United States than in the other countries and smoking declined more rapidly, so neither can explain the differences in survival rates. Homicide and traffic fatality rates have remained steady over time, and social, economic and educational factors do not vary greatly among these countries.

But not all experts agree with this analysis. Samuel Preston, a demographer and a professor of sociology at the University of Pennsylvania, says the analysis is faulty.

"The basic message is correct - that measures of U.S. health, including mortality and morbidity, are very poor in comparison with other countries," he said. But the Columbia researchers "have no direct evidence about the health care system in this article," he continued. "Their conclusion is extremely speculative."

That they did not find smoking at fault, Dr. Preston said, "is mysterious to me, particularly since they show high lung cancer mortality for the U.S." Dr. Preston has published widely on mortality trends and the effects of smoking.

Dr. Muennig conceded that the study examined only life expectancy and health care spending in the 13 countries, and not the structure or economics of health care. "We did a pretty good job of showing that smoking isn't the culprit," he said.

"Smoking and obesity are still major risk factors for an individual's health," he said. "But they are sapping life expectancy in all countries. Whereas in the U.S. we have a highly inefficient health system that's taking away financial resources from other lifesaving programs."

This article has been revised to reflect the following correction: ***Correction: December 1, 2010***

An article on Tuesday about life expectancy in the United States misstated the name of the journal in which researchers reported that inefficiencies in the health care system were to blame for the country's poor ranking compared with other industrialized nations. It is Health Affairs, not Health Services. The article also misspelled the surname of one of the researchers. She is Sherry A. Glied, not Gleid.

http://www.physorg.com/news/2010-12-tricyclic-anti-depressants-linked-heart-disease.html

Tricyclic anti-depressants linked to increased risk of heart disease

Research that followed nearly 15,000 people in Scotland has shown that a class of older generation anti-depressant is linked to an increased risk of cardiovascular disease (CVD).

The study showed that tricyclic anti-depressants were associated with a 35% increased risk of CVD, but that there was no increased risk with the newer anti-depressants such as the selective serotonin reuptake inhibitors (SSRIs). The study is published online today (Wednesday 1 December) in the European Heart Journal and was led by researchers from University College London (UCL).

The prospective study, which followed 14,784 men and women without a known history of CVD, is the first to look at the risks associated with the use of anti-depressants in a large, representative sample of the general population. Until now, there have been uncertain and conflicting findings from earlier studies that have looked at the link between anti-depressant use and the risk of CVD.

Dr Mark Hamer, Senior Research Fellow in the Department of Epidemiology and Public Health at UCL (London, UK), said: "Our study is the first to contain a representative sample of the whole community, including elderly and unemployed participants, men and women, etc. Therefore, our results can be generalised better to the wider community. The majority of previous work in this area has focused on clinical cardiac patients, so studies in healthy participants are very important. Given that anti-depressants, such as SSRIs, are now prescribed not only for depression, but for a wide range of conditions such as back pain, headache, anxiety and sleeping problems, the risks associated with anti-depressants have increasing relevance to the general population."

Dr Hamer and his colleagues used data from the Scottish Health Survey, which collects information from the general population every three to five years. They combined data from separate surveys in 1995, 1998 and 2003 in adults aged over 35 and linked them with records on hospital admissions and deaths, with follow-up until 2007. Anyone with a history of clinically confirmed CVD was excluded.

During the surveys, interviewers visited eligible households and asked participants a range of questions on demographics and lifestyle, such as smoking, alcohol intake and physical activity, and measured their height and weight. They assessed psychological distress using a questionnaire (the General Health Questionnaire) that enquires about symptoms of anxiety and depression in the last four weeks. In a separate visit, nurses collected information on medical history, including psychiatric hospital admissions, and medication, and took blood pressure readings.

During an average of eight years follow-up there were 1,434 events related to CVD, of which 26.2% were fatal. Of the study participants, 2.2%, 2% and 0.7% reported taking tricyclic anti-depressants, SSRIs or other

antidepressants respectively. After adjusting for various confounding factors, including indicators of mental illness, the researchers found there was a 35% increased risk of CVD associated with tricyclic anti-depressants. The use of SSRIs was not associated with any increased risk of CVD, nor did the researchers find any significant associations between anti-depressant use and deaths from any cause.

Dr Hamer said: "Our findings suggest that there is an association between the use of tricyclic anti-depressants and an increased risk of CVD that is not explained by existing mental illness. This suggests that there may be some characteristic of tricyclics that is raising the risk. Tricyclics are known to have a number of side effects; they are linked to increased blood pressure, weight gain and diabetes and these are all risk factors for CVD."

He continued: "It is important that patients who are already taking anti-depressants should not cease taking their medication suddenly, but should consult their GPs [primary care physicians] if they are worried. There are two important points to be made. First, tricyclics are the older generation of anti-depressant medicines and we found no excess risk with the newer drugs (SSRIs). Secondly, people taking the anti-depressants are also more likely to smoke, be overweight, and do little or no physical activity – by giving up smoking, losing weight, and becoming more active a person can reduce their risk of CVD by two to three-fold, which largely out-weighs the risks of taking the medications in the first place. In addition, physical exercise and weight loss can improve symptoms of depression and anxiety.

"Our findings suggest that clinicians should be cautious about prescribing anti-depressants and should also consider lifestyle advice, such as smoking cessation, exercise and sensible alcohol intake."

More information: "Anti-depressant medication use and future risk of cardiovascular disease: the Scottish Health Survey". European Heart Journal. doi:10.1093/eurheartj/ehq438

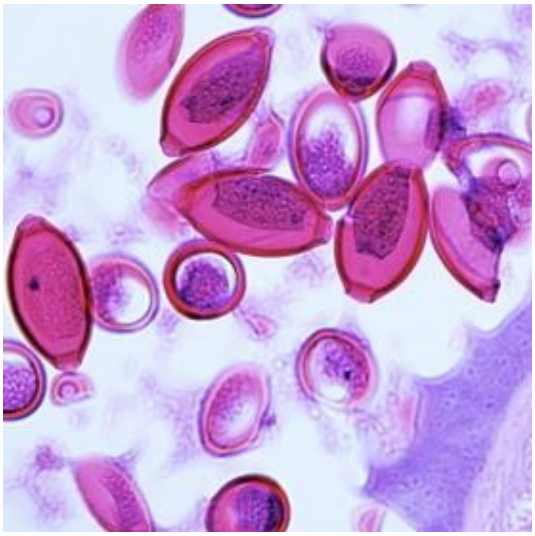
Provided by European Society of Cardiology

http://www.scientificamerican.com/article.cfm?id=helminthic-therapy-mucus

For the Good of the Gut: Can Parasitic Worms Treat Autoimmune Diseases?

