http://www.eurekalert.org/pub_releases/2011-09/aga-ela091211.php

Even low-dose aspirin may increase risk of GI bleeding

The risk of gastrointestinal (GI) bleeding needs to be considered when determining the potential preventive benefits associated with low-dose aspirin for cardiovascular disease and cancer.

According to a new study in Clinical Gastroenterology and Hepatology, the use of low-dose aspirin increases the risk for GI bleeding, with the risk being increased further with accompanying use of cardiovascular disease-preventing therapies, such as clopidogrel and anticoagulants. In patients who took proton pump inhibitors (PPIs), bleeding risk decreased. Clinical Gastroenterology and Hepatology is the official journal of the American Gastroenterological Association.

"The use of aspirin has been proven beneficial in reducing cardiac events and deaths in patients who have cardiovascular disease, and has even been shown to reduce cancer risk," said Angel Lanas, MD, PhD, of University Hospital Lozano Blesa and lead author of this study. "However, clinicians need to be more proactive in their efforts to reduce potential risk factors associated with all doses of aspirin, especially gastrointestinal bleeding. New low-dose aspirin studies should report more precisely on the incidence of bleedings, especially gastrointestinal bleedings, to better determine the balance between risks and benefits ."

Low-dose aspirin - commonly defined as 75 to 325 mg daily - is a mainstay of therapy for cardiovascular disease. In fact, patients with prior cardiovascular disease have fewer cardiovascular events and deaths with the use of low-dose aspirin compared with patients who do not use it. It is now likely to also be used for cancer prevention, especially GI and colon cancer.

A major factor limiting the widespread use of aspirin is concern about the development of GI adverse events, especially GI bleeding. However, damage may vary depending on the dose taken, other medication being consumed along with aspirin and patients' risk profiles. For example, certain patients have an increased likelihood of experiencing bleeding: those with long-term pharmacotherapy use, patients using combinations of low-dose aspirin with clopidogrel and anticoagulants, and patients with previous GI ulcers or bleedings.

In this study, doctors searched 10 electronic databases and collected data on adverse events in studies that evaluated low doses of aspirin alone or in combination with anticoagulants, clopidogrel or PPIs. They found that low doses of aspirin alone decreased the risk of death. However, the risk of major GI bleeding increased with low doses of aspirin alone compared with placebo. The risk also increased when aspirin was combined with clopidogrel (compared with aspirin alone), anticoagulants versus low doses of aspirin alone, or in studies that included patients with a history of GI bleeding or of longer duration. Importantly, PPI use reduced the risk for major GI bleeding in patients given low doses of aspirin.

http://www.scientificamerican.com/article.cfm?id=peace-of-mind-near-death

Peace of Mind: Near-Death Experiences Now Found to Have Scientific Explanations

Seeing your life pass before you and the light at the end of the tunnel, can be explained by new research on abnormal functioning of dopamine and oxygen flow

By Charles Q. Choi | Monday, September 12, 2011 | 75

Near-death experiences are often thought of as mystical phenomena, but research is now revealing scientific explanations for virtually all of their common features. The details of what happens in near-death experiences are now known widely - a sense of being dead, a feeling that one's "soul" has left the body, a voyage toward a bright light, and a departure to another reality where love and bliss are all-encompassing.

Approximately 3 percent of the U.S. population says they have had a near-death experience, according to a Gallup poll. Near-death experiences are reported across cultures, with written records of them dating back to ancient Greece. Not all of these experiences actually coincide with brushes with death - one study of 58 patients who recounted near-death experiences found 30 were not actually in danger of dying, although most of them thought they were.

Recently, a host of studies has revealed potential underpinnings for all the elements of such experiences. "Many of the phenomena associated with near-death experiences can be biologically explained," says neuroscientist Dean Mobbs, at the University of Cambridge's Medical Research Council Cognition and Brain Sciences Unit. Mobbs and Caroline Watt at the University of Edinburgh detailed this research online August 17 in Trends in Cognitive Sciences.

For instance, the feeling of being dead is not limited to near-death experiences - patients with Cotard or "walking corpse" syndrome hold the delusional belief that they are deceased. This disorder has occurred following trauma, such as during advanced stages of typhoid and multiple sclerosis, and has been linked with brain regions such as the parietal cortex and the prefrontal cortex - "the parietal cortex is typically involved in attentional processes, and the prefrontal cortex is involved in delusions observed in psychiatric conditions such

as schizophrenia," Mobbs explains. Although the mechanism behind the syndrome remains unknown, one possible explanation is that patients are trying to make sense of the strange experiences they are having.

Out-of-body experiences are also now known to be common during interrupted sleep patterns that immediately precede sleeping or waking. For instance, sleep paralysis, or the experience of feeling paralyzed while still aware of the outside world, is reported in up to 40 percent of all people and is linked with vivid dreamlike hallucinations that can result in the sensation of floating above one's body. A 2005 study found that out-of-body experiences can be artificially triggered by stimulating the right temporoparietal junction in the brain, suggesting that confusion regarding sensory information can radically alter how one experiences one's body.

A variety of explanations might also account for reports by those dying of meeting the deceased. Parkinson's disease patients, for example, have reported visions of ghosts, even monsters. The explanation? Parkinson's involves abnormal functioning of dopamine, a neurotransmitter that can evoke hallucinations. And when it comes to the common experience of reliving moments from one's life, one culprit might be the locus coeruleus, a midbrain region that releases noradrenaline, a stress hormone one would expect to be released in high levels during trauma. The locus coeruleus is highly connected with brain regions that mediate emotion and memory, such as the amygdala and hypothalamus.

In addition, research now shows that a number of medicinal and recreational drugs can mirror the euphoria often felt in near-death experiences, such as the anesthetic ketamine, which can also trigger out-of-body experiences and hallucinations. Ketamine affects the brain's opioid system, which can naturally become active even without drugs when animals are under attack, suggesting trauma might set off this aspect of near-death experiences, Mobbs explains.

Finally, one of the most famous aspects of near-death hallucinations is moving through a tunnel toward a bright light. Although the specific causes of this part of near-death experiences remain unclear, tunnel vision can occur when blood and oxygen flow is depleted to the eye, as can happen with the extreme fear and oxygen loss that are both common to dying.

Altogether, scientific evidence suggests that all features of the near-death experience have some basis in normal brain function gone awry. Moreover, the very knowledge of the lore regarding near-death episodes might play a crucial role in experiencing them - a self-fulfilling prophecy. Such findings "provide scientific evidence for something that has always been in the realm of paranormality," Mobbs says. "I personally believe that understanding the process of dying can help us come to terms with this inevitable part of life."

One potential obstacle to further research on near-death experiences will be analyzing them experimentally, says cognitive neuroscientist Olaf Blanke at the Swiss Federal Institute of Technology in Lausanne in Switzerland, who has investigated out-of-body experiences. Still, "our work has shown that this can be done for out-of-body experiences, so why not for near-death-experience-associated sensations?"

http://www.eurekalert.org/pub_releases/2011-09/uoc - tdc091211.php

Tinnitus discovery could lead to new ways to stop the ringing

Retraining the brain could reanimate areas that have lost input from the ear

Berkeley - Neuroscientists at the University of California, Berkeley, are offering hope to the 10 percent of the population who suffer from tinnitus – a constant, often high-pitched ringing or buzzing in the ears that can be annoying and even maddening, and has no cure. Their new findings, published online last week in the journal Proceedings of the National Academy of Sciences, suggest several new approaches to treatment, including retraining the brain, and new avenues for developing drugs to suppress the ringing.

"This work is the most clearheaded documentation to this point of what's actually happening in the brain's cortex in ways that account for the ongoing genesis of sound," said Michael Merzenich, professor emeritus of otolaryngology at UC San Francisco and inventor of the cochlear implant, who was not involved with the research. "As soon as I read the paper, I said, 'Of course!' It was immediately obvious that this is almost certainly the true way to think about it."

Merzenich is also chief scientific officer at Posit Science, which develops software to retrain the brain, primarily to improve learning and memory but more recently to address problems like schizophrenia, Alzheimer's Disease and tinnitus. "Two million Americans are debilitated by tinnitus; they can't work, they can't sleep. Its life destroying and a substantial cause of suicide," he said. "These experiments have led us to rethink how we attack the tinnitus by our training strategies."

Loud noises kill hair cells

According to coauthor Shaowen Bao, adjunct assistant professor in the Helen Wills Neuroscience Institute at UC Berkeley, tinnitus – pronounced TIN-it-tus or tin-NIGHT-us – is most commonly caused by hearing loss. Sustained loud noises, as from machinery or music, as well as some drugs can damage the hair cells in the inner

ear that detect sounds. Because each hair cell is tuned to a different frequency, damaged or lost cells leave a gap in hearing, typically a specific frequency and anything higher in pitch.

Experiments in the past few years have shown that the ringing doesn't originate in the inner ear, though, but rather in regions of the brain – including the auditory cortex – that receives input from the ear.

Bao's experiments in rats with induced hearing loss explain why the neurons in the auditory cortex generate these phantom perceptions. They showed that neurons that have lost sensory input from the ear become more excitable and fire spontaneously, primarily because these nerves have "homeostatic" mechanisms to keep their overall firing rate constant no matter what. "With the loss of hearing, you have phantom sounds," said Bao, who himself has tinnitus. In this respect, tinnitus resembles phantom limb pain experienced by many amputees.

One treatment strategy, then, is to retrain patients so that these brain cells get new input, which should reduce spontaneous firing. This can be done by enhancing the response to frequencies near the lost frequencies. Experiments over the past 30 years, including important research by Merzenich, have shown that the brain is plastic enough to reorganize in this way when it loses sensory input. When a finger is amputated, for example, the region of the brain receiving input from that finger may start handling input from neighboring fingers.

Bao noted that retraining the ear has been tried before, but with limited success. Most such attempts have taken patients with some residual hearing and trained their ears to be more sensitive to the affected frequencies. This wouldn't work for patients with profound hearing loss, however.

Most retraining is also based on the assumption that reorganization of the brain – that is, changing how frequencies "map" to regions of the auditory cortex – is a cause of the tinnitus. This is the opposite of Bao's conclusion. "We argue that reorganizing the cortical map should be the goal, so that the nerves get some input and stop their tinnitus activity," he said. "You don't want to leave these cells without sensory input."

"We changed our (brain training) strategy from one where we completely avoided the tinnitus domain to one where we directly engage it and try to redifferentiate or reactivate it, and we seem to be seeing improvement," Merzenich said.

Drugs can boost inhibitors

Another treatment strategy, Bao said, is to find or develop drugs that inhibit the spontaneous firing of the idle neurons in the auditory cortex. Hearing loss causes changes at junctions between nerve cells, the so-called synapses, that both excite and inhibit firing. His experiments showed that tinnitus is correlated with lower levels of the inhibitory neurotransmitter GABA (gamma-aminobutyric acid), but not with changes in the excitatory neurotransmitters.

He demonstrated that two drugs that increase the level of GABA eliminated tinnitus in rats. Unfortunately, these drugs have serious side effects and cannot be used in humans. He has applied for several grants to start screening drugs for their ability to enhance GABA receptor function, increase the synthesis of GABA, slow the re-uptake of GABA around nerve cells, or slow its enzymatic degradation.

"Our findings will guide the kind of research to find drugs that enhance inhibition on auditory cortical neurons," Bao said. "There are a lot of things we can do to change GABA functions, some of which could potentially alleviate tinnitus with fewer side effects."

Bao's colleagues include post-doctoral fellow Sungchil Yang, who developed a new technique to measure tinnitus behaviors in rats with hearing loss, and research associates Banjamin D. Weiner and Li S. Zhang of the Wills Neuroscience Institute, and post-doc Sung-Jin Cho of UC Berkeley's Department of Molecular and Cell Biology.

The research was supported by the American Tinnitus Association and the National Institutes of Health's National Institute on Deafness and other Communicative Disorders.

http://www.eurekalert.org/pub_releases/2011-09/uoc - pci091211.php

Primary component in turmeric kicks off cancer-killing mechanisms in human saliva

Study could have an impact in fighting head and neck cancers

Curcumin, the main component in the spice turmeric, suppresses a cell signaling pathway that drives the growth of head and neck cancer, according to a pilot study using human saliva by researchers at UCLA's Jonsson Comprehensive Cancer Center.

The inhibition of the cell signaling pathway also correlated with reduced expression of a number of pro-inflammatory cytokines, or signaling molecules, in the saliva that promote cancer growth, said Dr. Marilene Wang, a professor of head and neck surgery, senior author of the study and a Jonsson Cancer Center researcher.

"This study shows that curcumin can work in the mouths of patients with head and neck malignancies and reduce activities that promote cancer growth," Wang said. "And it not only affected the cancer by inhibiting a critical cell signaling pathway, it also affected the saliva itself by reducing pro-inflammatory cytokines within the saliva." The study appears Sept. 15 in Clinical Cancer Research, a peer-reviewed journal of the American Association of Cancer Research.

Turmeric is a naturally occurring spice widely used in South Asian and Middle Eastern cooking and has long been known to have medicinal properties, attributed to its anti-inflammatory effects. Previous studies have shown it can suppress the growth of certain cancers. In India, women for years have been using turmeric as an anti-aging agent rubbed into their skin, to treat cramps during menstruation and as a poultice on the skin to promote wound healing.

A 2005 study by Wang and her team first showed that curcumin suppressed the growth of head and neck cancer, first in cells and then in mouse models. In the animal studies, the curcumin was applied directly onto the tumors in paste form. In a 2010 study, also done in cells and in mouse models, the research team found that the curcumin suppressed head and neck cancer growth by regulating cell cycling, said scientist Eri Srivatsan, an adjunct professor of surgery, article author and a Jonsson Cancer Center researcher who, along with Wang, has been studying curcumin and its anti-cancer properties for seven years.

The curcumin binds to and prevents an enzyme known as IKK, an inhibitor of kappa β kinase, from activating a transcription factor called nuclear factor kappa β (NFκβ), which promotes cancer growth.

In this study, 21 patients with head and neck cancers gave samples of their saliva before and after chewing two curcumin tablets totaling 1,000 milligrams. One hour later, another sample of saliva was taken and proteins were extracted and IKKβ kinase activity measured. Thirteen subjects with tooth decay and five healthy subjects were used as controls, Wang said. Eating the curcumin, Wang said, put it in contact not just with the cancer but also with the saliva, and the study found it reduced the level of cancer enhancing cytokines.

An independent lab in Maryland was sent blind samples and confirmed the results - the pro-inflammatory cytokines in the saliva that help feed the cancer were reduced in the patients that had chewed the curcumin and the cell signaling pathway driving cancer growth was inhibited, Wang said.

"The curcumin had a significant inhibitory effect, blocking two different drivers of head and neck cancer growth," Wang said. "We believe curcumin could be combined with other treatments such as chemotherapy and radiation to treat head and neck cancer. It also could perhaps be given to patients at high risk for developing head and neck cancers – smokers, those who chew tobacco and people with the HPV virus – as well as to patients with previous oral cancers to fight recurrence."

The curcumin was well tolerated by the patients and resulted in no toxic effects. The biggest problem was their mouths and teeth turned bright yellow. "Curcumin inhibited IKKβ kinase activity in the saliva of head and neck cancer patients and this inhibition correlated with reduced expression of a number of cytokines," the study states. "IKKβ kinase could be a useful biomarker for detecting the effects of curcumin in head and neck cancer."

To be effective in fighting cancer, the curcumin must be used in supplement form. Although turmeric is used in cooking, the amount of curcumin needed to produce a clinical response is much larger. Expecting a positive effect through eating foods spiced with turmeric is not realistic, Wang said.

The next step for Wang and her team is to treat patients with curcumin for longer periods of time to see if the inhibitory effects can be increased. They plan to treat cancer patients scheduled for surgery for a few weeks prior to their procedure. They'll take a biopsy before the curcumin is started and then at the time of surgery and analyze the tissue to look for differences.

"There's potential here for the development of curcumin as an adjuvant treatment for cancer," Wang said. "It's not toxic, well tolerated, cheap and easily obtained in any health food store. While this is a promising pilot study, it's important to expand our work to more patients to confirm our findings."

Finding ways to better treat head and neck cancers is vital as patients often require disfiguring surgery, often losing parts of their tongue or mouth. They also experience many side effects, including difficulty swallowing, dry mouth and have the potential for developing another oral cancer later.