Helminths could suppress immune disorders by promoting healthy mucus production in the intestine

By Ferris Jabr Wednesday, December 1, 2010 4



In 2007, parasite immunologist P'ng Loke sat down for lunch at a University of California, San Francisco, cafeteria with an inquisitive man who had called him earlier that week. Their chosen topic of conversation would deprive many people of an appetite, but the scientist and his guest shared an intellectual hunger for a stomach-churning subject: gut worms—specifically, tiny worm-like parasitic organisms called helminths that live nestled in the gastrointestinal tracts of their hosts.

Loke was fully prepared to answer the man's questions about the parasites he knew so well, but what he did not realize was that his companion had more than just questions—he had worms burrowed in his intestinal walls, worms he had deliberately swallowed. Together, Loke and the worm-wrangler embarked on a research project, the results of which appear today in the December 2010 issue of Science Translational Medicine.

PROPITIOUS PARASITE: Human whipworm (Trichuris trichiura) eggs from a patient who deliberately infected himself with parasitic worms to treat his ulcerative colitis, an inflammatory bowel disease. The worms may have sent his sent his disease into remission. Image: Kimberley Evason, UCSF

The 35-year-old man who had lunch with Loke was quite healthy in 2007. But only a few years earlier he was in the throes of an inflammatory bowel disease known as ulcerative colitis. An autoimmune disease, ulcerative colitis inflames the colon and leaves it rife with open sores; patients experience intense abdominal pain, vomiting, diarrhea, rectal bleeding and weight loss. While searching for treatments, the man discovered the work of Joel Weinstock, a gastroenterologist, parasitologist and immunologist at Tufts University who has pioneered research on helminthic therapy - treating autoimmune diseases by deliberately infesting patients with parasitic worms, such as whipworm and hookworm.

The results of Loke's new case study - the most recent of only five studies that investigate helminthic therapy in people instead of animals - suggest that helminths may ease the symptoms of autoimmune diseases by increasing mucus production.

"It's a unique study—there's nothing like it before," says Weinstock, who was not involved in the new research. "In this case they had a very unique patient—one who was self-infecting with helminths." Clinical trials on

helminthic therapy are particularly difficult to arrange because helminths are live pathogens and have not been officially approved as therapeutic agents by any governmental agency, although the U.S. Food and Drug Administration has granted pig whipworm (Trichuris suis) the status of Investigational New Drug. In contrast to human whipworm (Trichuris trichiura), the porcine variety cannot survive inside the human gut for very long.

"The researchers noticed a specific pattern of behavior, cycling between remission and active disease depending on when the patient infected himself with helminths," Weinstock adds. "This is not a double-blind study, but the pattern is highly suggestive that the worms helped this patient. The major point of this paper is the potential mechanism—mucus production—which has not been looked at properly before."

The Might of Mucus

In the new study, Loke—who is now with New York University—analyzed the man's medical records prior to 2007 and personally tracked the man's health from 2007 onwards. In 2004 the man swallowed a vial of salty liquid brimming with 500 human whipworm eggs, which he obtained from a parasitologist in Thailand. Three months later, he slurped down another 1,000 eggs. The larvae hatched and matured within his gastrointestinal tract, burying their heads in the intestinal wall. By mid-2005, he was virtually symptom free and required no medical treatment for his colitis, except occasional anti-inflammatory drugs to suppress flare-ups. The nearly complete dismissal of colitis symptoms is especially striking because human whipworm infection can itself cause digestive problems, including diarrhea, abdominal pain, nausea, vomiting and, in extreme cases, rectal prolapse. Severe infections can also cause anemia and stunt the growth of children.

In 2008, the number of whipworm eggs in the man's stool began to dwindle, dropping from more than 15,000 per gram to fewer than 7,000 per gram. As the eggs disappeared, the symptoms of colitis returned. So the man infected himself with another 2,000 whipworm eggs and, a few months later, his symptoms practically vanished once again. Repeated colonoscopies revealed that wherever worms colonized his colon, the symptoms of colitis were significantly reduced or nonexistent.

During the 2008 relapse, the researchers found that immune cells in tissues with active colitis produced large quantities of an inflammatory signaling molecule named interluekin-17 (IL-17), but very little IL-22, the latter of which has been linked to wound healing and mucus production. When worms recolonized the colon, however, immune cells began manufacturing much more IL-22. Blood profiling and genetic analysis further revealed that tissues in which helminths thrived increased carbohydrate metabolism—a prerequisite for mucus production.

"Ulcerative colitis is often associated with decreased mucus production and the worms seem to somehow restore mucus production, possibly by inducing a population of immune cells that make IL-22," Loke says. "It's possible the mucus serves as a defensive barrier between bacteria and the gut that prevents bacteria from causing inflammation and crossing over into other tissues." Autoimmune diseases generally occur when the immune system overreacts to benign—and even beneficial—organisms living within the body. In the case of colitis, researchers suspect the reaction is directed toward the bacteria in the gut. Loke thinks that the human body may boost mucus production when it detects helminths as a defense against the parasites; for a patient with ulcerative colitis, the extra mucus may also help calm an excessively aggressive immune system.

"We saw an association with remission and immune cells that make IL-22, but we don't know for sure if these immune cells are actually induced by worms," Loke says. "You can't tell with a sample size of one," which is especially susceptible to the placebo effect. Still, Loke adds, "the results seems quite compelling, especially when you consider the background—all the animal studies and clinical trials that show worms can suppress colitis and other autoimmune disorders."

Mounting Evidence

In fact, in numerous animal studies, helminth infestation has protected rodents against colitis, asthma, rheumatoid arthritis, food allergies and type 1 diabetes.

Researchers have conducted few human studies, but most have shown promise. In a clinical trial published in 2005 in the journal Gut, Weinstock asked 29 participants with Crohn's disease (another autoimmune inflammatory bowel condition) to ingest 2,500 pig whipworm eggs every three weeks for six months. Twenty-three patients (79.3 percent) improved significantly, and 21 (72.4 percent) experienced remission. Both the researchers and participants, however, knew exactly what treatment they were receiving, which makes excluding a placebo effect impossible.

In a controlled clinical trial published in 2005 in Gastroenterology, Weinstock and his colleagues gave 52 participants with colitis 2,500 pig whipworm eggs or a placebo every two weeks for three months. Thirteen of the 29 patients (44.8 percent) who received whipworm eggs improved, compared with only four of the 23 participants (17.4 percent) who received the placebo.

Weinstock and his collaborators point to these trials as experimental evidence that fits a global pattern: immune disorders are much rarer in less developed countries where helminthic infestation is widespread than in industrialized countries where much smaller populations host helminths. The "old friends hypothesis" proposes that the human immune system cannot learn to regulate itself without exposure to common pathogens like helminths that have coevolved with people and that modern hygienic practices deprive people of this necessary exposure, possibly explaining the relatively higher and more recent prevalence of immune diseases in industrialized countries like the U.S.

Loke plans to continue researching helminthic therapy in people and in monkeys. "We are talking about doing a small trial of, say, 10 people and basically doing colonoscopies on them before and after giving them pig whipworm," he says. Loke also mentions that colitis plagues many juvenile monkeys in primate research centers and that he has received a pilot grant to treat diseased monkeys with human whipworm, an as-yet-unpublished experiment that is already returning promising results.

"When I first sat down to lunch with the guy who called me and he started telling me his story, I was really quite skeptical," Loke recalls. "But now I am completely changing my mind about helminthic therapy."

http://news.nationalgeographic.com/news/2010/12/101201-sleep-memories-health-brain-science/

Sleep Cherry-picks Memories, Boosts Cleverness

Sleeping brain "calculates" what to remember and what to forget, study says.

Charles Choi for National Geographic News

The brain cherry-picks what people remember during sleep, resulting in sharper and clearer thinking, a new study suggests.

Previous research had shown that sleep helps people consolidate their memories, fixing them in the brain so we can retrieve them later.

But the new study, a review based on new studies as well as past research on sleep and memory, suggests that sleep also transforms memories in ways that make them somewhat less accurate but more useful in the long run.

For example, sleep-enabled memories may help people produce insights, draw inferences, and foster abstract thought during waking hours.

"The sleeping brain isn't stupid—it doesn't just consolidate everything you put into it, but calculates what to remember and what to forget," said study leader Jessica Payne, a cognitive neuroscientist at the University of Notre Dame in Indiana.

Emotional Memories Stick

For instance, the memory details that seem to get remembered best are often the most emotional ones, Payne said. Payne and colleagues found that when people are shown a scene with an emotion-laden object in the foreground—such as a wrecked car—they are more likely to remember that object than, say, palm trees in the background, especially if they are tested after a night of slumber.

Rather than preserving scenes in their entirety, the brain apparently restructures scenes to remember only their most emotional and perhaps most important elements while allowing less emotional details to deteriorate.

Measurements of brain activity support this notion, revealing that brain regions linked with emotion and memory consolidation are periodically more active during sleep then when awake.

"It makes sense to selectively remember emotional information—our ancestors would not want to forget a snake was in a particular location or that someone in the tribe was particularly mean and should be avoided," said Payne, whose study appeared in the October issue of the journal Current Directions in Psychological Science. "Memories are not so much about remembering the past as being able to anticipate and predict multiple possible futures."

Selective Memory's Dark Side

But there are dark sides to such selectivity. For instance, the brain can focus on remembering negative experiences at the exclusion of others, which occurs in depression and post-traumatic stress disorder.

Future research may shed light on what details are remembered and how they're remembered, which could help deal with trauma, Payne noted. "You could also see such work being helpful in coming up with solutions in the classroom or in the business world," she said. Future research may also reveal what components of sleep might be linked with these mental processes.

"Does it require the REM sleep associated with dreaming, or deeper slow-wave sleep?" said Robert Stickgold, a cognitive neuroscientist at Harvard Medical School who researches sleep.

Overall, "sleep is doing much more complicated stuff than just stabilizing or strengthening memories," Stickgold added. "We're seeing the sorts of memory processing in sleep that we usually attribute to cleverness."

http://www.physorg.com/news/2010-12-oncolytic-virus-cancer-cell-surival.html

Researchers show an oncolytic virus switches off cancer cell survival signal

Researchers from Boston University School of Medicine (BUSM) have identified a mechanism by which specific viruses acting as oncolytic agents can enter and kill cancer cells.

This finding, which is currently featured in an online edition of the Journal of Virology, could help lead to the development of more targeted treatments against many types of cancer.

The study was conducted by Ewan F. Dunn, a postdoctoral fellow, under the direction of John H. Connor, an assistant professor of microbiology at BUSM.

The virus, known as vesicular stomatitis virus (VSV), is being developed in the Connor lab and in other international research laboratories to kill cancer cells. VSV is not a significant human pathogen.

VSV is sensitive to the innate immune response, which causes lymphocytes to release interferon and protect the body from developing an infection. Cancer cells lose the ability to respond in that way, said Dunn. "When cancer cells transform, they become non-responsive, leaving them vulnerable to viruses attacking the cell and its function."

Previous research has shown that a major signaling pathway in cancer cells, called the AKT signaling pathway, is frequently turned on. AKT signaling is a cell survival signal, helping to keep the cancer cells alive. The team demonstrated was that VSV can switch off that signaling pathway, which suggests that a single viral protein could play a major role in cancer cell death.

"This study showed the important role of VSV in killing cancer cells through turning off a major survival signal," added Connor. "The identification of this mechanism is fundamental to understanding how VSV and other oncolytic viruses function." Provided by Boston University Medical Center

http://www.bbc.co.uk/news/science-environment-11878241

Coca leaves first chewed 8,000 years ago, says research

By Jason Palmer Science and technology reporter, BBC News

Peruvian foraging societies were already chewing coca leaves 8,000 years ago, archaeological evidence has shown.

Ruins beneath house floors in the northwestern Peru showed evidence of chewed coca and calcium-rich rocks.

Such rocks would have been burned to create lime, chewed with coca to release more of its active chemicals.

Writing in the journal Antiquity, an international team said the discovery pushed back the first known coca use by at least 3,000 years.

Coca leaves contain a range of chemical compounds known as alkaloids. In modern times, the most notable among them is cocaine, extracted and purified by complex chemical means. But the chewing of coca leaves for medicinal purposes has long been known to be a pastime at least as old as the Inca civilisation.

Other alkaloids within the leaves have mildly stimulating effects, can reduce hunger and aid digestion, and can mitigate the effects of high-altitude, low-oxygen environments.

Evidence of the chewing of the leaves has been found from around 3,000 years ago, but the addition of calcium-rich substances - which draw out far more of the alkaloids - was seen to be a much more recent development.

Now, Tom Dillehay of Vanderbilt University in the US and his colleagues have found evidence both of chewed leaves and calcium-rich rocks that were burned and scraped to supply ash for chewing. The evidence was found beneath the buried floors of the homes of foraging peoples from northwestern Peru, where the conditions were favourable to preserve what is normally a fleeting, organic remnant of a bygone civilisation.

The samples were dated to about 8,000 years, but Dr Dillehay told BBC News that a further surprise was the distribution of the finds. "We found it not so much in a household context, as if it was something that was heavily used by a lot of people, but rather... restricted to certain households of individuals and produced in a sort of public context - not individualised," he explained.

"The evidence we have suggests that unlike in Western societies - where if you've got the economic means you can have access to medicinal plants - that seems not to be the case back then."

More than providing an archaeological perspective on the ancient civilisation, however, the find provides evidence that feeds into a current debate.