The study was funded by Veterans Affairs Greater Los Angeles Health System, West Los Angeles Surgical Education Research Center, UCLA Academic Senate, the National Institutes of Health and the Veterans Administration.

http://www.eurekalert.org/pub_releases/2011-09/e-fne091211.php

50 new exoplanets discovered by HARPS

Richest haul of planets so far includes 16 new super-Earths

The HARPS spectrograph on the 3.6-metre telescope at ESO's La Silla Observatory in Chile is the world's most successful planet finder [1]. The HARPS team, led by Michel Mayor (University of Geneva, Switzerland), today announced the discovery of more than 50 new exoplanets orbiting nearby stars, including sixteen super-Earths [2]. This is the largest number of such planets ever announced at one time [3]. The new findings are being presented at a conference on Extreme Solar Systems where 350 exoplanet experts are meeting in Wyoming, USA.

"The harvest of discoveries from HARPS has exceeded all expectations and includes an exceptionally rich population of super-Earths and Neptune-type planets hosted by stars very similar to our Sun. And even better - the new results show that the pace of discovery is accelerating," says Mayor.

In the eight years since it started surveying stars like the Sun using the radial velocity technique HARPS has been used to discover more than 150 new planets. About two thirds of all the known exoplanets with masses less than that of Neptune [4] were discovered by HARPS. These exceptional results are the fruit of several hundred nights of HARPS observations [5].

Working with HARPS observations of 376 Sun-like stars, astronomers have now also much improved the estimate of how likely it is that a star like the Sun is host to low-mass planets (as opposed to gaseous giants). They find that about 40% of such stars have at least one planet less massive than Saturn. The majority of exoplanets of Neptune mass or less appear to be in systems with multiple planets.

With upgrades to both hardware and software systems in progress, HARPS is being pushed to the next level of stability and sensitivity to search for rocky planets that could support life. Ten nearby stars similar to the Sun were selected for a new survey. These stars had already been observed by HARPS and are known to be suitable for extremely precise radial velocity measurements. After two years of work, the team of astronomers has discovered five new planets with masses less than five times that of Earth. These planets will be among the best targets for future space telescopes to look for signs of life in the planet's atmosphere by looking for chemical signatures such as evidence of oxygen," explains Francesco Pepe (Geneva Observatory, Switzerland), the lead author of one of the recent papers.

One of the recently announced newly discovered planets, HD 85512 b, is estimated to be only 3.6 times the mass of the Earth [6] and is located at the edge of the habitable zone - a narrow zone around a star in which water may be present in liquid form if conditions are right [7].

"This is the lowest-mass confirmed planet discovered by the radial velocity method that potentially lies in the habitable zone of its star, and the second low-mass planet discovered by HARPS inside the habitable zone," adds Lisa Kaltenegger (Max Planck Institute for Astronomy, Heidelberg, Germany and Harvard Smithsonian Center for Astrophysics, Boston, USA), who is an expert on the habitability of exoplanets.

The increasing precision of the new HARPS survey now allows the detection of planets under two Earth masses. HARPS is now so sensitive that it can detect radial velocity amplitudes of significantly less than 4 km/hour [8] - less than walking speed.

"The detection of HD 85512 b is far from the limit of HARPS and demonstrates the possibility of discovering other super-Earths in the habitable zones around stars similar to the Sun," adds Mayor.

These results make astronomers confident that they are close to discovering other small rocky habitable planets around stars similar to our Sun. New instruments are planned to further this search. These include a copy of HARPS to be installed on the Telescopio Nazionale Galileo in the Canary Islands, to survey stars in the northern sky, as well as a new and more powerful planet-finder, called ESPRESSO, to be installed on ESO's Very Large Telescope in 2016 [9]. Looking further into the future also the CODEX instrument on the European Extremely Large Telescope (E-ELT) will push this technique to a higher level.

"In the coming ten to twenty years we should have the first list of potentially habitable planets in the Sun's neighbourhood. Making such a list is essential before future experiments can search for possible spectroscopic signatures of life in the exoplanet atmospheres," concludes Michel Mayor, who discovered the first-ever exoplanet around a normal star in 1995.

Notes

[1] HARPS measures the radial velocity of a star with extraordinary precision. A planet in orbit around a star causes the star to regularly move towards and away from a distant observer on Earth. Due to the Doppler effect, this radial velocity change induces a shift of the star's spectrum towards longer wavelengths as it moves away (called a redshift) and a blueshift (towards shorter wavelengths) as it approaches. This tiny shift of the star's spectrum can be measured with a high-precision spectrograph such as HARPS and used to infer the presence of a planet.

[2] Planets with a mass between one and ten times that of the Earth are called super-Earths. There are no such planets in our Solar System, but they appear to be very common around other stars. Discoveries of such planets in the habitable zones around their stars are very exciting because - if the planet were rocky and had water, like Earth - they could potentially be an abode of life.

[3] Currently the number of exoplanets stands at close to 600. In addition to exoplanets found using radial velocity techniques, more than 1200 exoplanet candidates have been found by NASA's Kepler mission using an alternative method - searching for the slight drop in the brightness of a star as a planet passes in front of it (transits) and blocks some of the light. The majority of planets discovered by this transit method are very distant from us. But, in contrast, the planets found by HARPS are around stars close to the Sun. This makes them better targets for many kinds of additional follow-up observations.

[4] Neptune has about seventeen times the mass of Earth.

[5] This huge observing programme is led by Stephane Udry (Geneva Observatory, Switzerland).

[6] Using the radial velocity method, astronomers can only estimate a minimum mass for a planet as the mass estimate also depends on the tilt of the orbital plane relative to the line of sight, which is unknown. From a statistical point of view, this minimum mass is however often close to the real mass of the planet.
[7] So far, HARPS has found two super-Earths that may lie within the habitable zone. The first one, Gliese 581 d, was discovered in 2007 (eso0722). HARPS was also recently used to demonstrate that the other candidate super-Earth in the habitable zone around the star Gliese 581 (Gliese 581 g) does not exist.
[8] With large numbers of measurements, the detection sensitivity of HARPS is close to 100% for super-Earths of ten Earth-masses with orbital periods of up to one year, and even when considering planets of three Earth masses with a one-year orbit, the probability of detection remains close to 20%.
[9] ESPRESSO, the Echelle SPectrograph for Rocky Exoplanet and Stable Spectroscopic Observations, is to be installed on the ESO Very Large Telescope. Currently undergoing preliminary design, it is scheduled to start operating in 2016. ESPRESSO will feature radial velocity precision of 0.35 km/h or less. For comparison, Earth induces a 0.32 km/h radial velocity on the Sun. This resolution should thus enable ESPRESSO to discover Earth-mass planets in the habitable zone of low-mass stars.

http://www.eurekalert.org/pub_releases/2011-09/ada-spq091211.php

Sugar-free polyol gum, lozenges, hard candy; Nonfluoride varnishes help prevent cavities

Recommended in conjunction with fluoride for patients at high-risk for developing cavities

CHICAGO, Sept. 12, 2011 – A multi-disciplinary expert panel, convened by the American Dental Association (ADA) Council on Scientific Affairs, issued a report this month containing clinical recommendations that sugar-free chewing gum, lozenges and hard candy including xylitol or polyol combinations, and a prescription varnish with chlorhexidine and thymol could be beneficial in preventing cavities when used as adjuncts to a comprehensive cavity prevention program which includes the use of fluoride-containing products.

The panel noted in its report that these nonfluoride options could provide an extra benefit to prevent cavities in patients at high risk for developing cavities when used in addition to products such as toothpaste, dental sealants and varnishes that contain fluoride as well as community water fluoridation and good eating habits.

The full report is available on the ADA's Center for Evidence-Based Dentistry (EBD) website (http://ebd.ada.org/contentdocs/clinical_recommendations_non_fluoride_caries_preventive_agents_full_report.pdf) . The executive summary of the report entitled, "Nonfluoride Caries Preventive Agents," is published in the September issue of The Journal for the American Dental Association and is available on the EBD website. The clinical recommendations from the expert panel were reviewed and approved by the ADA's Council on Scientific Affairs.

The ADA recommends that clinicians determine a patient's risk for developing cavities by conducting a caries risk assessment, which includes completing a caries risk assessment form that can be used as a communications tool with their patients. The Caries Form (Patients Ages 0 Years and the Caries Form (Patients Over 6 Years are available on ADA.org.

Nonfluoride agents

In addition to a comprehensive cavity-prevention program which includes the use of fluoride, the scientific panel recommended that clinicians consider applying a mixture of cholrhexidine-thymol varnish to the teeth of high-risk adults and the elderly every three months to reduce cavities developing in the root of the tooth.

The panel encouraged clinicians to consider advising parents and caregivers of healthy children older than 5 years who are at higher risk for cavities to chew sugar-free polyol gum after meals for 10 to 20 minutes to prevent cavities.

A polyol is a low-calorie sweetener such as xylitol, sorbitol or mannitol, which is not broken down by the bacteria in the mouth and therefore does not contribute to tooth decay. The panel also recommended that sucking xylitol-containing sugar-free lozenges or hard candy after meals may reduce cavities in children.

The panel's recommendations are based on a review of evidence from 71 published articles that described 50 randomized controlled trials and 15 nonrandomized studies to assess the effectiveness of various nonfluoride agents in preventing cavities.

ADA expert panels, Evidence-Based Dentistry

The clinical recommendations, developed by expert multidisciplinary panels convened by the ADA Council on Scientific Affairs, assessed available scientific evidence and developed practice-oriented recommendations through a comprehensive evidence-based process.

Evidence-based clinical recommendations are intended to provide dentists and other health professionals with a review of the latest scientific evidence on particular topics and are not considered a standard of care. Rather, health care professionals can consider clinical recommendations, patient preference and their own clinical judgment when diagnosing and treating patients.

Evidence-based clinical recommendations are a product of the Center for Evidence-Based Dentistry (EBD). The ADA created the Center for EBD to connect the latest research findings with the daily practice of dentistry. The EBD website (http://jada.ada.org/content/142/9/1065.full.pdf) provides on-demand access to systematic reviews, summaries and clinical

recommendations (http://jada.ada.org/content/142/9/1065.full.pdf) that translate the latest scholarly findings into a user-friendly format that dentists can use with their patients.
The ADA Center for Evidence-Based Dentistry has a two-fold vision: to disseminate the most current scientific evidence and to help dentists implement the current best evidence in practice. The Center has several ongoing programs to help dentists implement EBD, including the EBD Champion Program and the ADA Evidence Reviewer Workshop. For more information, visit http://ebd.ada.org/.

http://www.eurekalert.org/pub_releases/2011-09/jaaj-afb090911.php

Association found between long-term use of nonaspirin anti-inflammatory drugs and renal cell cancer

Long-term use of nonaspirin anti-inflammatory drugs (NSAIDs) is associated with an increased risk of renal cell cancer (RCC), according to a report in the September issue of Archives of Internal Medicine, one of the JAMA/Archives journals.

CHICAGO – According to background information in the article, in the United States, kidney cancer is the seventh leading type of cancer among men and the ninth leading type of cancer among women. The most common type of kidney cancer, renal cell cancer, accounts for 85 percent of all cases. Analgesics (pain-relieving medications) are among the most commonly used groups of drugs in the United States, and some appear to have protective effects against cancer. "However," the authors write, "some epidemiologic data, mainly from case-control studies, suggest an association between analgesic use and an increased risk of RCC."

Eunyoung Cho, Sc.D., from Harvard Medical School and Brigham and Women's Hospital, Boston, and colleagues examined the relationship between analgesic use and RCC risk. They used data from the Nurses' Health Study and the Health Professionals Follow-up Study, both prospective cohort studies. Beginning in 1990 in the Nurses' Health Study and 1986 in the Health Professionals Follow-up Study, and every two years thereafter, use of aspirin, other NSAIDs and acetaminophen was determined. Follow-up was 16 years and 20 years, respectively. The researchers evaluated the baseline and duration of use of analgesics. They also assessed other risk factors for RCC, such as body weight, smoking, recreational physical activity and history of hypertension.

Among the 77,525 women and 49,403 men included in the study, the researchers documented 333 RCC cases. No association was found between aspirin and acetaminophen use and RCC risk. An association was found between regular use of nonaspirin NSAIDs and an increased risk of RCC, with a 51 percent increase in the relative risk. The researchers noticed a dose-response relationship between duration of nonaspirin NSAID use and RCC risk; there was a 19 percent decrease in relative risk for use less than four years, a 36 percent increase in relative risk for use of analgesics for four years to less than 10 years and nearly three times the relative risk for use for 10 or more years.

"In these large prospective studies of women and men, we found that use of nonaspirin NSAIDs was associated with an elevated risk of RCC, especially among those who took them for a long duration," write the authors, who add that aspirin and acetaminophen were not associated with RCC risk. "Risks and benefits should be considered in deciding whether to use analgesics; if our findings are confirmed, an increased risk of RCC should also be considered."

(Arch Intern Med. 2011;171[16]:1487-1493. Available pre-embargo to the media at www.jamamedia.org.)
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http://www.eurekalert.org/pub_releases/2011-09/umcu-for090911.php

Fish oil reduces effectiveness of chemotherapy

Dutch researchers warn against combining chemotherapy and fish oil

Researchers at University Medical Center Utrecht, the Netherlands, have discovered a substance that has an adverse effect on nearly all types of chemotherapy - making cancer cells insensitive to the treatment. Chemotherapy often loses effectiveness over time. It is often unclear how or why this happens.

It now appears that chemotherapy is made ineffective by two types of fatty acid that are made by stem cells in the blood. Under the influence of cisplatin chemotherapy, the stem cells secrete these fatty acids that induce resistance to a broad spectrum of chemotherapies. These substances are referred to by researchers as 'PIFAs' which stands for platinum-induced fatty acids. Cisplatin is a type of chemotherapy that is widely used for the treatment of cancer, including cancer of the lungs and ovaries.

Tumors under the skin

The researchers studied the effect of PIFA's in mice and human cells. The mice studied had tumors under the skin. Under normal conditions, the tumors would decrease in size following the administration of chemotherapy.

In the study, after administering the fatty acids to the mice, the tumors were found to be insensitive to chemotherapy. The fatty acids were isolated from the medium in which chemotherapy exposed stem cells were grown. But also stem cells in the blood of patients produce the fatty acids that desensitize tumors to chemotherapy.

The fatty acids are also found in commercially-produced fish oil supplements containing omega-3 and omega-6 fatty acids as well as in some algae extracts. In the experiments conducted in mice, the tumors became insensitive to chemotherapy after administration of normal amounts of fish oil. Natural products that include fish oil are frequently used by cancer patients in addition to their regular treatment.

"Don't use these products"

Professor Emile Voest, a medical oncologist at UMC Utrecht, supervised the research. "Where resistance to chemotherapy is concerned, we usually believe that changes in the cancer cells themselves have occurred. Now we show that the body itself secretes protective substances into the blood that are powerful enough to block the effect of chemotherapy. These substances can be found in some types of fish oil. Whilst waiting for the results of further research, we currently recommend that these products should not be used whilst people are undergoing chemotherapy."

Researchers at the University Medical Center Utrecht, the Netherlands, describe these findings, that will appear online on September 12, in the journal Cancer Cell.

http://www.scientificamerican.com/article.cfm?id=fatherhood-lowers-testosterone-keeps-dads-at-home

Fatherhood Lowers Testosterone, Keeps Dads at Home

A new study finds that levels of testosterone, the "macho" sex hormone, drop in new fathers

By Jennifer Welsh , LiveScience and LiveScience

Men may not go on a hormonal rollercoaster with their pregnant partners, but once the baby shows up, their bodies biologically transition into "daddy mode," suggests a new study finding that levels of testosterone, the "macho" sex hormone, drop in new fathers.

"Men are, to a certain degree, hardwired to take care of their kids," study researcher Lee Gettler, of Northwestern University in Chicago, Illinois, told LiveScience. "This is important because traditional models of human evolution have portrayed women as the gatherers that take care of the kids and stay behind."

The hormone drop makes sense, the researchers say, since high testosterone tends to boost behaviors linked to competing for a mate, risky activities that may conflict with the responsibilities of fatherhood. [History's 12 Most Doting Dads] In fact, the biggest testosterone drops were observed in fathers of newborns and those highly invested in child care.

The finding that fathers are hardwired to care for children adds to previous cultural models of human evolution, which traditionally depict the mother as being hardwired for hands-on child care.

Studying fathers

The study followed 465 men participating in the Cebu Longitudinal Health and Nutrition Survey, started in the Philippines in 1983, when the participants were 1 year old. At age 21.5 (in 2005), the researchers tested the single male participants' testosterone levels when they woke and when they went to sleep. The measurements were repeated at age 26 (in 2009), when about half of the participants had become fathers.

Men who stayed single showed a small age-related decline of about 12 to 15 percent in the male sex hormone, while the testosterone levels of new fathers - those with a baby between 1 month and 1 year - on average dropped about 30 percent. Hormone levels in fathers of newborns (1 month and younger) dropped four to five times lower than levels in single men levels and twice as much as fathers of older children.