International moves are being made to curb coca production in the Andes because of its association with cocaine, but Dr Dillehay argues there is far more to the plant. "Some have argued that (coca chewing) is a fairly recent historical tradition - meaning the last several centuries or a thousand years - but it's a deeply-rooted economic, social and even religious tradition in the Andes."

Peter Houghton of King's College London, editor of the Journal of Ethnopharmacology, told BBC News that the finds were "significant" in terms of pushing the date back for the first known coca chewing - in particular finding both leaves and calcium-bearing rocks in the same place.

That the consumption appears to have been restricted to few would not be surprising, he told BBC News.

"The evidence is that the widespread use amongst the people in that part of Peru and Bolivia is a comparatively recent thing; before then it was restricted to a privileged class."

http://www.eurekalert.org/pub_releases/2010-12/mh-uou112210.php

University of Utah and Harvard researchers take major step toward first biological test for autism

BELMONT, MA—*Researchers at Harvard-affiliated McLean Hospital and the University of Utah have developed the best biologically based test for autism to date.*

The test was able to detect the disorder in individuals with high-functioning autism with 94 percent accuracy. The study will be published online the week of November 29th in Autism Research.

The test, which uses MRI to measure deviations in brain circuitry, could someday replace the subjective test now used to identify those with the disorder. It could also lead to a better understanding of autism and to better management and treatments of affected individuals.

"This is not yet ready for prime time use in the clinic yet, but the findings are the most promising thus far," said lead author Nicholas Lange, ScD, Associate Professor of Psychiatry at Harvard Medical School and director of the Neurostatistics Laboratory at McLean. "Indeed, we have new ways to discover more about the biological basis of autism and how to improve the lives of individuals with the disorder," said senior author Janet Lainhart, MD, Principal Investigator of the research at the University of Utah.

The Harvard-McLean and University of Utah researchers used the test on two groups of subjects. One group consisted of individuals who had previously been diagnosed with high-functioning autism using the standard subjective scoring system. That system is based on assessing patients and questioning their parents about their functionality in a variety of areas including language, social functioning, and behavior. The second group studied was a control group consisting of normally developing individuals.

The subjects were put in an MRI scanner that was programmed to be sensitive to water diffusion along the axons of the brain to measure microscopic features of the brain's circuitry. The Lange-Lainhart test employs Diffusion Tensor Imaging.

"It provides pictures and measurements of the microscopic fiber structures of the brain that enable language, social and emotional functioning, which can reveal deviations that are not found in those without autism," Lange said.

By measuring six aspects of the brain's circuitry, the test was able to correctly distinguish those who had previously been diagnosed with autism with 94 percent accuracy.

A repeat study using two different sets of subjects showed the same high level of performance.

"The differences picked up on the study correlate with clinical symptoms that are part of the features of autism," Lainhart said. "There is less directional flow to and from brain regions where there should be more information exchange," said Lange.

The collaborative research group will further study and develop the test with more findings due out in a year or two. Future studies will look at patients with high-severity autism, younger children, and patients with brain disorders such as developmental language disorders, ADHD and OCD, who do not have autism.

If the test demonstrates further success, it could someday replace the current subjective system of diagnosing autism, which is not biologically based.

It could also someday lead to pinpointing how autism develops. "We can gain a better understanding of how this disorder arises and changes over the lifetime of an individual, and derive more effective treatments," said Lainhart.

Co-authors included: Molly DuBray, Alyson Froehlich, Brad Wright, P. Thomas Fletcher, all of the University of Utah, Erin Bigler of Brigham Young University, Nagesh Adluru, Alexander Alexander, and Jee Eun Lee of the University of Wisconsin, and Michael Froimowitz and Caitlin Ravichandran at Harvard and McLean.

http://www.eurekalert.org/pub_releases/2010-12/asu-ada112910.php

Astrobiologists: Deadly arsenic breathes life into organisms

Scientists 'follow the elements' in the hunt for 'weird life' on Earth

TEMPE, Ariz. – Evidence that the toxic element arsenic can replace the essential nutrient phosphorus in biomolecules of a naturally occurring bacterium expands the scope of the search for life beyond Earth, according to Arizona State University scientists who are part of a NASA-funded research team reporting findings in the Dec. 2 online Science Express.

It is well established that all known life requires phosphorus, usually in the form of inorganic phosphate. In recent years, however, astrobiologists, including Arizona State University professors Ariel Anbar and Paul Davies, have stepped up conversations about alternative forms of life. Anbar and Davies are coauthors of the new paper, along with ASU associate research scientist Gwyneth Gordon. The lead author is Felisa Wolfe-Simon, a former postdoctoral scientist in Anbar's research group at ASU's School of Earth and Space Exploration and Department of Chemistry and Biochemistry in the College of Liberal Arts and Sciences.

"Life as we know it requires particular chemical elements and excludes others," says Anbar, a biogeochemist and astrobiologist who directs the astrobiology program at ASU. "But are those the only options? How different could life be?" Anbar and Wolfe-Simon are among a group of researchers who are testing the limits of life's chemical requirements.

"One of the guiding principles in the search for life on other planets, and of our astrobiology program, is that we should 'follow the elements,'" says Anbar. "Felisa's study teaches us that we ought to think harder about which elements to follow."

Wolfe-Simon adds: "We took what we do know about the 'constants' in biology, specifically that life requires the six elements CHNOPS (carbon, hydrogen, nitrogen, oxygen, phosphorus and sulfur) in three components, namely DNA, proteins and fats, and used that as a basis to ask experimentally testable hypotheses even here on Earth."

From this viewpoint, rather than highlighting the conventional view of the "diversity" of life, all life on Earth is essentially identical, she says. However, the microbe the researchers have discovered can act differently.

Davies has previously speculated that forms of life different from our own, dubbed "weird life," might even exist side-by-side with known life on Earth, in a sort of "shadow biosphere." The particular idea that arsenic, which lies directly below phosphorous on the periodic table, might substitute for phosphorus in life on Earth, was proposed by Wolfe-Simon and developed into a collaboration with Davies and Anbar. Their hypothesis was published in January 2009, in a paper titled "Did nature also choose arsenic?" in the International Journal of Astrobiology.

"We not only hypothesized that biochemical systems analogous to those known today could utilize arsenate in the equivalent biological role as phosphate," notes Wolfe-Simon "but also that such organisms could have evolved on the ancient Earth and might persist in unusual environments today."

Wolfe-Simon, now a NASA astrobiology research fellow in residence at the U.S. Geological Survey, was one of the participants, along with Anbar, at a workshop titled "Tree or Forest? Searching for Alternative Forms of Life on Earth," that was organized in December 2006 by the BEYOND Center, a "cosmic think tank" at ASU.

"That's where it all began," says Davies, a cosmologist, astrobiologist, theoretical physicist and director of the BEYOND Center.

"Felisa's talk was memorable for being a concrete proposal," Davies says. "Many of the talks at the workshop discussed searching for radically alternative forms of life with suggestions of the form 'maybe something roughly like this,' or 'maybe a bit like that.' But Felisa said, quite explicitly, 'this is what we go look for.' And, she did."

"The idea was provocative, but it made good sense," notes Anbar. "Arsenic is toxic mainly because its chemical behavior is so similar to that of phosphorus. As a result, organisms have a hard time telling these elements apart. But arsenic is different enough that it doesn't work as well as phosphorus, so it gets in there and sort of gums up the works of our biochemical machinery."

After leaving ASU, Wolfe-Simon began a collaboration with Ronald Oremland of the U.S. Geological Survey to chase down the hypothesis. Oremland was a natural choice to bring into the project because he is a world expert in arsenic microbiology. What Wolfe-Simon discovered is presented in the Science Express paper titled "A bacterium that can grow by using arsenic instead of phosphorus."

The latest discovery is all about a bacterium – strain GFAJ-1 of the Halomonadaceae family of Gammaproteobacteria – scooped from sediments of eastern California's Mono Lake, which is extremely salty with naturally high levels of arsenic.

In the laboratory, the researchers successfully grew microbes from the lake on a diet that was very lean on phosphorus, but included generous helpings of arsenic.

Key issues that the researchers needed to address were the levels of arsenic and phosphorus in the experiments and whether arsenic actually became incorporated into the organisms' vital biochemical machinery, such as DNA, proteins and the cell membranes. A variety of sophisticated laboratory techniques was used to nail down where the arsenic went, including mass spectrometry measurements by Gordon at the W.M. Keck Foundation Laboratory for Environmental Biogeochemistry at ASU.

Commenting on the significance of the discovery, Davies says: "This organism has dual capability. It can grow with either phosphorous or arsenic. That makes it very peculiar, though it falls short of being some form of truly 'alien' life belonging to a different tree of life with a separate origin. However, GFAJ-1 may be a pointer to even weirder organisms. The holy grail would be a microbe that contained no phosphorus at all."

Davies predicts that the new organism "is surely the tip of a big iceberg, and so has the potential to open up a whole new domain of microbiology."

It is not only scientists, however, who will be interested in this discovery. "Our findings are a reminder that life-as-we-know-it could be much more flexible than we generally assume or can imagine," says Wolfe-Simon, noting that because microbes are major drivers of biogeochemical cycles and disease this study may open up a whole new chapter in biology textbooks.

"Yet, this story isn't about arsenic or Mono Lake," Wolfe-Simon says. "If something here on Earth can do something so unexpected, what else can life do that we haven't seen yet? Now is the time to find out."

Other authors of the new study published in Science Express include Jodi Switzer Blum, Thomas Kulp and Shelly Hoeft, USGS; Jennifer Pett-Ridge and Peter Weber, Lawrence Livermore National Laboratory; John Stolz, Duquesne University; and Samuel Webb, Stanford Synchrotron Radiation Lightsource.

This study was funded in part by NASA's Astrobiology Program. Wolfe-Simon, Anbar, Davies and Oremland are members of the NASA Astrobiology Institute "Follow the Elements" team at Arizona State University.

http://www.eurekalert.org/pub_releases/2010-12/sumc-dft120210.php

Doctors failing to prescribe low-dose menopausal hormone therapy, Stanford study finds

STANFORD, Calif. — *Doctors across the country are still prescribing higher-dose menopausal hormone therapy pills, despite clinical evidence that low doses and skin patches work just as well and carry fewer health risks.*

That's what researchers at the Stanford University School of Medicine found in a study that will be published online Dec. 2 in Menopause: The Journal of the North American Menopause Society.

Doctors have been treating the symptoms of menopause with hormone therapy for decades. During menopause, the ovaries decrease their estrogen production, and women experience symptoms to varying degrees; for some, symptoms are non-existent while for others they are debilitating. In the United States last year, formulations of estrogen and progestin hormones helped more than 6 million women who had symptoms such as hot flashes, sleep disturbance and irritability.

Still, there are risks. In 2002, a large, placebo-controlled clinical trial by the Women's Health Initiative - which tested the higher-dose, oral estrogen-plus-progestin therapy — was halted because of the increased incidence of breast cancer and cardiovascular disease in women taking the hormones. The results contradicted the clinical wisdom of the time: that hormone therapy could help protect against heart disease. Since that trial, there has been evidence indicating that a lower dose of hormones can treat menopausal symptoms just as effectively in many women with minimal side effects — and "may incur lower risks of breast cancer and cardiovascular disease," said Sandra Tsai, MD, MPH, clinical instructor of medicine and lead author of the new study.

The latest findings from Stanford researchers show that as of 2009, physicians' practices weren't keeping up with this clinical evidence about lower hormone doses, which the U.S. Food and Drug Administration recommends. "We're disappointed," said the paper's senior author Randall Stafford, MD, PhD, associate professor of medicine at the Stanford Prevention Research Center. "Yes, there was an increase in the use of low-dose preparations, but it was not sizeable."

To conduct the study, the researchers analyzed survey data collected from physicians between 2001 and 2009 by the IMS National Disease and Therapeutic Index (a commercial data source from IMS Health Inc.). The database reflects prescriptions that are issued as a result of outpatient visits to physician offices.

While the Stanford researchers found that the use of lower-dose therapy did increase between 2001 and 2009, it was not nearly enough to suggest that physicians were fully incorporating the new evidence into everyday practice. About two-thirds of women with menopausal symptoms are likely to respond to low-dose therapy, Stafford said, so he and his colleagues were surprised that not even one-third of the women taking hormone therapy in 2009 were on a low dose.

That's a marked contrast to the response to the 2002 trial findings. After those initial results were publicized, the number of women with prescriptions for the higher-dose menopausal hormone therapy declined sharply — it fell by 47 percent between 2001 and 2004, according to the Stanford study. "This is our best example of clinical trial findings dramatically changing practice," said Stafford. The new study also showed that the decline continued, albeit much more gradually, between 2004 and 2009.

In addition to the research on the effects of low-dose hormone therapy, recent studies have also established that delivering hormones through the skin with a small patch, called transdermal delivery, reduces risk of

serious health problems such as blood clots. Because of that, the Stanford team had expected more of the women on hormone therapy would be using transdermal hormones in 2009 than in 2001. But the data showed no meaningful change at all. "We thought that over time there might be greater tailoring of therapy based on characteristics of the individual woman," said Stafford. "The bottom line is that over time we didn't see the level of refinement in clinical practice that we expected."