"Newborn babies come with really intense physical, emotional and psychological changes," Gettler said. "We kind of see men's biology responding to that, in line with what we would expect in men trying to transition into this new role of being a father to a newborn."

Testosterone effects

As to the effect of the lowered testosterone, the researchers can't be sure. There could be effects on libido and muscle mass, though they are probably mild, since the participants' levels are still within the normal range.

"The reason sex life changes is a lot more complicated than that a father's testosterone levels go down," Gettler said. "The reality is there's not a terribly strong relationship between testosterone levels and libido."

Lower testosterone could influence the amount of time a man spends with his family, essentially by tempering his urge to go out and reproduce. Higher testosterone has been associated with increased risk-taking and competition with other males. This could be why testosterone levels are even lower with increased child care investment. "When fathers make this choice, this active decision to be involved, testosterone reacts to that by going down even further," Gettler said. "Their bodies respond by saying, 'This is where we are focused now, we are focused on the kids.'"

The finding may also explain why having a partner and becoming a father are good for a man's health and longevity. This could be somewhat mediated by the changes in testosterone levels. Some researchers believe testosterone lowers immune function: Higher testosterone levels may interfere with the immune system's ability to fight off infection. If this is true, lowering testosterone could be an investment in men's health.

The researchers plan on following up with these men at around age 30. The study was published today (Sept. 12) in the journal Proceedings of the National Academies of Sciences.

http://www.eurekalert.org/pub_releases/2011-09/c-rua091211.php

Researchers uncover a potential new benefit of pure maple syrup on liver health

New research conducted at the University of Tokyo suggests that pure maple syrup may promote a healthy liver.

NEW YORK – September 13, 2011 – The pilot study, conducted by Dr. Keiko Abe of the University of Tokyo's Graduate School of Agricultural and Life Sciences, showed that healthy laboratory rats fed a diet in which some of the carbohydrate was replaced with pure maple syrup from Canada yielded significantly better results in liver function tests than the control groups fed a diet with a syrup mix containing a similar sugar content as maple syrup. The results will be published in the November, 2011 issue of Bioscience, Biotechnology, and Biochemistry.

Although most healthy individuals take liver function for granted, liver health is of great importance because of the hundreds of vital functions it performs that are essential to human life, which include storing energy (glycogen) and regulating blood glucose, the production of certain amino acids (building blocks of protein), filtering harmful substances from the blood. Liver disease not related to alcohol consumption is estimated to affect 25% of people in the United States, according to the American Liver Foundation. It shows up most often in middle aged people who are overweight, have abnormal blood lipids and diabetes or insulin resistance conditions when grouped together, are known as metabolic syndrome.

"It is important to understand the factors leading to impaired liver function – our lifestyle choices including poor diet, stress and lack of exercise, as well as exposure to environmental pollutants that produce tissue-damaging free radicals," says Dr. Melissa Palmer, clinical professor and medical director of hepatology at New York University Plainview. "The preliminary results of this research are encouraging and emphasize the importance of choosing a healthy diet to help counteract the lifestyle and environmental factors that may impact liver function, even our choice of a sweetener. In addition to Dr. Abe's recent findings, published research suggests that pure maple syrup may prove to be a better choice of sweetener because it was found to be rich in polyphenolic antioxidants and contains vitamins and minerals," notes Palmer.

Click here to view a brief video detailing the liver health findings with Dr. Keiko Abe and Dr. Melissa Palmer.

The animals were evaluated using the latest analytical methods including gene expression profiling called nutrigenomics. In the study, rats were fed diets consisting of 20% pure maple syrup, or 20% syrup mixture with similar sugar content as maple syrup. After 11 days, the rats on the maple syrup diet showed significantly decreased levels of liver enzymes AST, ALT and LDH in the blood, standard biomarkers for evaluating liver function. The gene expression profiling observations also suggest a mechanism whereby the maple syrup diet caused genes involved in the production of harmful ammonia in the liver to down-regulate, that is, to be less active.

"This research contributes to our growing understanding of the incredible health potential of maple syrup," remarked Serge Beaulieu, President of the Federation of Quebec Maple Syrup Producers. "We learned previously that maple syrup contains antioxidant compounds that may actually help regulate glucose metabolism and increase insulin release, possibly aiding in the management of type 2 diabetes. And now Dr. Abe is exploring the relationship between maple syrup consumption and liver health. Her current findings give us even more reason to enjoy our maple syrup."

This study was funded by the Conseil pour le développement de l'agriculture du Québec (CDAQ) and Agriculture and Agri-Food Canada (AAFC) on behalf of the Canadian Maple Syrup Industry and the Federation of Quebec Maple Syrup Producers.

http://www.eurekalert.org/pub_releases/2011-09/uoic-met091211.php

More evidence that spicing up broccoli boosts its cancer-fighting power

Teaming fresh broccoli with a spicy food that contains the enzyme myrosinase significantly enhances each food's individual cancer-fighting power and ensures that absorption takes place in the upper part of the digestive system where you'll get the maximum health benefit, suggests a new University of Illinois study.

URBANA – "To get this effect, spice up your broccoli with broccoli sprouts, mustard, horseradish, or wasabi. The spicier, the better; that means it's being effective," said Elizabeth Jeffery, a U of I professor of nutrition.

In the study, when fresh broccoli sprouts were eaten with broccoli powder, the scientists were able to measure bioactive compounds in the blood 30 minutes later. When these peaked at three hours, they were much higher when the foods were eaten together than when either was eaten alone. Urine samples corroborated the blood results, said Jenna Cramer, lead author of the study.

It's no secret that many people cook the benefits right out of broccoli instead of steaming it lightly for two to four minutes to protect its healthful properties, she said. "However, this study shows that even if broccoli is overcooked, you can still boost its benefits by pairing it with another food that contains myrosinase," she said.

Myrosinase is the enzyme necessary to form sulforaphane, the vegetable's cancer-preventive component, co-author Margarita Teran-Garcia explained. Note what happened with the fresh broccoli sprouts and broccoli powder eaten in this experiment. The powder doesn't contain myrosinase, but it does contain the precursor to the anti-cancer agent sulforaphane. Eaten together, the sprouts were able to lend their myrosinase to the powder. As predicted, both foods produced sulforaphane and provided greater anti-cancer benefit, Jeffery said.

Other foods that will boost broccoli's benefits if they are paired together include radishes, cabbage, arugula, watercress, and Brussels sprouts.

"Here's another benefit of protecting and enhancing the myrosinase in your foods," Jeffery said. "If myrosinase is present, sulforaphane is released in the ilium, the first part of your digestive system. Absorption happens well and quickly there, which is why we saw bioactivity in 30 minutes."

An earlier Jeffery study showed that microbiota are capable of releasing sulforaphane in the lower gut, but absorption happens more slowly in the colon than in the upper intestine, she said.

Scientists say that as little as three to five servings of broccoli a week provide a cancer-protective benefit.

"But it pays to spice it up for added benefits and find ways to make it appealing so you don't mind eating it if you're not a broccoli fan. I add fresh broccoli sprouts to sandwiches and add them as one of my pizza toppings after the pie is out of the oven," Cramer said.

The study is available pre-publication online in the British Journal of Nutrition at http://journals.cambridge.org/jeffery.

http://www.physorg.com/news/2011-09-salmonella-similar-mechanism-infect-humans.html

Salmonella uses similar mechanism to infect plants and humans

In recent years, it has become clear that food poisoning due to Salmonella typhimurium can be contracted not only by uncooked eggs and meat but also through eating contaminated raw vegetables and fruit.

So far, it was unclear how these bacteria can infect humans and plants alike. A team associating researchers from INRA, CNRS and the Universities of Evry (France), Giessen (Germany) and Vienna (Austria), has shown that Salmonella suppress the defense systems of plants and humans by a similar mechanism. Moreover, the teams showed that plants contaminated with Salmonella are highly infectious to human cells and mice. The results were published in PLoS ONE on September 6, 2011.

Salmonellosis is one of the most common types of food poisoning induced by bacteria from the genus Salmonella. Every year 100 million people are infected throughout the world by what is the primary cause for gastro-enteritis and typhoid fever. Until recently, it was thought that humans become infected by eating contaminated products of animal origin only (meat, eggs, milk). However, there has been a significant increase in the past 10 years of people infected by Salmonella having ingested raw vegetables. Research showed that contaminated vegetables and fruits equally have to be considered as vectors to transmit Salmonella to humans and that the bacteria are thus found throughout the food chain.

Recent evidence indicates that Salmonella attack plants in a highly sophisticated manner. They not only attach to plant cell surfaces but also sense and migrate towards pores of leaves for getting access to the interior of plants. For successful infection of human cells, a complex cocktail of virulence proteins is injected by Salmonella by a needle-like apparatus. The virulence proteins switch off the human defense system and allow the bacteria to enter and replicate inside human cells. Researchers at INRA in Evry and Tours as well as of the Universities of Giessen and Vienna now show that Salmonella also suppress the plant defense system by using the same mechanism. The group of scientists also showed that contaminated plants are highly infectious to human cells and mice, thereby raising new concerns about food safety and disease control.

Humans and plants are not powerless to an attack by Salmonella. Plants and animals have developed sensors to perceive a Salmonella attack and activate their respective immune systems. It is often a question of speed and quantity of the host defense responses that determines whether of an attack by Salmonella will lead to disease of the host or defeat of the bacteria. Interestingly, some plant varieties were found to be highly resistant to Salmonella infection whereas other varieties were easy prey for the bacteria.

Today, along with Escherichia coli, Salmonella belong to the best-studied bacteria. To understand the mechanisms by which these bacteria infect plants and how plants protect themselves may offer new insight into infection mechanisms and should contribute to diminish the number of vegetable- and fruit-related infections.
More information: *Schikora A, et al. (2011) Conservation of Salmonella infection mechanisms in plants and animals. PLoS ONE, September 6, 2011 Provided by CNRS*

http://www.eurekalert.org/pub_releases/2011-09/haoq-pcr091311.php

Plant compound reduces breast cancer mortality

Phytoestrogens are plant compounds which, in the human body, can attach to the receptors for the female sexual hormone estrogen and which are taken in with our daily diet.

A number of findings have attributed a cancer protective effect to these plant ho
ones. At DKFZ, a team headed by Prof. Dr. Jenny Chang-Claude summarized the results of several studies in a meta-analysis last year and showed that a diet rich in phytoestrogens lowers the risk of developing breast cancer after menopause. Now the Heidelberg researchers wanted to find out whether phytoestrogens also have an influence on the course of breast cancer. Prior investigations on this topic had provided contradictory results.

The most important type of phytoestrogens in our Western diet are lignans, which are contained in seeds, particularly flaxseeds, as well as in wheat and vegetables. In the bowel, these substances are turned into enterolactone, which is absorbed by the mucous tissue and which was determined by the Heidelberg researchers as a biomarker in the patients' blood.

From 2002 to 2005, the DKFZ researchers used the MARIE study to take blood samples of 1,140 women who had been diagnosed with postmenopausal breast cancer. After a mean observation time of six years, they related enterolactone levels to clinical disease progression.

The result: Compared to the study subjects with the lowest enterolactone levels, the women with the highest blood levels of this biomarker had an approximately 40 percent lower mortality risk. When the scientists additionally took account of the incidence of metastasis and secondary tumors, they obtained a similar result: Women with the highest enterolactone levels also had a lower risk for such an unfavorable disease progression.

"We now have first clear evidence showing that lignans lower not only the risk of developing postmenopausal breast cancer, but also the mortality risk," says Jenny Chang-Claude. There had been prior studies to determine the lignan intake by means of dietary surveys. But the results of such surveys are often unreliable and, in addition, there are big differences in the way individuals actually process the plant substances into effective metabolic products. Therefore, the Heidelberg team chose the more reliable measurement of biomarkers.

However, Chang-Claude narrowed down the result: "The result was significant only for the group of tumors that have no receptor for the estrogen hormone (ER-negative tumors). This gives reason to suspect that enterolactone protects from cancer not only by its hormone-like effect." Indeed, studies of cells and animals had already provided evidence suggesting that the substance also has an influence on cancer growth irrespective of estrogen. Thus, it promotes cell death and inhibits sprouting of new blood vessels.

"In order to find out whether enterolactone also inhibits the aggressiveness of estrogen receptors in estrogen-positive tumors, we would need to expand this study to include much larger groups of women," said Jenny Chang-Claude. Moreover, the scientist firmly emphasized: "By eating a diet that is rich in wholemeal products, seeds and vegetables, which is considered to be health-promoting anyway, everybody can take in enough lignans. At the present time, we can only discourage people from taking any food supplements."

Phytoestrogens have been the subject of intense scientific debates in past years. On the one hand, the results of several studies of cells as well as epidemiological findings suggest that they have a cancer protective effect. Another observation that may be interpreted in this direction is that Asian women are less frequently affected by breast cancer. Their soy-rich diet contains large amounts of another type of phytoestrogens, isoflavones. On the other hand, scientists fear that isoflavones might imitate the growth-promoting properties of real hormones and, thus, accelerate hormone-dependent tumors such as breast cancer and prostate cancer. "It has not yet been finally determined whether lignans in the body imitate the hormone effect or, on the contrary, counteract it," says Jenny Chang-Claude. "Our studies will help achieve more clarity in this important question, which also concerns our daily diet."

Katharina Buck, Alina Vrieling, Aida Karina Zaineddin, Susen Becker, Anika Hüsing, Rudolf Kaaks, Jakob Linseisen, Dieter Flesch-Janys, and Jenny Chang-Claude: Serum Enterolactone and Prognosis of Postmenopausal Breast Cancer. Journal of Clinical Oncology, 2011, DOI: 10.1200/JCO.2011.34.6478

http://www.scientificamerican.com/article.cfm?id=qr-tags-can-be-rigged-to

QR Tags Can Be Rigged to Attack Smart Phones

A blogger has demonstrated how these innocuous tags can be made into cyber-crime weapons

By Matt Liebowitz and SecurityNewsDaily | Tuesday, September 13, 2011 | 6

You've probably seen QR tags thousands of times, from advertisements in the subway to coupon flyer in the mail to products in the supermarket. They look like stamp-size bar codes, a grid of small black-and-white rectangles and squares, usually with bigger black squares in the corners.

A marketer's dream-come-true, these tiny images are capable of storing and transmitting loads of data directly to the smartphones of interested customers. When a person scans a QR tag with a smartphone, the tag can do any number of things, including taking the user right to the product's website.

[How to Protect Your Smartphone From Malware]

But like any technology, they can also be manipulated to bite the hands - or phones - that feed them. On the mobile security blog Kaotico Neutral, researcher Augusto Pereyra demonstrated how these innocuous QR tags can be made into cybercrime weapons. In his proof-of-concept hack, Pereyra took a QR tag he created from a free online tag creator and embedded in it the URL for an attack server called evilsite.dyndns.org. When the target smartphone scanned the tag, the browser was directed to the spoofed site and fed malware.

QR tags are touted for their convenience, but it's that same convenience - coupled with their increasing prevalence - that Pereyra believes could allow them to become dangerous attack vectors. Popular QR tag-scanning software, such as ScanLife, automatically takes mobile browsers to the site embedded within the tag, and while it makes the process quick, it does nothing for its safety.

"This is a serious problem since this is the equivalent of clicking a link with your eyes closed," Pereyra wrote.

Tim Armstrong, researcher for the security firm Kaspersky Lab, said this streamlined process creates a "run first, ask questions later" mentality that benefits attackers.

An attack like his could easily be scaled up, Pereyra said, simply by printing the rigged QR tags and pasting them atop already-existing tags on posters in public places.

As companies and marketers take advantage of the power and ubiquity of mobile devices, and it becomes easier for consumers to carry out financial transactions via smartphones, researchers suspect online attackers will attempt to gain their own foothold in the market.

http://medicalxpress.com/news/2011-09-breaching-blood-brain-barrier-year-old-puzzle.html

Breaching the blood-brain barrier: Researchers may have solved 100-year-old puzzle

Cornell University researchers may have solved a 100-year puzzle: How to safely open and close the blood-brain barrier so that therapies to treat Alzheimer's disease, multiple sclerosis and cancers of the central nervous system might effectively be delivered.

The researchers found that adenosine, a molecule produced by the body, can modulate the entry of large molecules into the brain. For the first time, the researchers discovered that when adenosine receptors are activated on cells that comprise the blood-brain barrier, a gateway into the blood-brain barrier can be established. (Journal of Neuroscience, Sept. 14, 2011.)

Although the study was done on mice, the researchers have also found adenosine receptors on these same cells in humans. They also discovered that an existing FDA-approved drug called Lexiscan, an adenosine-based drug used in heart imaging in very ill patients, can also briefly open the gateway across the blood-brain barrier.