Stafford and his colleagues had also expected that for women who needed treatment for menopausal symptoms, physicians would start prescribing hormone therapy during or just after menopause more often. The data, however, showed that in 2009, like in 2001, the preponderance of women on the drugs were older, and thus at greater risk for adverse effects.

The study reached no definite conclusions about why clinical practice has not caught up with research findings. Perhaps physicians made adjustments after the 2002 trial, and that "clinical inertia" led them to maintain their prescribing practices since that time, the study said. It's possible that older women who have been on hormone therapy for many years are satisfied with their results, don't want to risk recurring symptoms and don't realize that the risks of breast cancer and heart disease increase with age, Stafford suggested. Maybe doctors who are familiar with the immediate benefits of higher-dose hormone therapy in relieving menopausal symptoms are reluctant to change, said Tsai.

"It takes too long to disseminate research into practice," Tsai added. "It helps when findings are presented in the media and when physicians discuss findings with their patients." She suggested that cooperation between research institutions, drug companies and professional societies could help produce consistent clinical guidelines and find the best ways to disseminate the information to both physicians and patients. "There needs to be a lot of collaboration to make this work."

"It takes a huge event to change clinical practice," Stafford said. "We haven't had that big, well-controlled clinical trial hitting the front page of the newspapers, demonstrating that the risks of standard-dose estrogen and progestin therapies are potentially much higher than at lower doses."

The other co-author of this study is Marcia Stefanick, MD, PhD, professor of medicine at the Stanford Prevention Research Center. The study was funded by grants from the National Heart, Lung, and Blood Institute.

http://www.eurekalert.org/pub_releases/2010-12/uoc--dbu120210.php

Discovery by UC Riverside entomologists could shrink dengue-spreading mosquito population

Alexander Raikhel's lab identifies a microRNA molecule that controls blood feeding and egg development in Aedes aegypti females

RIVERSIDE, Calif. – Each year, dengue fever infects as many as 100 million people while yellow fever is responsible for about 30,000 deaths worldwide. Both diseases are spread by infected female Aedes aegypti mosquitoes, which require vertebrate blood to produce eggs. The blood feeding and the egg development are tightly linked to how the mosquito transmits the disease-causing virus.

Now a team of entomologists at the University of California, Riverside has identified a microRNA (a short ribonucleic acid molecule) in female Aedes aegypti mosquitoes that when deactivated disrupts the mosquito's blood digestion and egg development – a discovery that could help control the spread of not only dengue and yellow fever but potentially all vector-borne diseases.

MicroRNAs do not code for protein products but play powerful regulatory roles in development and cell growth; their mis-regulation leads to defects, including cancer. The researchers asked if microRNAs were involved in essential functions in female mosquitoes such as blood feeding and egg maturation. These functions are required not only for successful reproduction, but also serve as a foundation for the mosquito's ability to transmit pathogens of devastating human diseases.

In their experiments in the lab, the researchers were screening a number of microRNAs in female Aedes aegypti mosquitoes to study their behavior during blood feeding and reproduction, when they found one microRNA, "miR-275," was highly elevated during egg development.

Next, the researchers developed a method for specific deactivation of miR-275 in Aedes aegypti females and fed these mosquitoes with blood to analyze what effects occur when female mosquitoes no longer have this microRNA at their disposal.

They found that the blood these mosquitoes had fed on remained undigested in their guts. Further, the overall volume of the engorged blood was unusually large, suggesting that the mosquitoes' fluid excretory function had been impeded. The researchers also found that in these mosquitoes, egg development, whose success is dependent on blood digestion, was severely inhibited.

"Our finding is exciting because it gets to the very core of what a vector of diseases is all about," said Alexander Raikhel, a distinguished professor of entomology, whose lab led the study. "We can now knock

down a series of events – starting with the digestion of blood and proceeding all the way to egg maturation – simply by eliminating this small molecule, miR-275. In tropical areas of the world, where dengue and yellow fever are often leading causes of hospitalization and death among adults and children, a reduction in the number of Aedes aegypti mosquitoes would be tremendously beneficial."

Study results appear this week in the online edition of the Proceedings of the National Academy of Sciences.

Next in this line of work, Raikhel's lab plans to focus on determining which genes miR-275 targets, what roles these genes play in blood digestion and egg development, and what mechanism underlies the activation and deactivation of miR-275.

Bart Bryant, the first author of the research paper and a postdoctoral researcher in Raikhel's lab, explained that the research team knocked down or "depleted" the miR-275 with an "antagomir" – a small synthetic RNA molecule that in this research study binds with miR-275, preventing it from doing its job of allowing blood digestion and egg development to proceed.

"We think our work has opened the door for exploring how microRNAs regulate critical physiological functions specific to vectors that transmit deadly disease pathogens," Bryant said.

The study was supported by a 10-year grant to Raikhel from the National Institutes of Health. Raikhel, a member of the National Academy of Sciences, and Bryant were joined in the study by Warren MacDonald, a graduate student in Raikhel's lab.

http://www.eurekalert.org/pub_releases/2010-12/bumc-pod120210.php

Pattern of drinking affects the relation of alcohol intake to coronary heart disease

A fascinating study published in the BMJ shows that although the French drink more than the Northern Irish each week, as they drink daily, rather than more on less occasions, the French suffered from considerably less coronary heart disease than the Northern Irish.

Ruidavets and colleagues compared groups of middle aged men in France and Northern Ireland, who have very different drinking cultures and rates of heart disease. The authors found that men who "binge" drink (drink =50 g of alcohol once a week) had nearly twice the risk of myocardial infarction or death from coronary disease compared with regular drinkers over 10 years of follow-up. Similarly abstainers were at higher risk. 9,778 men aged 50-59, free of ischaemic heart disease at baseline, were recruited between 1991 and 1994. A total of 2,405 men from Belfast and 7,373 men from the French centres were included in the analyses.

The investigators related weekly alcohol consumption, incidence of binge drinking (alcohol >50 g on at least one day a week), incidence of regular drinking (at least one day a week, and alcohol < 50 g if on only one occasion), volume of alcohol intake, frequency of consumption, and types of beverage consumed to risk of coronary heart disease (CHD) events over a 10 year follow-up period. Overall, 60.5% of subjects from N. Ireland and 90.6% of French reported drinking alcohol at least once a week. Among drinkers, 12% of men in Belfast drank alcohol every day compared with 75% of men in France. Mean alcohol consumption was 22.1 g/day in Belfast and 32.8 g/day in France. Binge drinkers comprised 9.4% and 0.5% of the Belfast and France samples, respectively.