The blood-brain barrier is composed of the specialized cells that make up the brain's blood vessels. It selectively prevents substances from entering the blood and brain, only allowing such essential molecules as amino acids, oxygen, glucose and water through. The barrier is so restrictive that researchers couldn't find a way to deliver drugs to the brain – until now.

"The biggest hurdle for every neurological disease is that we are unable to treat these diseases because we cannot deliver drugs into the brain," said Margaret Bynoe, associate professor of immunology at Cornell's College of Veterinary Medicine and senior author of a paper appearing Sept. 14 in the Journal of Neuroscience. Aaron Carman, a former postdoctoral associate in Bynoe's lab, is the paper's lead author. The study was funded by the National Institutes of Health.

"Big pharmaceutical companies have been trying for 100 years to find out how to traverse the blood-brain barrier and still keep patients alive," said Bynoe, who with colleagues have patented the findings and have started a company, Adenios Inc., which will be involved in drug testing and preclinical trials.

Researchers have tried to deliver drugs to the brain by modifying them so they would bind to receptors and "piggyback" onto other molecules to get across the barrier, but so far, this modification process leads to lost drug efficacy, Bynoe said.

"Utilizing adenosine receptors seems to be a more generalized gateway across the barrier," she added. "We are capitalizing on that mechanism to open and close the gateway when we want to."

In the paper, the researchers describe successfully transporting such macromolecules as large dextrans and antibodies into the brain. "We wanted to see the extent to which we could get large molecules in and whether there was a restriction on size," Bynoe said.

The researchers also successfully delivered an anti-beta amyloid antibody across the blood-brain barrier and observed it binding to beta-amyloid plaques that cause Alzheimer's in a transgenic mouse model. Similar work has been initiated for treating multiple sclerosis, where researchers hope to tighten the barrier rather than open it, to prevent destructive immune cells from entering and causing disease.

Although there are many known antagonists (drugs or proteins that specifically block signaling) for adenosine receptors in mice, future work will try to identify such drugs for humans.

The researchers also plan to explore delivering brain cancer drugs and better understand the physiology behind how adenosine receptors modulate the blood-brain barrier. *Provided by Cornell University*

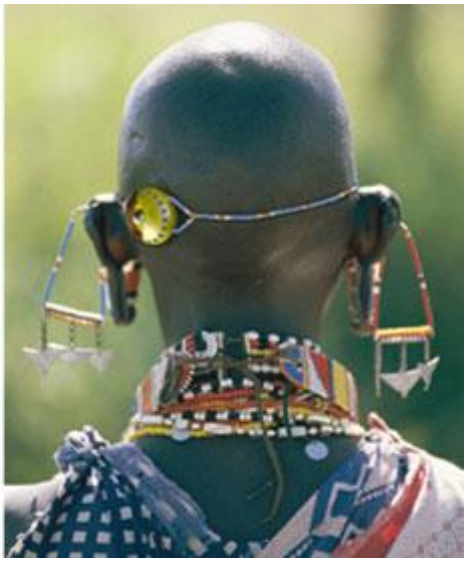
http://www.guardian.co.uk/global-development/poverty-matters/2011/sep/08/appropriate-medical-devices-poor-countries?intcmp=122

Could donkey ambulances save lives in poor countries?

Three-quarters of medical devices donated to poor countries are unsuitable. Experts gathered in London to find appropriate medical devices for the developing world

Professor Chris Lavy, an orthopaedic surgeon who spent years working in Africa, gives a vivid example of inappropriate medical technology for the developing world.

One of the newest hospitals in sub-Saharan Africa, he points out, was built with infrared sensors to turn the taps on in the operating theatres. "Wonderful idea, but is it really appropriate in a country where there are no other infrared controlled taps and no engineer to fix them," he asks rhetorically. "Within a year most of them had failed, some in the off position and some in the on position."



Two of the 10 ground-breaking technologies for the developing world: donkey ambulances and Hearware. Photograph: Institution of Mechanical Engineers

It is a familiar problem. A well-meaning donor gives a shiny new piece of equipment to a poor country only for it to gather dust. Parts that are expensive and difficult to replace, the need for a constant electricity supply, a lack of trained operators, unsuitability to rough terrain are all factors preventing the use of these devices in the developing world.

The scale of the problem is considerable. The World Health Organisation (WHO) estimates that as much as three-quarters of all medical devices in the developing world do not function.

"Factors contributing to this are: lack of needs assessment, appropriate design, robust infrastructure, spare parts when devices break down, consumables and a lack of information for procurement and maintenance, as well as trained healthcare staff," says the WHO. "These issues are part of a broader problem in many countries: the lack of a medical device management system."

To avoid such pitfalls, the Institution of Mechanical Engineers (IMechE) organised a one-day conference in London this week, bringing together engineers, health workers, donors and charities to look at devices specifically designed for the developing world.

They include a nipple shield for breastfeeding HIV-positive mothers, which can block transmission of the virus to their babies; an eRanger ambulance – a motorbike sidecar stretcher that can handle rough terrain far better than a four-wheeled ambulance and is much cheaper; and a stethoscope that can attach to a mobile phone, allowing doctors to monitor hard-to-reach patients remotely.

The heart-rate monitoring device is particularly ingenious as the microphone on a mobile phone is used as a stethoscope to analyse and record heart sounds. This means a patient's condition can be analysed by a doctor hundreds of miles away. The device specifically targets tuberculosis pericarditis, which affects around 10% of

all TB patients and has an unusually high mortality rate (40%). It would be particularly useful for remote rural communities where access to qualified doctors for routine check-ups can be difficult.

The onset of symptoms is insidious and sufferers in developing countries not being able to reach the clinic before it is too late accounts for the high death rate. Being able to pick up the early warning signs by monitoring the heart could therefore be crucial. As half of Africa's 1 billion population have mobile phones, the mobile stethoscope could be a simple and cheap solution to the problem.

The idea came from a conversation between Professor Bongani Mayosi, at the University of Cape Town, and Thomas Brennan, a post-doctoral researcher at the Oxford department of engineering science, about how to bring down tuberculosis pericarditis mortality rates in a low-cost way.

"All you need are a mobile phone, a hands-free kit and an egg cup that you put against your chest," said Brennan. "Then you can send the recording by SMS over the phone. Tests have shown that the results are as good as when you use a £400 [$640] 3M Littmann stethoscope, and a clinical study is being done in October awaiting approval."

Even more low-tech is a donkey ambulance for remote villages in Afghanistan, developed by HealthProm, a British NGO. This consists of a specially designed seat that can be attached to a donkey. It provides cheap emergency transport using the donkeys that locals already use to travel through mountainous regions.

Another device, called Hearware, is a solar-powered hearing aid that uses bone conduction to send vibrations to the working cochlea, bypassing the need for expensive batteries and treating the type of hearing loss most prevalent in the developing world. The internal battery charges from four hours of sunlight and lasts for three days. It was developed by Andrew Carr, at Glasgow University, five years ago.

"For years, many hospitals around the world have been forced to rely on inappropriate hand-me-downs from richer countries, but what use is an ambulance to a village with no paved roads, or a dialysis machine to a clinic with no mains electricity," asks Patrick Finlay, medical division chairman at IMechE. "Simple, inexpensive technologies engineered for use in the developing world have the potential to save thousands of lives. It's now up to the engineering and development communities to get these technologies out of the workshop and into the world's poorest countries."

http://www.eurekalert.org/pub_releases/2011-09/uoe-sdi091411.php

Self-delusion is a winning survival strategy, study suggests

Harboring a mistakenly inflated belief that we can easily meet challenges or win conflicts is actually good for us, a new study suggests

Harbouring a mistakenly inflated belief that we can easily meet challenges or win conflicts is actually good for us, a new study suggests.

Researchers have shown for the first time that overconfidence actually beats accurate assessments in a wide variety of situations, be it sport, business or even war.

However, this bold approach also risks wreaking ever-greater havoc. The authors cite the 2008 financial crash and the 2003 Iraq war as just two examples of when extreme overconfidence backfired.

A team from the University of Edinburgh and the University of California, San Diego used a mathematical model to simulate the effects of overconfidence over generations. It pitted overconfident, accurate, and underconfident strategies against each other.

A paper published in Nature today shows that overconfidence frequently brings rewards, as long as spoils of conflict are sufficiently large compared with the costs of competing for them. In contrast, people with unbiased, accurate perceptions usually fare worse.

The implications are that, over a long period of time the evolutionary principal of natural selection is likely to have favoured a bias towards overconfidence. Therefore people with the mentality of someone like boxer Mohammad Ali would have left more descendents than those with the mindset of film maker Woody Allen.

The evolutionary model also showed that overconfidence becomes greatest in the face of high levels of uncertainty and risk. When we face unfamiliar enemies or new technologies, overconfidence becomes an even better strategy.

Dr Dominic Johnson, reader in Politics and International Relations at the University: "The model shows that overconfidence can plausibly evolve in wide range of environments, as well as the situations in which it will fail. The question now is how to channel human overconfidence so we can exploit its benefits while avoiding occasional disasters."

http://www.eurekalert.org/pub_releases/2011-09/uovm-cv091411.php

Cowpox virus: Old friend but new foe

Despite the importance of cowpox in human medicine the virus has attracted relatively little attention and how the many forms of cowpox are related was until recently a matter of conjecture.

The observation that milkmaids are frequently infected with cowpox but rarely catch smallpox is generally credited to the English doctor Edward Jenner. Although Jenner might not have been the first person to notice the correlation, he was the first to make use of it: in 1796 he "vaccinated" children with material from cowpox blisters and showed that they became immune to smallpox. Jenner's work led directly to the development of a smallpox vaccine and less than 200 years later the disease was eradicated. Jenner's initial vaccine presumably came from an English strain of cowpox and it was generally assumed that commercial vaccines are derived from this. Recent findings from an international consortium including the group of Norbert Nowotny at the University of Veterinary Medicine, Vienna challenge this view and suggest that smallpox vaccines come instead from central or eastern Europe. The results have recently been published in the prestigious online journal PLoS One. The work is not merely of historical interest: since the cessation of smallpox vaccination there has been a rise in cases of related diseases and pox viruses once again represent a serious threat to public health.

The family of orthopox viruses is generally considered to comprise vaccinia virus, variola virus (which causes smallpox), cowpox virus and at least six other species. The various pox viruses are named after their usual hosts but this nomenclature may give rise to a false sense of security: most of them seem to have fairly catholic tastes and cowpox is able to infect not only cows but also a variety of other animals, ranging from mice to elephants as well as man.

Despite the importance of cowpox in human medicine the virus has attracted relatively little attention and how the many forms of cowpox are related was until recently a matter of conjecture. The issue has been clarified by a large international consortium headed by Darin Carroll at the Centers for Disease Control and Prevention in Atlanta, Georgia and including Jolanta Kolodziejek and Norbert Nowotny of the University of Veterinary Medicine, Vienna. The scientists compared the complete genome sequences of twelve different isolates of the cowpox virus, using sophisticated computer methods to prepare a phylogeny or family tree of the various forms.

Their first finding was that "cowpox" may actually comprise a number of distinct species. The researchers found a high degree of variation between samples, with the sequences clustering into five distinct "clades" or groups, each of which could be considered to represent a separate species. This is in contrast to prevailing wisdom, which considers cowpox to be a disease with a single causative agent. The second surprising finding was that the strains used in smallpox vaccines were most closely related to cowpox virus isolates from Russia, Finland and Austria rather than to samples from England. This suggests that commercial smallpox vaccines were not derived from Jenner's original strain but instead from somewhere in central or eastern Europe.

The last reported case of smallpox was in 1977 and in 1979 the World Health Organization declared that the disease had been eradicated. To date, smallpox is the only human viral disease to have been fully eradicated. Because smallpox is no longer a threat and because vaccination against it was occasionally associated with unpleasant side-effects, wide scale vaccination ceased in the early 1980s and fewer people are now immune to smallpox and related viruses, such as monkeypox and cowpox. As a consequence, these diseases are increasingly recorded in man. The incidence of monkeypox in the Democratic Republic of the Congo (the country with the most cases) has risen twenty-fold since the 1980si and 2003 saw a serious outbreak of the disease in the US.

As Jenner noted in the 18th century, the cowpox virus is also readily transmitted to man. Despite its name, cowpox no longer occurs in cows but wild mice and voles represent a source of infection: Nowotny cites a recent study in Austria that revealed that "about 1 in 6 mice carries the cowpox virus. As a result, the virus can be transmitted to domestic cats (at least, to those that hunt mice) and we and others have shown that it can then be passed on to humans" and the decades since the cessation of vaccination have witnessed a significant rise in the incidence in humans. The majority of cases stem from Great Britain (a nation of dog-lovers, perhaps, although cats are also popular pets) with the remainder restricted to Europe, apart from a single case in Israel. The disease is unpleasant but not generally fatal, except in immunocompromised patients. As Nowotny says, "diagnosis of cowpox is relatively straightforward – in humans as well as in animals – but it is important that doctors and vets consider the possibility when they see patients with lesions."

The paper Chasing Jenner's Vaccine: Revisiting Cowpox Virus Classification by Darin S. Carroll, Ginny L. Emerson, Yu Li, Scott Sammons, Victoria Olson, Michael Frace, Yoshinori Nakazawa, Claus Peter Czerny, Morten Tryland, Jolanta Kolodziejek, Norbert Nowotny, Melissa Olsen-Rasmussen, Marina Khristova, Dhwani Govil, Kevin Karem, Inger K. Damon

and Hermann Meyer is published in the online journal PloS One (http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0023086).

http://www.eurekalert.org/pub_releases/2011-09/uonc-2hc091311.php

24-week hepatitis C treatment as effective as 48-week treatment

A new multinational study finds that a 24-week treatment course for hepatitis C that adds telaprevir to peginterferon alfa and ribavirin is just as effective as a 48-week regimen for many patients.

CHAPEL HILL, N.C. – This is good news for up to 4 million people in the U.S. who suffer from this chronic liver disease, many of whom will undergo treatment for hepatitis C, said Michael W. Fried, MD, professor of medicine at the University of North Carolina at Chapel Hill, director of the UNC Liver Center and a co-author of the ILLUMINATE study, which is published in the Sept. 15, 2011 issue of The New England Journal of Medicine. "The medications that we use to treat hepatitis C do have some side effects, and shortening the duration of treatment shortens a patient's exposure to these side effects," Fried said.

Lead author of the study, which was conducted at 74 sites in Belgium, the Netherlands and the U.S., was Kenneth E. Sherman, MD, PhD, of the University of Cincinnati College of Medicine.

The study included 540 patients with chronic genotype 1 hepatitis C who had not previously been treated or who could not be successfully treated with a combination of peginterferon alfa and ribavirin, which is the current standard of care. Nineteen of the patients in the study were enrolled at UNC Hospitals in Chapel Hill or at Medical Specialty Services, in Greensboro, N.C., where UNC runs a hepatitis C practice in collaboration with the Moses Cone Health System.

All of the patients started the study by taking all three drugs for 12 weeks. They stopped taking telaprevir after week 12. Then patients who tested negative for the hepatitis C virus were randomized to receive either 12 weeks or 36 weeks of additional treatment with the other two drugs, peginterferon alfa and ribavirin. One group received a total of 24 weeks of treatment while the other group was treated for 48 weeks.

In the 24-week group, 92 percent of the patients ultimately achieved a sustained virological response, meaning that the hepatitis C virus remained undetectable in their blood after treatment was discontinued. In the 48-week group, 88 percent achieved a sustained virological response. Fried notes that sustained virological response is analogous to cure of hepatitis C.

"These are very nearly identical results, showing that 24 weeks of treatment with triple therapy is just as effective as 48 weeks," Fried said. About two-thirds of the patients who started with triple therapy were eligible for shorter duration of treatment by clearing virus early in their treatment course.

In addition, the study found uniformly high rates of sustained virologic response regardless of the race or ethnicity of the patients, and no matter whether they had advanced fibrosis or cirrhosis of the liver.

Side effects associated with telaprevir reported in the study include rash and anemia, but in most cases these side effects were mild or moderate and could be managed by the patient's physician, Fried said.

The study was funded by Vertex Pharmaceuticals and Tibotec. Vertex markets telaprevir in the United States under the brand name Incivek. Tibotec plans to market the drug in Europe.

The U.S. Food and Drug Administration approved Incivek on May 23, 2011 for the treatment of chronic hepatitis C in combination with peginterferon alfa and ribavirin.

Peginterferon alfa is marketed under the brand name Pegasys, while ribavirin is sold as Copegus and Rebetol.

http://www.eurekalert.org/pub_releases/2011-09/nlmc-scs091211.php

Scientists crack sparse genome of microbe linked to autoimmunity

Research adds to growing knowledge of how gut bacteria influence health

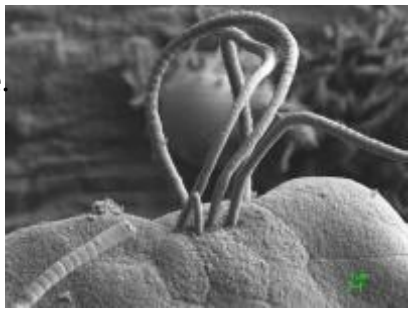
Scientists have deciphered the genome of a bacterium implicated as a key player in regulating the immune system of mice. The genomic analysis provides the first glimpse of its unusually sparse genetic blueprint and offers hints about how it may activate a powerful immune response that protects mice from infection but also spurs harmful inflammation.

The researchers, led by Dan Littman, the Helen L. and Martin S. Kimmel Professor of Molecular Immunology at NYU School of Medicine and a Howard Hughes Medical Institute Investigator, and Ivaylo Ivanov, PhD, of Columbia University Medical Center, published their findings in the September 15, 2011, issue of Cell Host and Microbe. The study suggests that the gut-dwelling microorganism, named segmented filamentous bacteria (SFB), is genetically distinct from all 1,200 bacterial genomes studied so far, reflecting its relatively unique role in the gut.

Although SFB was first identified more than 40 years ago, it wasn't until 2009 that Dr. Littman and an international team of collaborators discovered that it can recruit specialized T cells, called Th17 cells, in the small intestine of mice. These potent immune cells, they subsequently found, protected the mice from disease-

causing Citrobacter rodentium bacteria, but also made them more susceptible to inflammation and autoimmune arthritis. Those initial results suggested other intestinal bacteria might also regulate immune function.

"What has become clear in the last couple of years is that individual bacteria can specifically influence particular branches of the immune system," says Dr. Littman. In the new study, his team deciphered SFB's 1.57 million letters of DNA, almost 2,000 times smaller than our own genome and about one-third the size of its closest relative.



The microbe's sparse genome lacks many genes needed for its own survival, such as ones for making amino acids and other essential nutrients. As a result, it is dependent on other gut-dwelling bacteria or its host for food, according to the study. The examination of its 1,500 genes, however, suggests it is well adapted to the small intestine, where it clings to the thin lining and may help prevent other microbes from breaching the barrier.

A little-known bacterial species called segmented filamentous bacterium, or SFB, can activate the production of specialized immune cells in mice. This scanning electron microscope image of an SFB colony shows a mass of long hair-like filaments created when the bacteria stay attached to each other after they divide. **Ivaylo Ivanov (Columbia University Medical Center), Dan Littman (NYU Langone Medical Center) and Doug Wei (Carl Zeiss SMT, Inc.)**

Although the study didn't uncover any definitive signs of the SFB living within us, Dr. Littman suspects the resourceful bacteria have adapted to certain human populations. Even if it isn't found in our intestinal tract, scientists could apply what they have learned to obtain insights into the function of similarly acting microorganisms within us.

"Maybe in humans, there is another bacterium that is different from SFB but behaves functionally in the same way," says Dr. Ivanov, who conducted the latest analysis as a postdoctoral researcher in Dr. Littman's lab.

Recently, Japanese researchers found intestinal bacteria in humans that can boost development of regulatory immune cells in mice, thereby keeping the inflammatory activity of Th17 cells in check. Dr. Littman and his NYU collaborators may have also uncovered a microbe in the intestinal tract of rheumatoid arthritis patients that alters immune function. These emerging results underscore the need to understand how the microbes living in our bodies may impact our health.

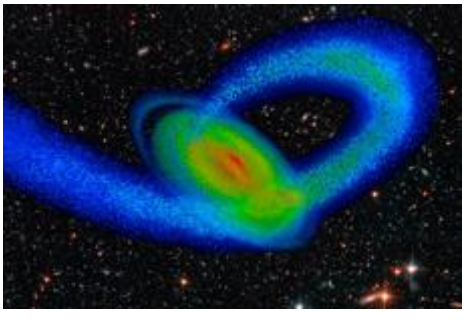
"This research brings us the potential genetic mechanisms that trigger differentiation of Th17 cells which we have long believed to have a strong role in the development of autoimmune diseases, including rheumatoid arthritis (RA), psoriatic arthritis (PsA), and Crohn's disease," said Steven Abramson, MD, professor, Departments of Medicine and Pathology and director of the Rheumatology Division at NYU Langone Medical Center. "With more than 50 million Americans suffering from at least one autoimmune disease, this research gives scientists and clinicians a greater ability to apply knowledge gained in the laboratory to actual clinical cases, moving it from 'bench-to-beside' to give patients a tremendous advantage and physicians the ability to fine-tune medications and protocols based on patient response."

http://today.uci.edu/news/2011/09/nr_milkyway_110914.php

Milky Way's spiral arms are the product of an intergalactic collision course

UC Irvine models show dark matter packs a punch

UC Irvine astronomers have shown how the Milky Way galaxy's iconic spiral arms form, according to research published today in the journal Nature.



A dwarf galaxy named Sagittarius loaded with dark matter has careened twice through our much larger home galaxy in the past two billion years, according to telescope data and detailed simulations, and is lined up to do it again. As the galaxies collide, the force of the impact sends stars streaming from both in long loops. Those continue to swell with stars and are gradually tugged outward by the Milky Way's rotation into a familiar ringed arm.

Computer model of the Milky Way and its smaller neighbor, the Sagittarius dwarf galaxy. The flat disk is the Milky Way, and the looping stream of material is made of stars torn from Sagittarius as a result of the strong gravity of our galaxy. The spiral arms began to emerge about two billion years ago, when the Sagittarius galaxy first collided with the Milky Way disk. ***Video here*** **Image by Tollerud, Purcell and Bullock/UC Irvine**

It's the weighty dark matter from Sagittarius that provided the initial push, the researchers said.

"It's kind of like putting a fist into a bathtub of water as opposed to your little finger," said James Bullock, a theoretical cosmologist who studies galaxy formation. The smaller galaxy pays a steep price though – sucked

inward repeatedly by the Milky Way's mightier gravity, it's being ripped apart by the blows, sending huge amounts of its stars and dark matter reeling into the new arms.

"When all that dark matter first smacked into the Milky Way, 80 percent to 90 percent of it was stripped off," explained lead author Chris Purcell, who did the work with Bullock at UCI and is now at the University of Pittsburgh. "That first impact triggered instabilities that were amplified, and quickly formed spiral arms and associated ring-like structures in the outskirts of our galaxy."

The Sagittarius galaxy is due to strike the southern face of the Milky Way disk fairly soon, Purcell said – in another 10 million years or so.

Additional authors are UCI doctoral students Erik Tollerud and Miguel Rocha, and Sukanya Chakrabarti of Florida Atlantic University in Boca Raton.

http://www.eurekalert.org/pub_releases/2011-09/yu-yru091411.php

Yale researchers use uterine stem cells to treat diabetes

Controlling diabetes may someday involve mining stem cells from the lining of the uterus, Yale School of Medicine researchers report in a new study published in the journal Molecular Therapy.

The team treated diabetes in mice by converting cells from the uterine lining into insulin-producing cells.

The endometrium or uterine lining, is a source of adult stem cells. These cells generate uterine tissue each month as part of the menstrual cycle. Like other stem cells, however, they can divide to form other kinds of cells. The Yale team's findings suggest that endometrial stem cells could be used to develop insulin-producing islet cells, which are found in the pancreas. These islet cells could then be used to advance the study of islet cell transplantation to treat people with diabetes.

Led by Yale Professor Hugh S. Taylor, M.D., the researchers bathed endometrial stem cells in cultures containing special nutrients and growth factors. Responding to these substances, the endometrial stem cells adopted the characteristics of beta cells in the pancreas that produce insulin. Over the course of a three-week incubation process, the endometrial stem cells took on the shape of beta cells and began to make proteins typically made by beta cells. Some of these cells also produced insulin.

After a meal, the body breaks food down into components like the sugar glucose, which then circulates in the blood. In response, beta cells release insulin, which allows the body's cells to take in the circulating glucose. In this study, Taylor and his team exposed the mature stem cells to glucose and found that, like typical beta cells, the cultured cells responded by producing insulin. The team then injected diabetic mice with the mature, insulin-making stem cells. The mice had few working beta cells and very high levels of blood glucose.

Mice that did not receive the stem cell therapy continued having high blood sugar levels, developed cataracts and were lethargic. In contrast, mice that received the cell therapy were active and did not develop cataracts, but the animals' blood sugar levels remained higher than normal.

Taylor said that the next step in the research will be to verify how long this treatment remains effective. "We will also investigate how changing the nutrient bath or increasing the dose of injected cells could make this treatment more effective," he said. "Endometrial stem cells might prove most useful for Type 1 diabetes, in which the immune system destroys the body's own insulin-producing cells. As a result, insulin is not available to control blood glucose levels."

Other Yale authors on the study included Xavier Santamaria, Elfi E. Massasa, Yuzhe Feng, and Erin Wolff.
The study was funded by the National Institutes of Health's Eunice Kennedy Shriver National Institute of Child Health and Human Development. ***Citation:*** *Molecular Therapy doi:10.1038/mt.2011.173*

http://www.physorg.com/news/2011-09-odd-namibia-weather.html

Something odd is happening with Namibia's weather

Something's up with the weather in Namibia, say geoscientists Kyle Nichols of Skidmore College in Saratoga Springs, N.Y., and Paul Bierman of the University of Vermont in Burlington, Vt.

Nichols and Bierman should know. They're just back from the western mountains and coastal plain of this sparsely populated African country. Usually, western Namibia is a dusty place where the stream beds are sand and the "lakes" are nothing more than flats of dried mud.

Not now.

This year, rivers with names like Swakop and Omaruru and Kuiseb flowed all the way to the sea - something they don't do often, "maybe once a decade," says Bierman. The rivers didn't just flow for a day or two, Nichols and Bierman say, they ran from the desert to the ocean for weeks on end. "There was so much water," says Bierman, "that people went swimming, they went tubing, and the desert turned green around rivers carrying so much sediment they were chocolate-brown." The rains were unprecedented in both their intensity and duration. "There's nothing like this widespread, heavy rain in the historic record," says Nichols.

The two geoscientists have been working for more than a decade in Namibia, collecting samples of rock and river sediment and bringing them back for analysis at the University of Vermont (see Cosmogenic Nuclide Laboratory and Geomorphology Research Group's website). Their goal is to understand how quickly Namibia's arid lands are eroding, "both the spectacular bedrock outcrops, and the landscape's drainage basins as a whole," says Nichols.

After the recent Namibian rains, the U.S. National Science Foundation (NSF) awarded Nichols and Bierman a rapid response grant to travel quickly back to the country last month. There they collected river sediment and rock at many of the sites they had sampled in 1997, 2001 and 2010. Their hope is to discover whether sediment carried by rivers in such "mega-floods" is coming from sources that are the same as those when sediment is transported by more "normal" events.

They work with collaborators at the Lawrence Livermore National Laboratory, counting rare isotopes, or sub-types, of elements formed in the mineral quartz. The results provide valuable information about the samples.

"The research focuses on the use of isotopes of the chemical elements beryllium, cesium and lead to measure erosion rates and determine sediment sources," says Paul Cutler, program director in NSF's Division of Earth Sciences, which awarded the grant. "Techniques using these isotopes have become increasingly popular," says Cutler, "as ways of finding out the sources and ages of sediments and other rock deposits."

Bierman says that "there has been little testing of a fundamental aspect of the method, however - the similarity of isotope abundance over time. In Namibia we now have huge run-off and a chance to test this assumption of consistency."

It will be months before the geologists have the first results, but the effects of the torrential rains and floods in Namibia in early 2011 are clearly evident, they say. Grass covers what should be barren stony desert, and there is water in streams, something Nichols and Bierman haven't seen before. Namibia's rains stopped months ago, but the groundwater table is so high that there is still flow in some streams and rivers. Almost every river crossing shows the effects - logs, mud and bridges torn asunder. In some streams, the scientists saw minnows and frogs stranded in pools. "They must have been delivered during the flood," says Bierman.

In a few places, water, road damage and stream beds laden with sediment kept the researchers from collecting samples from the exact same places as in previous years. "The riverbed four-by-four truck tracks we needed to get to sample sites were sometimes gone," says Bierman, "replaced by truck-sucking mud and soft sand."

For 68 of 82 original sample sites, with the help of a GPS and maps and field notes, the scientists collected sand from within just a few meters of the original samples.

Their typical days involved getting up with the sun, says Nichols, eating a quick breakfast at a lodge, programming the GPS with the day's route, and driving off in their diesel four-by-four truck.

One day they left the lodge at 7 a.m., drove 700 or more kilometers, and finally collected their last samples using headlamps just before 7 p.m. Then, by dark of night across deserted Namib "roads," they drove 170 kilometers back to the lodge. "As we were packing samples to ship home from Windhoek, Namibia's capital," says Bierman, "we watched the predictions as Hurricane Irene marched up the eastern U.S."

By the time Bierman had travelled 36 hours and arrived home in Vermont, and Nichols back in upstate N.Y., the region was reeling from the worst flooding since the epic floods of November, 1927.

"This could all be coincidence, but it's hard not to think that something's up with the weather," says Bierman. "A warming Earth equals a more intense hydrologic cycle, with repercussions for erosion rates, sediment redistribution and landscape evolution."

The riverbeds of western Namibia, land of arid deserts, are awash in water. At least for now.

Provided by National Science Foundation

http://medicalxpress.com/news/2011-09-discovery-ways-herpes.html

Discovery could lead ways to prevent herpes spread

Herpesviruses are thrifty reproducers - they only send off their most infectious progeny to invade new cells.

(Medical Xpress) - Two Cornell virologists recently have discovered how these viruses determine which progeny to release. The College of Veterinary Medicine researchers report in the Aug. 23 (108:34) issue I of the Proceedings of the National Academy of Sciences on the mechanisms of this quality-control system, which helps streamline viral reproduction to optimize its spreading.

The virologists identified proteins in the nuclear membranes of infected cells that control which viral products exit. This map could be used to identify new targets for future drugs that would hamper viral reproduction by clogging inspection pathways to trap viruses in the cells they first infect.

"When a herpesvirus hijacks a cell, it turns the nucleus into a viral production factory," said Joel Baines, the James Law Professor of Virology, who co-authored the study with postdoctoral research associate Kui Yang.

"It makes protein shells called capsids, stuffs them with viral DNA and ships them out of the nuclear membrane to infect new cells. But errors in the assembly line leave some capsids empty, without DNA, and shipping these is a waste of resources."

When capsids bud from the nuclear membrane, they take pieces of it with them, forming protective lipid envelopes that let them move to new cells. Empty capsids can't reproduce, so the virus only allows capsids with DNA through. How the membrane could determine whether the capsid had DNA or not was a mystery until Yang and Baines mapped its method.

"We found clamplike proteins on the surface of herpesvirus capsids that hold them together and keep them from bursting when they're stuffed full of DNA," said Baines. "Those with DNA have far more of these than empty capsids. We also found a protein complex living in the host cell's nuclear membrane that binds to these structural support proteins, selecting DNA-filled capsids to pull through the membrane. Thus the virus releases only its most infectious particles."

Discovery could lead ways to prevent herpes spread

This streamlining process has helped herpesvirus species spread prevalently and permanently across all animal species. Eight of the 25 known viruses in the herpes family regularly infect humans, posing a leading cause of human viral infection.

Once in a body, herpesvirus stays for life. It can flare up at any time, causing symptoms and diseases, ranging from infected sores to brain inflammation, birth defects and cancers of the nose, throat and lymphatic system. Though usually not fatal, herpes can prove dangerous to patients with weak immune systems, such as those with HIV/AIDS or infants who contract HIV/AIDS from their mothers.

There is no cure for herpes, but Baines' map illustrates a viral reproduction system that can be subverted.

"Take away either component, the capsid's clamplike proteins or the membrane's inspector proteins, and nothing escapes the host cell," said Baines. "This opens the door to developing drugs that could block the interactions between these protein complexes, covering the binding sites to clog the system so that no viral particles get through. This would significantly slow or even stop the virus's spread between cells. Our lab is now working on even more detailed maps of these proteins' exact interaction sites that will help drug developers pinpoint precise targets to thwart viral reproduction."

The research was supported, in part, by the National Institutes of Health. Provided by Cornell University

http://www.newscientist.com/article/dn20909-synthetic-yeast-will-evolve-on-command.html?DCMP=OTC-rss&nsref=online-news

Synthetic yeast will evolve on command

18:00 14 September 2011 by Michael Marshall

Yeast is going digital. Biologists have built two artificial chromosome arms and put them to work in a living yeast. They plan to replace the entire yeast genome over the next five years and then evolve new strains to order.