Results showed that, after multivariate adjustment, the hazard ratio for hard CHD events compared with regular drinkers was 1.97 (95% CI 1.21 - 3.22) for binge drinkers, 2.03 (95% CI 1.41 - 2.94) for never drinkers, and 1.57 (95% CI 1.11 - 2.21) for former drinkers. The hazard ratio for hard CHD events in Belfast compared with in France was 1.76 (95% CI 1.37 to 2.67) before adjustment, and 1.09 (95% CI 0.79 to 1.50) after adjustment for alcohol patterns and wine drinking, indicating that most of the differences between the rates in the two countries were related to these two factors. Irrespective of country, only wine drinking was associated with a lower risk of hard coronary events.

The authors conclude that regular and moderate alcohol intake throughout the week, the typical pattern in middle-aged men in France, is associated with a low risk of ischemic heart disease, whereas the binge drinking pattern more prevalent in Belfast confers a higher risk.

Comments: While a strong inverse association between moderate alcohol consumption and cardiovascular disease has been demonstrated for decades, more recent research has emphasized the importance of the pattern of drinking (regular moderate versus episodic or binge drinking). Further, there continues to be debate about the potential greater effect of wine versus other beverages containing alcohol. This study shows that regular moderate drinking (especially of wine) is associated with lower risk of MI, but episodic or binge drinking increases the risk. Lifetime abstinence has a similar adverse relation to CHD as does episodic or binge drinking.

Reference: http://www.bmj.com/content/341/bmj.c6077 Ruidavets J-B, Ducimetièere P, Evans A, Montaye M, Haas B, Bingham A, Yarnell J, Amouyel P, Arveiler D, Kee F, Bongard V, Ferrières J.
Patterns of alcohol consumption and ischaemic heart disease in culturally divergent countries: the Prospective Epidemiological Study of Myocardial Infarction (PRIME). BMJ 2010;341:c6077 doi:10.1136/bmj.c6077.

http://news.sciencemag.org/sciencenow/2010/11/earth-oceans-were-homegrown.html

Earth Oceans Were Homegrown

by Bruce Dorminey

Early seas. A new study may explain how Earth got its oceans.

Where did Earth's oceans come from? Astronomers have long contended that icy comets and asteroids delivered the water for them during an epoch of heavy bombardment that ended about 3.9 billion years ago. But a new study suggests that Earth supplied its own water, leaching it from the rocks that formed the planet. The finding may help explain why life on Earth appeared so early, and it may indicate that other rocky worlds are also awash in vast seas.

Our planet has always harbored water. The rubble that coalesced to form Earth contained trace amounts—tens to hundreds of parts per million—of the stuff. But scientists didn't believe that was enough to create today's oceans, and thus they looked to alien origins for our water supply. Geologist Linda Elkins-Tanton of the Massachusetts Institute of Technology in Cambridge didn't think researchers needed to look that far.

To make her case, she conducted a chemical and physical analysis of Earth's library of meteorites—a useful analogue for the building blocks of our planet. She then plugged the data into a computer simulation of early Earth-like planets. Her models show that a large percentage of the water in the molten rock would quickly form a steam atmosphere before cooling and condensing into an ocean. The process would take tens of millions of years, meaning that oceans were sloshing around on Earth by as early as 4.4 billion years ago. Even the scant amount of water in the mantle, which is much drier than the sand in the Sahara, should produce oceans hundreds of meters deep, Elkins-Tanton reports in an upcoming paper in Astrophysics and Space Science.

Astrobiologists have been continually surprised by how quickly life evolved on Earth—within 600 million years after the planet's formation, or about 3.9 billion years ago. Elkins-Tanton's findings may help explain why. "If water oceans were present shortly after the impact that formed the moon [some 4.45 billion years ago]," says Dirk Schulze-Makuch, an astrobiologist at Washington State University, Pullman, "much more time would be available for the evolution of life, and it would explain why life was already relatively complex when we find the first traces of it in the rock record."

Pin Chen, a planetary scientist at NASA's Jet Propulsion Laboratory in Pasadena, California, says Elkins-Tanton presents a compelling scientific story that oceans form very early in the history of a terrestrial-type planet. Chen notes that the work also supports the suggestion that early Mars had a wetter climate than it does today and thus might have supported life. So, too, might a number of Earth-like planets that astronomers are just beginning to discover, says Schulze-Makuch.

Even so, Max Bernstein, an astrochemist at NASA Headquarters in Washington, D.C., notes that Elkins-Tanton's models don't include the possibility that the huge asteroid and comet impacts prevalent during the formation of our solar system boiled off the water. "Just because there was an ocean early on," he says, "doesn't mean that it stuck around long enough for life." Elkins-Tanton counters that even a huge impact would not cause Earth-like planets to lose more than half of their oceans.

http://www.physorg.com/news/2010-12-vitamins-key-nutrient-algal-blooms.html

Vitamins identified as key nutrient which may promote harmful algal blooms in coastal waters

(PhysOrg.com) -- ***Harmful algal blooms, which negatively affect coastal ecosystems, public health, economies and fisheries around the world, may be promoted by vitamins B-1 and B-12***

according to Stony Brook University scientists, whose findings were published in an early online edition (Nov. 10) and in the current issue of Proceedings of the National Academy of Sciences (PNAS) in an article entitled "Most harmful algal bloom species are vitamin B-1 and B-12 auxotrophs."

Professor Christopher J. Gobler, Ph.D., research scientist Ying Zhong Tang, and Ph.D. candidate Florian Koch of the School of Marine and Atmospheric Sciences at Stony Brook conducted experiments to evaluate whether the species of phytoplankton which form harmful algal blooms (HAB's) require B-vitamins to grow. Harmful algal blooms are caused by phytoplankton and have a negative impact on coastal ecosystems and fisheries world-wide and cost the U.S. economy alone hundreds of millions of dollars annually. The impacts of harmful algal blooms have intensified in recent decades and most research has focused on chemical nutrients such as nitrogen and phosphorus as causative agents of these blooms. Vitamins have not been considered as prime suspects since prior investigations suggested that only small portion of phytoplankton species require B-vitamins for growth.

"Harmful algal blooms are not a new phenomenon, although many people may know them by other names such as red tides or brown tides," Dr. Gobler said. "These events can harm humans by causing poisoning from

shellfish contaminated with algal toxins and can damage marine ecosystems by killing fish and other marine life. The distribution, frequency and intensity of these events have increased across the globe and scientists have been struggling to determine why this is happening."

Every coastal state in the United States experiences harmful algal blooms, according to Dr. Gobler.

While previous studies have examined the role of nutrients in harmful algal blooms, "the importance of coenzymes and particularly vitamins (vitamins B-1, B-7 and B-12) in regulating and stimulating harmful algal blooms has rarely been considered," the researchers wrote.

"New methods have recently been developed to measure concentrations of vitamins B1 and B12 in the ocean and we discovered that vitamin levels were co-varying with the occurrence of HAB's," Dr. Gobler said.