"Nothing like this has ever been done before," says Jef Boeke of the Johns Hopkins University School of Medicine in Baltimore, Maryland, who is leading the research. As well as designing and building the new genome from scratch, his team has come up with a way to systematically scramble it to produce new strains.

The artificial yeast are similar to Craig Venter's synthetic cells, announced last year. Venter replaced the entire genome of a bacterium with a synthetic genome – but the task is far harder in yeast, because it is a more complex organism and has a bigger genome.

Yeast has 16 chromosomes, all of which have been sequenced. Boeke started small, replacing the right arm of chromosome 9 and part of the left arm of chromosome 6. He began by designing the new sequences on a computer, using the known sequence as his starting point. He stripped from this virtual DNA all the meaningless "junk" DNA, which does not code for proteins. Then he added markers called loxPsym at the ends of all non-essential genes – those that could be changed or deleted without killing the yeast. In the real world, these markers can be attacked by an enzyme called Cre, which swaps genes between the marker sites. Finally, he created these new sequences in the lab using the chemical building blocks of DNA, and inserted them into a living yeast in place of its natural chromosome arms.

Shuffling genes

"This is another remarkable example of how synthetic biology can be used to rewrite chromosome sequences at a sizeable scale," says Daniel Gibson of the J. Craig Venter Institute in Rockville, Maryland. He says it could help us understand the rules governing genome structure.

For instance, the reshuffling technique can test how different arrangements of genes affect the yeast. Boeke has already done this by shuffling the genes on the artificial chromosomes using the Cre enzyme.

"You can take a yeast gene and insert it somewhere else in the genome, and you tend to get a healthy yeast," Boeke says. That suggests a reshuffle wouldn't matter, but different yeasts consistently use the same order. "Maybe there are hidden rules of genome structure that we can distil," Boeke says.

Make your own yeast

Boeke now intends to repeat this re-engineering process with the other chromosomes in yeast. Once the entire genome is laced with loxPsym sites, Boeke plans to use Cre to make wholesale changes. Because the method targets only non-essential genes, and does not interfere with their internal structure, it should mostly produce healthy yeast.

Genomes can be rewritten in a different way using multiplex automated genome engineering (MAGE), which swaps out a particular piece of code and replaces it with another. Ultimately, organisms could be made that use a completely different genetic code. Both methods could produce useful organisms. Besides bread and beer, ordinary yeast is already used to make vaccines, and researchers have made genetically modified yeast that can make biofuels.

Journal reference: Nature, DOI: 10.1038/nature10403

http://medicalxpress.com/news/2011-09-grain-caveman-diet-gains-traction.html

Against the grain, 'caveman' diet gains traction

Could Paleolithic man hold the key to today's nutrition problems?

A growing number of adherents to the so-called "caveman" diet contend that a return to the hunter-gatherer foods of the Stone Age - heavy on meats, devoid of most grains - could alleviate problems like obesity, type 2 diabetes and many coronary problems. The Paleo diet movement is backed by some academics and fitness gurus, and has gained some praise in medical research in the US and elsewhere even though it goes against recommendations of most mainstream nutritionists and government guidelines.

Loren Cordain, a professor of health and exercise science at Colorado State University, said he believes millions in the United States and elsewhere are following the Paleo diet movement, based on sales of books such as his own and Internet trends. "It was an obscure idea 10 years ago, and in the last two to three years it has become known worldwide," Cordain, one the leading academics backing the Paleo diet, told AFP.

"There are at least a half-dozen books on the best seller list that are promoting this," he added.

The underlying basis for the Stone Age diet is a belief that homo sapiens evolved into modern humans with a hunter-gatherer diet that promoted brain function and overall health. Backers say the human genome is essentially unchanged from the end of the Paleolithic era 10,000 years ago after evolving over millions of years.

"It's intuitive," Cordain said. "Obviously you can't feed meat to a horse, you can't feed hay to a cat. The reason for that is that their genes were shaped in different ecological niches."

He said peer-reviewed research has shown the Paleo diet better than the Mediterranean diet, US government recommendations and diets aimed at controlling adult diabetes.

One study published in the Journal of Diabetes Science and Technology showed a Paleolithic diet "improved glycemic control and several cardiovascular risk factors compared to a diabetes diet."

A Swedish study published in the Journal Nutrition and Metabolism found that a Stone Age diet is "more satiating per calorie than a Mediterranean-like diet," making it something to be considered in fighting obesity.

High-energy foods at the lowest energy cost

Some aspects of the Paleo diet are widely accepted, such as shunning many refined and processed starches and sugars in favor of fresh fruits, nuts and vegetables. But the controversy stems from its elimination of most cereals, legumes and dairy products, relying instead on high-protein meats, fish and eggs.

The Paleo diet has a devoted following, some who link it to improved fitness and longevity, including Arthur De Vany, a 74-year-old former economics professor who promotes vigorous workouts and wrote a 2010 book, "The New Evolution Diet: What Our Paleolithic Ancestors Can Teach Us about Weight Loss, Fitness, and Aging. Our forager ancestors sought out high-energy (meaning high-calorie, high-fat) foods that could be obtained at the lowest energy cost," De Vany says in his book. "We began getting heavier and developing new diseases once we ceased to be hunter-gatherers and instead became farmers - or more specifically once we started eating the food we grow rather than gathering food."

But a US News survey of nutritionists ranked the Paleo diet last among 20 possible options, far below the Mediterranean, vegan or Weight Watchers diets. It noted that the Paleo diet gets 23 percent of calories from carbohydrates compared to 45 to 65 percent in US government recommendations, and that the Stone Age regime is higher than recommended for protein and fat. "While its focus on veggies and lean meat is admirable, experts couldn't get past the fact that entire food groups, like dairy and grains, are excluded on Paleo diets," US News said.

Marion Nestle, professor of nutrition, food studies, and public health at New York University, told AFP that the Paleo diet "would not be appropriate for today's sedentary lifestyles."

Nestle and others also dispute some of the historical claims of Paleo diet advocates. "The claim that half the calories in the Paleolithic diet came from meat is difficult to confirm," she said.

In a research paper, Nestle said the life expectancy of Stone Age man was around 25 years "suggesting that the Paleolithic diet, among other life conditions, must have been considerably less than ideal."

Cordain argues however that there are modern societies of hunter-gatherers where the theory can be tested. In these societies, "elderly people have been shown to be generally free of the signs and symptoms of chronic disease (obesity, high blood pressure, high cholesterol levels) that universally afflict the elderly in Western societies," he says on his blog. "When these people adopt Western diets, their health declines and they begin to exhibit signs and symptoms of 'diseases of civilization.'"

Cordain acknowledges that because of the way society has evolved, it is impractical to feed the world with Paleo diets because many societies have become dependent on cereals.

But he says it can be successfully used in many Western countries, and argues that despite jokes about the Stone Age, mainstream nutritionists will come around to his conclusions.

"This is not a fad, this is not Fred Flintstone, this is the wave of the future," he said. *(c) 2011 AFP*

http://www.physorg.com/news/2011-09-true-bargain-house-prototype-built.html

A true bargain house: First prototype built from MIT's effort to construct houses for $1,000 each

Home prices in many of the world's most famous cities run to well over $1,000 per square foot.

The interior of the house designed by Ying chee Chui as part of MIT's 1K House project.

By contrast, MIT architects have produced a decidedly more affordable alternative: the first prototype from the Institute's "1K House" project, an effort to see if low-cost homes for the poor can be constructed for $1,000, total.

The prototype, called Pinwheel House, was designed by Ying chee Chui, a graduate of MIT's Department of Architecture, and has been constructed in Mianyang, in Sichuan Province, China.

"It's part of the responsibility of an architect, to create these spaces for people to live," Chui says. "It's from the heart."

Chui first designed Pinwheel House in 2009 as part of the design studio - essentially a class - that launched the 1K House effort. The project is particularly focused on affordable housing for areas hit by natural disasters, such as the 2008 earthquake in Sichuan. This prototype turned out to be more costly, at $5,925, but is still very inexpensive in relative terms.

The idea to attempt building $1,000 homes was first conceived by Tony Ciochetti, the Thomas G. Eastman Chair at MIT's Center for Real Estate, and inspired by One Laptop Per Child, the foundation headed by MIT professor Nicholas Negroponte that brings low-cost computers to children.

"There is a huge proportion of the world's population that has pressing housing needs," says Ciochetti, who first got the idea for the initiative after seeing a family of four emerge from a tiny mud hut while he was traveling through rural India. Like One Laptop Per Child's aim of developing $100 computers, Ciochetti adds, the idea of the $1,000 house is intended as a challenge to designers: "Can you build affordable, sustainable shelter for such a large population?"

Pinwheel and courtyard

Chui's house is one of 13 plans that emerged from the first 1K House design studio, in 2009. It features hollow brick walls with steel bars for reinforcement, wooden box beams, and is intended to withstand a magnitude 8.0 earthquake.

The Pinwheel House prototype was more expensive to build partly because it is larger than Chui's original design - about 800 square feet, rather than 500 square feet. The smaller version of the house could be built for about $4,000, says Chui, now an architectural practitioner in New York City. That figure could be still lower if a large number of the homes were built at once, she adds.

In any case, the central design concept of Pinwheel House is the same: It has a modular layout, with rectangular room units surrounding a central courtyard space. "The module can be duplicated and rotated, and then it becomes a house," Chui says. "The construction is easy enough, because if you know how to build a single module, you can build the whole house."

A true bargain house: First prototype built from MIT's effort to construct houses for $1,000 each

Yung Ho Chang, a professor of architectural design at MIT who helped oversee the 2009 1K House design studio, thinks the prototype has fulfilled the promise of Chui's design. "The house Chee built has good ventilation and good light," Chang says.

Chang, for his part, is originally from China, and runs an independent practice there, Atelier FCJZ. He was attracted to the 1K House project, in part, by the shortage of good housing in some parts of his native country.

The exterior of the house.

"After the earthquake, this project came as a natural thing to do," Chang says. "It's not just about how cheap the house is, but if it's decent. When you look at living conditions in parts of China, India and Africa, they don't meet the basic standards of what we think of as real housing."

From $1K to $10K?

The 1K House project has proven successful enough, and attracted enough attention, that Chang is overseeing a related MIT design studio this fall, along with a number of outside collaborators. This one aims to create a series of home designs, intended for Japan, which would cost $10,000 to build. Participants in the studio include architects and designers from Tokyo University, the Japanese architecture firm Tsushima Design Studio, Atelier FCJZ, the Japanese retailer Muji, and Vanke, a real estate development firm in China.

"The idea of the 1K house is very much about how could we, as architects in research institutions like MIT, work on world poverty," Chang says. "This semester, the mission is more about how design could reach a bigger percentage of the population, in the middle class."

The new design studio also aims to create homes that could be built inexpensively following natural disasters, such as the earthquake and tsunami that struck northern Japan in March. Rebuilding in such situations, Chang says, often entails three stages of construction: the creation of temporary shelters, then stronger temporary homes sturdy enough for winter weather, and then permanent replacements for damaged or destroyed buildings.

During that process, Chang says, "there are a lot of resources wasted, including energy." Alternately, he suggests, inexpensive and simple houses built from an existing template could let countries rebuild more quickly with practical, permanent structures.

The use of inexpensive housing for rebuilding is, in part, why architects in Japan are now engaging with the project. The initiative "is an important step in the realization of rapid/permanent community building," says Andrew Wit, an architect with Tsushima Design Studio, responding to questions by email. After disasters, he adds, "the government very quickly builds shelters to house all of those affected by the events, but these cheap housing types have very short lifespans and are also made at very low quality standards … But the [MIT house project] asks if it is possible to utilize new technologies and processes for the quick creation of housing equal to or higher then the typical quality standards which are currently seen in Japan."

Plenty of hurdles remain before any home can be manufactured for $1,000 or less. "If it were easy, somebody would have done it," Ciochetti says.

But ultimately, Chang hopes, convening further studios in the vein of the 1K House project will allow more designs to move from the drawing board and onto solid ground. "The inexpensive laptop got to be more than an idea, it became available for children," Chang says. "I hope one day we'll be in the same position."

This story is republished courtesy of MIT News (http://web.mit.edu/newsoffice/), a popular site that covers news about MIT research, innovation and teaching. Provided by Massachusetts Institute of Technology

http://www.physorg.com/news/2011-09-sea-smarts-scientists-mollusks-brain.html

Sea smarts: Scientists studying mollusks discover there is more than one way to make a brain

Study suggests that the formation of a complex brain in mollusks has independently occurred at least four times during the course of evolution

(PhysOrg.com) - Seemingly simple animals such as the snail and squid have ransacked the genetic toolkit over the last half billion years to find different ways to build complex brains, nervous systems and shells, according to an international team of researchers, including a neuroscientist with the University of Florida Whitney Laboratory for Marine Bioscience.

Using genomics and computational approaches, the scientists have reconstructed the evolutionary history of the entire phylum Mollusca, which includes more than 100,000 living species, ranging from giant squid to microscopic marine worm-like creatures.

One of the surprising outcomes of the study, recently published online in the journal Nature, suggests that the formation of a complex brain in mollusks has independently occurred at least four times during the course of evolution - a finding that may prove useful to regenerative medicine scientists trying to develop new ways to help people with degenerative brain diseases.

"Nature did many experiments for us over the past 500 million years, using different molecular tools to build complex brains by independently centralizing smaller neuronal structures," said Leonid L. Moroz, a member of the department of neuroscience with the UF College of Medicine. "The octopus, for example, is very intelligent. It can learn by watching, and it has one of the most complicated brains of any animal without a backbone. And it evolved completely independently from us, using different genes, gene regulators and, in part, different neuronal signaling molecules."

By looking at the genomic data collected from the various classes and families of mollusks, the scientists were able to better understand the relationships between aplacophorans, which are worm-like creatures; gastropods, which include slugs and snails; cephalopods, such as octopuses and squids; and a variety of other shell-producing creatures. Researchers extracted RNAs from dozens of marine organisms for deep genomewide sequencing and backed that information with all publicly banked data, revealing for the first time a blueprint of the molluscan life history on Earth.

Every major lineage of mollusk was represented in the analysis except for a class called monoplacophorans, which are tiny, shelled animals that live at the bottom of the deep sea and are too scarce to be captured. Kenneth M. Halanych and graduate student Kevin M. Kocot of the department of biological sciences at Auburn University led the computational analysis, while the gene sequencing was led by Moroz at UF's Whitney Lab.

"Surprisingly, cephalopod mollusks - octopuses and squid that are known for intelligence and considered 'primates of the seas' - represent one of the earliest branches of shelled mollusks, while simpler mollusks such as clams and oysters were a later branch," Moroz said.

The study helps resolve many conflicting hypotheses constructed in the past 100 years regarding the evolutionary tracks of these animals, according to Rhanor Gillette, a professor of molecular and integrative physiology, and of neuroscience, at the University of Illinois at Urbana-Champaign, who was not involved in the research.

Gillette has studied mollusks and their nervous systems for more than 40 years, focusing on how they make decisions about defense, reproduction and predation by analyzing their behavior and neural circuitry.

"The researchers put the gastropods - snails and slugs - into a sister group with bivalves - clams and oysters - which have far less complex nervous systems," Gillette said. "I was under the impression that snails were closer to more complex cephalopods, like squid and octopus, but now we find they are more closely related to the oyster. That's quite an unusual fisherman's platter.

"What is of extreme interest will be to find out the nature of the basic neuronal circuits that different animals use to make the cost-benefit decisions of their daily lives, such as finding food or defending themselves," Gillette said. "There is likely to be a simple, core function for decision-making in neuronal circuitry that has evolved in tandem in mollusks and much more complex mammals, including humans, despite their remarkable differences in lifestyle, biochemistry and body structure."

Moroz said the discovery says much about the value of using genomic approaches to reveal the true diversity of life. "Some of these organisms, including a sea slug called Aplysia and the octopuses, have turned out to be good biomedical models for understanding learning, memory and disease in people," Moroz said. "It is important to establish ancestral relationships between organisms using genomic information, and to understand why this very successful group resulted in so many different forms and unique biochemical and behavioral adaptations."

Moroz's graduate student Mathew R. Citarella and molecular biologist Andrea B. Kohn, of the Whitney Laboratory were on the research team, as were scientists from the University of Bergen in Norway and the Johannes Gutenberg University in Germany. *Provided by University of Florida*

http://www.eurekalert.org/pub_releases/2011-09/uoc - etm091511.php

Estrogen treatment may help reverse severe pulmonary hypertension

UCLA researchers have found that the hormone estrogen may help reverse advanced pulmonary hypertension, a rare and serious condition that affects 2 to 3 million individuals in the U.S., mostly women, and can lead to heart failure.

The condition causes a progressive increase in blood pressure in the main pulmonary artery, which originates in the heart's right ventricle and delivers blood to the lungs. The rise in pressure impairs heart function by enlarging the right ventricle, potentially leading to heart failure.

Published in the Sept. 15 issue of the American Journal of Respiratory and Critical Care Medicine, the preclinical study shows that in rats, estrogen treatment can reverse the progression of pulmonary hypertension to heart failure and can restore lung and ventricle structure and function.

The disease progresses slowly, so most patients don't seek treatment until major symptoms occur, such as shortness of breath, dizziness and fainting. According to researchers, current medication for pulmonary hypertension only temporarily reduces the disease's severity. For advanced pulmonary hypertension, there are fewer options, and the condition often necessitates a lung transplant.

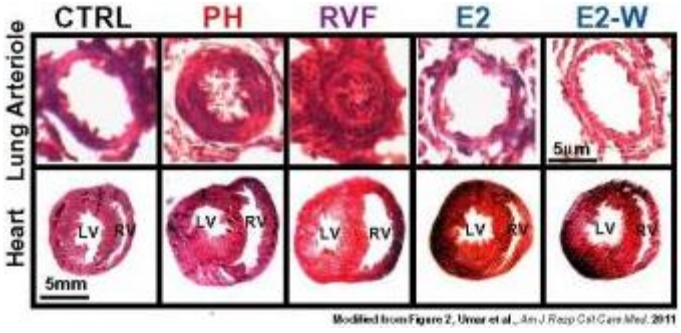


Image shows a normal control lung blood vessel and heart (CTRL) compared with these structures affected by pulmonary hypertension (PH), at the advanced disease stage of right ventricle failure (RVF) and disease reversal with estrogen treatment (E2) and continued benefit even after estrogen treatment withdrawal (E2-W). Note the completely blocked blood vessel and enlarged right ventricle in advanced disease (RVF) and how the right ventricle (RV) shrinks and vessel clears during and after estrogen treatment (E2) and (E2-W). **American Journal of Respiratory and Critical Care Medicine/UCLA**

"Unfortunately, up until now, there hasn't been an ideal pharmacological therapy to treat advanced pulmonary hypertension," said senior study author Mansoureh Eghbali, Ph.D., an assistant professor of anesthesiology at the David Geffen School of Medicine at UCLA who has a strong background in studying the role of gender and estrogen in cardiovascular diseases. "We hope that this early study may offer insight into new therapies."

The UCLA team found that by treating rats with severe pulmonary hypertension with low doses of estrogen, they were able to prevent the disease from progressing to right-ventricular heart failure; this did not happen in untreated rats.

Systolic blood pressure and ejection fraction - the volume of blood being pumped out of the heart's right chamber with each heart beat - also improved. Tests showed that lung weight, which can increase with the disease and resulting heart-ventricle enlargement, was also corrected. After 10 days of estrogen treatment, function returned to an almost normal state.

The researchers stopped the estrogen therapy after 10 days but continued to observe some of the treated rats. They tracked the continued improvement and found almost full restoration of systolic blood pressure and ejection fraction to normal levels after an additional 12 days.

"We were surprised to find this continued benefit, even after we stopped the estrogen treatment," said the study's first author, Dr. Soban Umar, a UCLA Department of Anesthesiology researcher who has studied pulmonary hypertension and right-ventricular heart failure and is a key member of Eghbali's laboratory team. "These findings suggest that even short-term estrogen therapy may suffice to reverse the disease."

All rats with severe pulmonary hypertension that were treated with estrogen survived by the study's end. Only 25 percent of the untreated rats survived.

The team also explored how estrogen could work in reversing the disease by studying several cellular and molecular mechanisms. They found that the number of inflammatory cells in rats with pulmonary hypertension increased five-fold, compared with normal rats. In the animals treated with estrogen, this was reversed to normal. The team found that estrogen reduced regulation of a pro-inflammatory gene that also plays a key role in disease development caused by pulmonary hypertension. They also found that estrogen had an inhibitory effect on lung fibrosis. In addition, the team observed that estrogen therapy restored blood vessels in the lungs and right ventricle whose loss is associated with the disease.

Further study identified that estrogen exerts its biological effects on pulmonary hypertension through a receptor called estrogen receptor beta, a protein that regulates estrogen's activity in the body.

"Estrogen appears to work through an interplay of several factors, including suppression of lung inflammation and fibrosis, as well as reversal of ventricle enlargement," Eghbali said. "We may be able to utilize estrogen receptor beta in the development of future therapies to stimulate estrogen activity to treat pulmonary hypertension." Researchers had also tested estrogen receptor alpha, the other receptor that controls estrogen activity, but found that it wasn't as effective in treating pulmonary hypertension.

Eghbali added that estrogen receptor beta may prove to be a favorable therapeutic target, since this receptor may require only a short treatment duration and low dosage and has less pro-estrogenic effects on the breasts and uterus than estrogen receptor alpha.

Pulmonary hypertension affects mostly younger women, despite the fact that females in this age group should be under the protective benefits of natural estrogen produced by the body, Eghbali said.

"These patients may have a genetic mutation that is interfering in how estrogen receptor beta directs estrogen activity that is leading to pulmonary hypertension," she said.

Her team's next step is to explore these genetic questions. Currently, Umar and Eghbali are collaborating with UCLA pulmonary hypertension physicians to investigate gender-related issues and to define the role of estrogen in patients with this deadly disease.

The study was funded by the National Institutes of Health.

Additional authors included Andrea Lorga, Humann Matori, Rangarajan Nadadur, Jingyuan Li and Federica Maltese of the department of anesthesiology in the division of molecular medicine at the Geffen School of Medicine, and Arnoud van der Laarse of the department of cardiology at Leiden University Medical Center in the Netherlands.

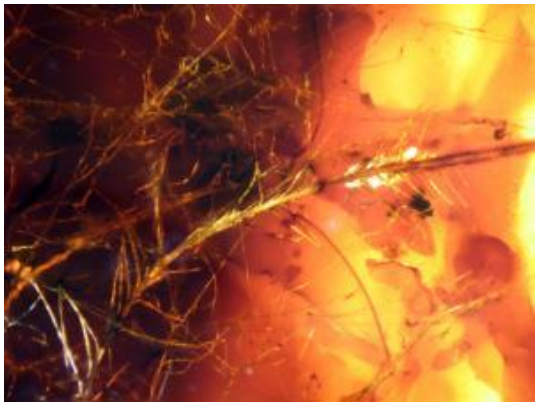
http://www.newscientist.com/article/dn20921-advanced-birds-lived-alongside-hairy-dinosaurs.html

Advanced birds lived alongside 'hairy' dinosaurs

17:06 15 September 2011 by Michael Marshall

By the late Cretaceous, about 80 million years ago, birds had evolved feathers for flying or diving, but they lived alongside dinosaurs with primitive feathers like hair. Both kinds of feathers have been found together, preserved in amber.

The feathers offer a snapshot of late Cretaceous life, says Ryan McKellar of the University of Alberta in Edmonton, Canada. He identified 11 pieces of amber from the same Canadian deposit, dating from 79 to 78 million years ago. Two were donated by amateur fossil hunters, and the rest had sat unremarked in a museum for 15 years.

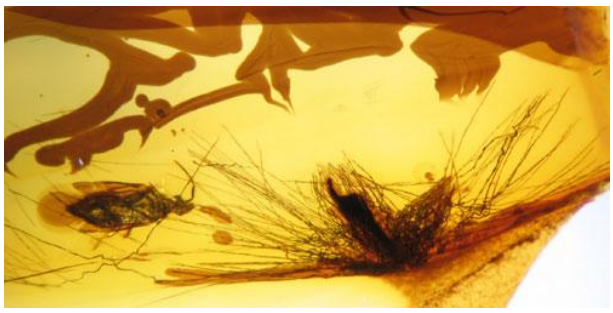


The amber, which is fossilised resin, contains fragments of feather between 2 and 8 millimetres long that were probably blown in as the resin dribbled down a tree trunk. Although small, they are exquisitely preserved.

The dinosaur feathers are primitive, thin filaments that look similar to mammalian hair but are much thinner and lack the scales that cover ordinary hair. Some appear to have been arranged evenly in a pelt, while others are in tufts. Their colour ranges from medium to dark brown. McKellar thinks the simple feathers helped keep dinosaurs warm, and endured until the animals died out.

A barb from a bird feather trapped in late Cretaceous amber **(Image: Science/AAAS)**

By contrast, the preserved bird feathers resemble those of modern birds. McKellar says some are clearly flight feathers, in line with fossil evidence that flight had evolved long before 80 million years ago.



Others have a coiled design that would have absorbed water. Modern grebes have similar feathers to help them dive into water, suggesting that the Cretaceous feathers served the same purpose.

The co-existence of groups with primitive and advanced feathers had been suspected, but McKellar's find is proof, says Mark Norell of the American Museum of Natural History in New York.

Late Cretaceous amber containing a cross section of a feather, with barbules that are coiled at their base. Such structures are found in modern-day diving birds **(Image: Science/AAAS)**

Journal reference: Science, DOI: 10.1126/science.1203344

http://www.eurekalert.org/pub_releases/2011-09/ci-dsd090911.php

Diamonds show depth extent of Earth's carbon cycle

Scientists have speculated for some time that the Earth's carbon cycle extends deep into the planet's interior, but until now there has been no direct evidence.

Washington, D.C. - The mantle–Earth's thickest layer –is largely inaccessible. A team of researchers analyzed diamonds that originated from the lower mantle at depths of 435 miles (700 kilometers) or more, and erupted to the surface in volcanic rocks called kimberlites. The diamonds contain what are impurities to the gemologist, but are known as mineral inclusions to the geologist. Analysis shows compositions consistent with the mineralogy of oceanic crust. This finding is the first direct evidence that slabs of oceanic crust sank or subducted into the lower mantle and that material, including carbon, is cycled between Earth's surface and depths of hundreds of miles. The research is published in the September 15, 2011, online Science Express.

The mantle extends from as little as 5 to 1,800 miles (10-2,900 kilometers) beneath the Earth's surface. Most diamonds are free from inclusions and come from depths less than 120 miles (200 km). But in a few localities researchers have found super-deep diamonds from the depths of the convecting upper and lower mantle, as well as the transition zone in between. Whereas inclusions in diamonds from the depths of the upper mantle and transition zone have been consistent with a surface-rock origin, none from the lower mantle have borne this signature until now.

The team,* which included Carnegie scientists, was led by former Carnegie postdoctoral fellow Michael Walter, now a professor at the University of Bristol, UK. The scientists analyzed minute (one to two hundredths of a millimeter) mineral grains from six diamonds from the Juina region in Brazil. The analysis showed that diamond inclusions initially crystallized as a single mineral that could form only at depths greater than 435 miles (700 km). But the inclusions recrystallized into multiple minerals as they were carried up to the surface - first probably from a mantle upwelling known as a plume, then as they erupted to the surface in kimberlites

The diamonds were analyzed for carbon at Carnegie. Four of the diamonds contained low amounts of carbon-13, a signature not found in the lower mantle and consistent with an ocean-crust origin at Earth's surface. "The carbon identified in other super-deep, lower mantle diamonds is chiefly mantle-like in composition," remarked co-author Steven Shirey * at Carnegie. "We looked at the variations in the isotopes of the carbon atoms in the diamonds. Carbon originating in a rock called basalt, which forms from lava at the surface, is often different from that which originates in the mantle, in containing relatively less carbon-13. These super-deep diamonds contained much less carbon-13, which is most consistent with an origin in the organic component found in altered oceanic crust."

"I find it astonishing that we can use the tiniest of mineral grains to show some of the motions of the Earth's mantle at the largest scales," concluded Shirey.

** The researchers on the paper are M.J. Walter, S. Kohn, G. Bulanova, and C. Smith of University of Bristol, UK; D. Araujo of Universidade de Brasilia-DF Brazil; A. Steele of Carnegie's Geophysical Laboratory, and S. Shirey, E. Gaillou, and J. Wang of Carnegie's Department of Terrestrial Magnetism. Funding was provided by the NSF in the US, the National Environmental Research Council (NERC) in the UK, and the Carnegie Institution for Science.*

http://www.eurekalert.org/pub_releases/2011-09/ci-tpd091211.php

Tatooine-like planet discovered

A planet with two suns may be a familiar sight to fans of the "Star Wars" film series, but not, until now, to scientists.

Washington, D.C. - A team of researchers, including Carnegie's Alan Boss, has discovered a planet that orbits around a pair of stars. Their remarkable findings will be published Sept. 16 in Science.

This is the first instance of astronomers finding direct evidence of a so-called circumbinary planet. A few other planets have been suspected of orbiting around both members of a dual-star system, but the transits of the circumbinary planet have never been detected previously.

The team, led by Laurance Doyle of the Carl Sagan Center for the Study of Life in the Universe at the SETI Institute, used photometric data from the NASA Kepler space telescope, which monitors the brightness of 155,000 stars.

They found the binary star system by detecting a system where the stars eclipsed each other from the perspective of the Kepler spacecraft. These stars have two eclipses: A primary eclipse when the larger star is partially blocked by the smaller star and a secondary eclipse where the smaller star is fully blocked by the larger star.

But the researchers also noticed other times when the brightness of the two stars dropped, even when they were not in an eclipse position. This pattern suggested that there was likely a third object involved. The fact that these so-called tertiary and quaternary eclipses recurred after varying intervals of time, and were of different depths, indicated that the stars were in different positions in their orbit at each instance. This result showed that the tertiary and quaternary eclipses were being caused by something circling both stars, and not an object circling one or the other star.

Measurements of the variations in the timing of all four types of eclipses, resulting from the mutual gravitational interactions of the two stars and the third body, demonstrated that the third object was, indeed, a planet. Their work indicates that the planet is less massive than Jupiter, possibly comparable in mass to Saturn, and that the larger of the two binary stars is smaller than our Sun.

"This discovery is stunning," Boss said. "Once again, what used to be science fiction has turned into reality."

Funding for the Kepler Discovery mission was provided by NASA's Science Mission Directorate. Various researchers were funded by the NASA Kepler Participating Scientist program, NASA Hubble Fellowship grants awarded by the Space Telescope Science Institute, which is operated by the Association of Universities for research in Astronomy Inc. for NASA, support from the NASA Origins program, and the Hungarian OTKA grant.

http://www.eurekalert.org/pub_releases/2011-09/tju-suc083111.php

Study update: Cancer information on Wikipedia is accurate, but not very readable

Lead researcher: 'I recommend to my patients that they start with PDQ, where they are less likely to get lost in jargon and hyperlinks'

PHILADELPHIA - It is a commonly held that information on Wikipedia should not be trusted, since it is written and edited by non-experts without professional oversight. But researchers from the Kimmel Cancer Center at Jefferson have found differently, according to a study published online Sept. 15 in the Journal of Oncology Practice.

Reassuringly, they found that cancer information found on a wiki was actually similar in accuracy and depth to the information on a peer-reviewed, patient-oriented cancer web site. There is one caveat, however: they found that the information on the peer-reviewed site was written in plainer English.

Data from this study was presented at the 2010 ASCO Annual Meeting in Chicago, but the full study, with some new details, was published online Sept. 15.

New data revealed that Wikipedia ranks higher in search engine results and updates faster. It also shed light on those hyperlinks embedded into content: Wikipedia takes you to more dense information, the researchers found, whereas a peer-reviewed site offer up a simplified, shorter explanations.

For the study, researchers led by Yaacov Lawrence M.D., adjunct assistant professor of Radiation Oncology at Jefferson Medical College of Thomas Jefferson University, and currently Director of the Center for Translational Research in Radiation Oncology at the Sheba Medical Center in Israel, compared the cancer information found on Wikipedia with the information found on the patient-oriented section of the National Cancer Institute's Physician Data Query (PDQ), a comprehensive peer-reviewed cancer database.

"There are a vast number of web sites where patients can obtain cancer information," Dr. Lawrence said. "The purpose of this study was to answer one question: Is the cancer information on Wikipedia correct? Reassuringly, we found that errors were extremely rare on Wikipedia. But the way information was presented on PDQ is more patient-friendly."

Dr. Lawrence and his colleague Malolan Rajagopalan, M.D.,from the University of Pittsburgh, started by choosing ten cancer types and selecting key factual statements for each cancer from standard oncology textbooks. The material covered epidemiology, etiology, symptoms, diagnosis, treatment and controversial topics in cancer care.

Medical student volunteers examined the PDQ and Wikipedia articles against the prepared statements. The web pages were printed out to ensure that each individual looked at the same version of the articles. Standard algorithms were used to calculate readability based upon word and sentence length.