The researchers examined more than 40 harmful algal bloom species in the laboratory and reported that all but one of the species tested (96%) required vitamin B-12 and that 20 of 27 species (74%) required vitamin B-1. In addition, the concentrations of vitamins B-1 and B-12 needed by the toxic algae were higher than those previously reported for other phytoplankton. The concentrations measured as needed for growth in the lab correspond closely to vitamin concentrations reported in coastal waters, suggesting that HAB demands for vitamins may exhaust the available supply of vitamins in hours to days. These findings demonstrate the potentially significant ecological role of B-vitamins in regulating the dynamics of HAB's, the authors wrote.

The larger than expected vitamin requirements of harmful algal blooms partly stems from the fact that most of these events are caused by a class of algae called dinoflagellates. Dinoflagellates often consume large organic molecules such as amino acids and proteins that are similar to vitamins. The authors wrote "vitamins are among a suite of organic compounds dinoflagellates exploit for growth. Since dinoflagellates are notorious for the ability to form HAB's, this study suggests vitamins are key organic compounds that may influence the occurrence of HAB's of dinoflagellates."

Harmful algal blooms have had a devastating impact many fisheries and ecosystems and there is great interest in curtailing these events. However, discovering the most important source of vitamins to HAB's may prove challenging. Dr. Gobler said. "There are a lot of efforts right now to protect coastal ecosystems against HAB's. Many efforts have been made to curb nitrogen loads since this nutrient has been considered the primary chemical promoting these events. This study demonstrates that vitamins must also be considered in order to understand the dynamics of HAB's." While the sources of nitrogen to coastal waters are well known, Dr. Gobler notes that, "we now need to identify the major sources vitamins promoting harmful algal blooms."

More information: Most harmful algal bloom species are vitamin B1 and B12 auxotrophs, DOI:10.1073/pnas.1009566107
Provided by Stony Brook University

http://www.eurekalert.org/pub_releases/2010-12/uoc-agh120210.php

Anesthetic gases heats climate as much as 1 million cars

New study by atmosphere chemists reveals that gasses for anaesthesia cause global warming

When doctors want their patients asleep during surgery they gently turn the gas tap. But Anaesthetic gasses have a global warming potential as high as a refrigerant that is on its way to being banned in the EU. Yet there is no obligation to report anaesthetic gasses along with other greenhouse gasses such as CO2, refrigerants and laughing gas.

One kilo of anaesthetic gas affects the climate as much as 1620 kilos of CO2. That has been shown by a recent study carried out by chemists from University of Copenhagen and NASA in collaboration with anaesthesiologists from the University of Michigan Medical School. The amount of gas needed for a single surgical procedure is not high, but each year surgery related anaesthetics affects the climate as much as would one million cars, states a new report in respected medical journal "British Journal of Anaesthesia".

Analyses of the anaesthetics were carried out by Ole John Nielsen, a Professor of atmospheric chemistry at the University of Copenhagen. And he's got an important message for doctors. "We studied three different gasses in regular use for anaesthesia, and they're not equally harmful," explains Professor Nielsen

All three are worse than CO2 but where the mildest ones have global warming potentials of 210 and 510 respectively, the most harmful will cause 1620 times as much global warming as an equal amount of CO2, explains the professor. "This ought to make anaesthesiologists sit up and take notice. If all three compounds have equal therapeutic worth, there is every reason to choose the one with the lowest global warming potential", says professor Ole John Nielsen.

The three anaesthetic gasses isoflurane, desflurane and sevoflurane were studied at the Ford atmospheric laboratories near Detroit, Michigan. Mads Andersen of NASA's Jet Propulsion Laboratories collaborated on the analyses with Ole John Nielsen who is his former PhD supervisor. He relates how he got the idea for the study while his wife was giving birth.

"The anaesthesiologist told me, that the gas used is what we chemist know as a halogenated compound. That's the same family of compound as the Freon that was famously eating the ozone layer back in the eighties" says research scientist Mads Andersen.

But the gasses are also related to HFC-134a which is slated to be banned across Europe from January 2011. With a global warming potential some 1.300 times that of CO2, HFC-134a is in the exact same range as the worst of the knock-out gasses. Not that the amounts of anaesthetic used warrant a ban as far as Professor Ole John Nielsen is concerned. But that doesn't mean we should be unconcerned.

"The surprising properties of anaesthetic gasses are an important reminder to anyone using any kind of gasses. They really ought to examine the atmospheric fate of them, before releasing them into nature", says Professor Nielsen.

http://www.bbc.co.uk/news/health-11909680

Child leukaemia drug boosts survival rates

ALL cells Acute lymphoblastic leukaemia

Scientists are hailing a chemotherapy drug found to significantly increase the survival chances of child leukaemia patients whose cancer has returned. A Cancer Research UK study found giving mitoxantrone to children whose acute lymphoblastic leukaemia returned led to a 69% survival rate after three years.

The standard treatment offers a 45% survival rate, The Lancet study says.

The research was so successful that doctors now give all children with the condition mitoxantrone.

'Striking results'

There have been significant improvements in survival rates for children with cancer in the last 40 years.

More than three quarters of children now survive the disease, compared to a quarter in the 1960s.

Cancer Research UK says around 380 children are diagnosed with acute lymphoblastic leukaemia (ALL) in the UK each year. Of those, around 40 relapse.

Over the last 30 years, the number of children who have survived an initial episode of ALL has risen from 50 to 80%. However, doctors have not seen similar improvements for children whose cancer returns, with the survival rate remaining unchanged at around 50%. It remains the leading cause of cancer death in children.

In this study, 216 UK children with a relapse of ALL were studied. Mitoxantrone was given to 105, while the rest were given idarubicin, the standard chemotherapy treatment. After three years, 69% of those taking mitoxantrone had survived, compared with 45% of those given idarubicin.

Children on mitoxantrone also experienced fewer side effects.

Professor Vaskar Saha, a child cancer specialist at the Paterson Institute in Manchester, who worked on the study, said: "These striking results show just what a powerful drug mitoxantrone is in treating children whose leukaemia has returned, offering hope to many families across the country."

The study began in 2003, but by 2008 the scientists felt the results were so promising that mitoxantrone - a cheap and readily available drug - is now recommended for children worldwide with relapsed ALL.

The study was stopped, and the children taking idarubicin were switched to mitoxantrone.

Professor Saha added: "As a result of this trial, mitoxantrone is now the standard treatment for relapsed ALL, and is having a significant impact on the number of children who beat the disease worldwide. "This is the first time that a trial in ALL has been stopped so early after one drug had such clear benefits for patients."

Kate Law, director of clinical research at Cancer Research UK, said: "These exciting results highlight the impact that research is continuing to have to help more children beat the disease."

Writing in the Lancet, Professor Martin Schrappe of the University Medical Centre Schleswig-Holstein said the 20% difference seen between the two groups was "one of the largest improvements ever achieved by a single modification of treatment".