For both web sites, inaccuracies were extremely rare: less than two percent of the information on either site was discordant with that presented in the textbooks. There was no difference between the sites in depth of coverage. Both sites poorly discussed controversial aspects of cancer care.

For example, they both scored poorly for coverage of options for prostate cancer, including watchful waiting versus radiation treatments. "The issues were not really dealt with in depth," said Dr. Lawrence.

But the PDQ site was notably more readable: whereas PDQ was written at a level suitable for a 9th grader, Wikipedia was written at a level suitable for a college student. This difference was highly statistically significant.

Researchers also found that Wikipedia ranked among the first 10 results for most search engines, including Google, for various medical terms and diseases tested, surpassing professionally maintained, government Web sites.

The research revealed that Wikipedia updates faster than PDQ; however, the hyperlinks embedded within Wikipedia take the user to more dense information. PDQ takes you to more simplified explanations on the content a user clicks on for more information.

"PDQ's readability is doubtless due to the site's professional editing, whereas Wikipedia's lack of readability may reflect its varied origins and haphazard editing," Dr. Lawrence said. "Overall our results are reassuring: on the one hand Wikipedia appears to be extremely accurate, on the other, the resources invested in the creation and upkeep of the PDQ are clearly justified.

"The sites appear to be complementary – but I recommend to my patients that they start with PDQ where they are less likely to get lost in jargon and hyperlinks."

The next step is to repeat the study with cancer patients to truly determine how this difference in readability impacts upon patients' understanding and retention of information, Dr. Lawrence said.

http://www.bbc.co.uk/news/world-14930778

Big drop in children under five dying, says UN report

The number of children under five who die each year has plummeted from 12 million in 1990, to 7.6 million last year, the UN says.

The reasons for the change include better access to health care and immunisation, says a report by Unicef and the World Health Organization. But they warn that more needs to be done to reach UN development goals on reducing child mortality. About 21,000 children are still dying every day from preventable causes.

But even the poorest regions have made progress. Child mortality in sub-Saharan Africa is declining twice as fast as it was a decade ago. "Focusing greater investment on the most disadvantaged communities will help us save more lives, more quickly and more cost effectively," said Anthony Lake, the executive director of Unicef.

Many factors are contributing to reductions in child mortality, including better healthcare for newborns, prevention and treatment of childhood diseases, clean water and better nutrition.

Most improved

Sierra Leone in West Africa - one of the world's poorest nations - ranks among the top five countries seeing improvements in child mortality in the past decade. The others were Niger, Malawi and Liberia - also in Africa - and East Timor in South East Asia. One of the reasons for Sierra Leone's success is that the government scrapped all fees for child and maternal health, said Ian Pett, the chief of health systems at Unicef.

About half of all deaths among under fives in the world took place in just five countries in 2010 - India, China, Pakistan, Nigeria and Democratic Republic of Congo.

Babies are particularly vulnerable. According to the report, more than 40% of deaths in children under the age of five occur within the first month of life and more than 70% in the first year of life. In sub-Saharan Africa, one in eight children die before reaching the age of five. That compares with one in 143 children dying before five years old in developed countries.

http://www.bbc.co.uk/news/health-14928217

Eyelid marks warn of heart attack

By James Gallagher Health reporter, BBC News

Yellow markings on the eyelids are a sign of increased risk of heart attack and other illnesses, say researchers in Denmark.

A study published on the BMJ website showed patients with xanthelasmata were 48% more likely to have a heart attack. Xanthelasmata, which are mostly made up of cholesterol, could be a sign of other fatty build-ups in the body.

Cardiologists said the findings could be used by doctors to help diagnose at-risk patients.

The research team at the Herlev Hospital in Denmark started following 12,745 people in the 1970s.

At the start of the study, 4.4% of patients had xanthelasmata.

Yellow alert

Thirty three years later, 1,872 had had a heart attack, 3,699 had developed heart disease and 8,507 had died - and the data showed that those with the yellow markings around the eyes were at greatest risk.

Those with the markings were 48% more likely to have a heart attack, 39% more likely to have developed heart disease and 14% more likely to have died during the study.

The authors believe patients with xanthelasmata may be more likely to deposit cholesterol around the body.

A build up of fatty material in the walls of arteries - known as atherosclerosis - leads to stroke and heart attack.

For both men and women in several age groups, the data said there was a one in five chance of developing heart disease in the next decade if the patient had xanthelasmata.

The authors said such patients were "generally considered to be at high risk" and should have "lifestyle changes and treatment to reduce [bad] cholesterol."

However they warned that: "Today, most people with xanthelasmata are seen by dermatologists, when they want their xanthelasmata removed for cosmetic reasons.

"Some of these people may not have been managed according to their increased risk of cardiovascular disease."

A review of the study, by US cardiologists Antonio Fernandez and Paul Thompson, concluded that: "Xanthelasmata could be used by general clinicians to help identify people at higher risk of cardiovascular disease."

Judy O'Sullivan, senior cardiac nurse at the British Heart Foundation, said: "There are many different techniques to predict someone's risk of developing heart disease in the future, none of which are perfect. The most important thing is that any one of these techniques is used in the first place."

http://www.bbc.co.uk/news/magazine-14930062

How can birds teach each other to talk?

By Megan Lane BBC News Magazine

Wild parrots in Australia are apparently picking up phrases from escapee pet cockatoos who join their flocks. Why - and how - can some birds talk?

Those strolling in Sydney's parks are being startled by squawks of "Hello darling!" and "What's happening?" from the trees.

Wild birds such as galahs, sulphur-crested cockatoos and corellas are repeating phrases passed on by domesticated counterparts that escaped or were released, says naturalist Martyn Robinson, of Sydney's Australian Museum. The museum has received numerous reports of talkative wild birds from startled members of the public.

Birds are social creatures, and chicks learn to communicate by imitating the sounds made by their parents and those at the top of the flock's pecking order. Unlike humans, birds do not have vocal cords. Instead, they are thought to use the muscles and membranes in their throats - specifically the syrinx - to direct airflow to make tones and sounds.

Not all birds can learn to make entirely new sounds. To date, only three groups of distantly related birds have been found to have this ability: songbirds; parrots such as cockatoos and parakeets; and hummingbirds.

"These birds are very smart birds and very social, and communication and contact is important between them," Robinson told Australia's Daily Telegraph. "So the pet bird begins to say things it's been taught by its owner and the rest of the flock learns and starts speaking too, to mimic the pet bird." Although parrots can make noises that sound like words, they're just mimicking sounds they find appealing, says Les Runce of the UK's Parrot Society. "It may be a nursery rhyme, a football chant, a microwave pinging or a phone ringing."

Young birds, like human babies, learn to speak or sing through imitation, says behavioural biologist Johan J Bolhuis, of Utrecht University in the Netherlands. In research published in August in Neuroscience Research, he describes "a transitional period of early vocalisation, which is called 'babbling' in humans and 'subsong' in birds." And, he tells the BBC News website, parrots and some songbird species can learn throughout their lives, such as the Sydney example.

"I have studied budgerigars - small parrots - that can teach each other to speak Japanese words. "In this and other research we found that the brains of these birds are organised in a similar way to human brains with regard to vocal learning. Also, the same genes are involved in song and speech." He adds that birdsong has a "primitive grammar" that is quite different from the complex grammar of human language. "Bird research can teach us a lot about the development of human speech and the problems that may occur - stuttering, for instance. So, parrots and songbirds may hold important clues as to how we humans can learn to speak and acquire languages."

Talk is cheep

Woman listens to a talking African Grey parrot
Parrots - a group that includes cockatoos, budgerigars and parakeets - are among the most intelligent birds
They are proficient mimics, and may imitate human voices and sounds such as car alarms
Lyrebirds can imitate other birds, and foresters and their chainsaws
Songbirds, dolphins and humans are also good mimics – but not apes, our closest relations

Parrot fanciers keen to teach their own pretty polly to talk may have to repeat their chosen phrase over and over. But the bird may pick it up after a single listen. "Parrots have good memories and only need to hear a sound once to reproduce it," says Runce. "A friend's daughter had an ingrown toenail, banged it and let out an almighty shriek. Their bird has still got that one, and that was 30 years ago."

http://www.ljmu.ac.uk/NewsUpdate/index_120774.htm

Does running explain the naked ape?

Compared with other mammals of similar size, humans are odd-looking creatures because they lack body hair and stand upright.

This difference has puzzled zoologists for decades, and speaking at the British Ecological Society's Annual Meeting earlier this week, LJMU's Dr David Wilkinson explained how better computer models are shedding light on this contentious issue. According to Dr Wilkinson, who illustrated his talk with pictures of the near naked combatants in David's Intervention of the Sabine Women and the statue of Adam, clad only in a fig leaf, in Milan Cathedral: "Most major western art galleries contain paintings or sculptures of the human nude, yet

viewed through the eyes of a zoologist rather than an art lover these representations show remarkably odd animals that have lost their body hair and walk upright."

One of the most important explanations of why we look so odd was proposed by LJMU's Dean of Science, Professor Peter Wheeler. In a series of seminal papers published in the 1980s and early 1990s based on mathematical models, he suggested our lack of hair and upright stance were adaptations that helped early humans keep cool on a hot African savanna.

Performed before powerful computers were widely available, Professor Wheeler's calculations – which were done on a programmable electronic calculator – could not take into account the impact of running on early humans' thermal ecology. Humans are adept at endurance running but exercise produces internal heat, a major issue for active animals in hot environments.

One influential theory proposed after Wheeler's work suggests that endurance running, used to run animal prey into the ground, played an important role in our evolution. This theory is, however, contentious, so Dr Wilkinson and Professor Graeme Ruxton of the University of Glasgow used new data and more powerful computers to revisit Wheeler's model – with intriguing results.

Dr Wilkinson says.

"In earlier models our virtual ancestors stood still in a gentle breeze, but our new model allows them to run around. This means we can investigate the theory that human body shape is an adaptation which allowed our ancestors to run for long distances in hot conditions."

The model shows endurance running requires high rates of sweating and areas of hairless skin similar to modern humans. "Our model suggests that although the earliest upright humans may well have walked from place to place or run short distances – perhaps to a tree to escape predators – they could not run long distances to catch their supper. Humans are unusually sweaty mammals and our results show just how important sweating rates are in allowing long-distance running in the tropics,"he explains.

The meeting will also learn what the new model reveals about why we walk upright and have lost most of our body hair. "The model predictions suggest to us that upright stance probably evolved not to keep us cool, but for other reasons," says Dr Wilkinson. "In my view, Wheeler's ideas still provide one of the most plausible explanations for why we lost most of our body hair, but I am more sceptical about his explanations for why we started walking upright. Without the ecological pressures of hot African habitats during our evolution modern artists might today be drawing much hairier life models."

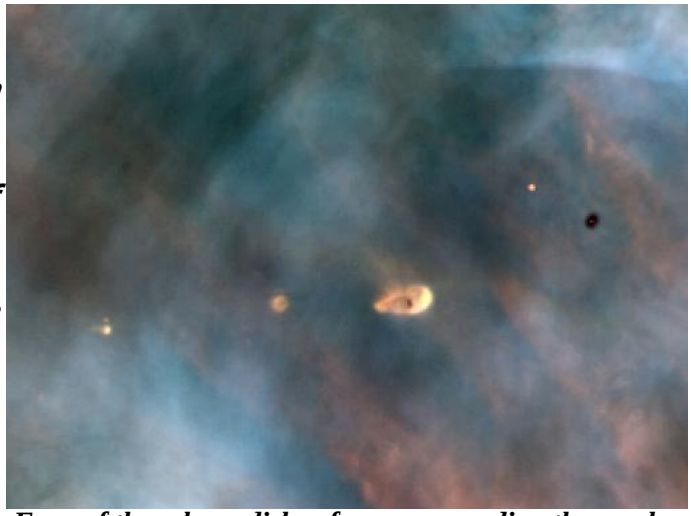
Dr David Wilkinson, Reader in Environmental Science at the School of Natural Sciences and Psychology, presented his full findings on 13 September 2011 to the British Ecological Society's Annual Meeting at the University of Sheffield. The story was featured internationally by the press which in the UK included The Daily Telegraph and coverage on The Daily Mail website: http://www.dailymail.co.uk/sciencetech/article-2036740/Hair-Why-lost-locks-run-faster-catch-food.html

Further details: *The paper containing the results on endurance running is Graeme D Ruxton and David M Wilkinson (2011), "Thermoregulation and endurance running in extinct hominins: Wheeler's models revisited", Journal of Human Evolution, 61, 169-175, doi: 10.1016/j.jhevol.2011.02.012.*

http://www.physorg.com/news/2011-09-rocky-planets-born-gas-giants.html

Rocky planets could have been born as gas giants

When NASA announced the discovery of over 1,200 new potential planets spotted by the Kepler Space Telescope, almost a quarter of them were thought to be Super-Earths. Now, new research suggests that these massive rocky planets may be the result of the failed creation of Jupiter-sized gas giants.



Most astronomers currently believe planets are created by a method known as core accretion. Giant disks of gas circle newborn stars. Grains in these disks bond together to form larger objects known as planetesimals, which collide, creating larger and larger clumps of material. When the clumps reach a critical mass, their gravity pulls in gas from the disk around them.

Five baby stars stand out in this image of the Orion Nebula. Four of them have disks of gas surrounding them, where new planets could be forming. **Credit: C.R. O'Dell/ Rice University/ NASA**

But last summer, Sergei Nayakshin of the University of Leicester in the United Kingdom proposed a new theory for planetary formation. Known as "tidal downsizing," it works at a faster pace.

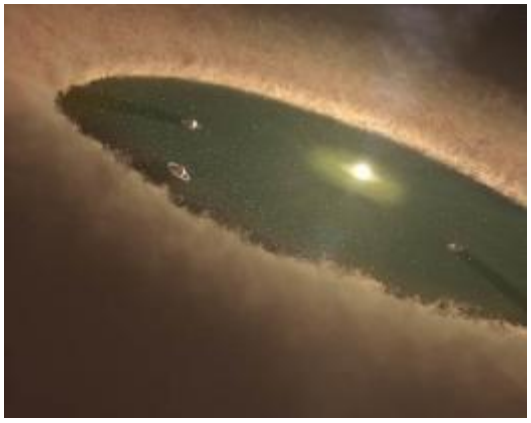
In tidal downsizing, a gas disk first forms massive gas clumps farther out in space than where most of the planets discovered so far reside in their solar systems. Left to their own devices, these clumps would cool and contract into very massive (~10 Jupiter mass) planets. Nayakshin showed that during this contraction dust grains grow to large sizes and then fall to the center of the gas clump, forming a massive solid core there – the proto-rocky planet within the much more massive gas cocoon.

"Once you have a core, it may build up an atmosphere around it," Nayakshin explained. "The atmosphere is dominated by hydrogen, but it is much more chemically-rich than the primordial dust material."

The more massive the rocky core, the more massive the atmosphere around it, and it grows with time. Given time, such a mix would result in a giant gas planet with a solid core inside, for example, a super-Jupiter.

However, the surrounding disk pushes the planet in, closer to the star, and there the outer layers of the gas envelope start to be disrupted and actually consumed by the star.

Building on this theory, Nayakshin determined that Super-Earths and other terrestrial planets could, in fact, be the cores of more massive proto-planets that did not have time to mature and were instead robbed of most of their gas by their parent stars. Rocky cores and close atmospheres could survive this disruption process because they are much denser. His paper describing this mechanism appeared in the August edition of the Monthly Notices of the Royal Astronomical Society. "The remaining core is pretty much a rocky planet, with a mass anywhere from almost zero to ten or so Earth masses," Nayakshin said. This means the resulting planet could wind up close to their parent star - or farther away, in the area known to astronomers as the habitable zone.



As planetesimals drift toward their star, they should clear out a path from the gas they move through. Some of that gas helps the planet to grow. **Credit: NASA/ JPL-Caltech/ T. Pyle (SSC**

Differing from star to star, the "habitable zone" is the area where water can exist as a liquid on the surface of a rocky world. Planets orbiting within this range are considered the most likely to host life.

In this respect, Aaron Boley of the University of Florida says that if planets do form as described by the tidal disruption theory, then planets may be able to form in systems that are unfavorable to the core accretion mechanism, such as in disks with little dust. Although he did not work with Nayakshin, he explored a similar theory early last year. "I like to think of the mechanisms as opposites," he said. "One is bottom up - core accretion - and the other is top down - tidal disruption."

Boley, who has done extensive research on the formation of gas giant planets and the evolution of planet-forming disks, believes that tidal disruption makes it more likely for life to evolve in a wider variety of stellar systems. "It is another way Nature can make planets," Boley said. And more planets mean more chances at life.

As a new theory, Nayakshin admits that there are many detailed calculations left to perform. He expressed hope that other scientists would help him put his theory to the test.

In last year's paper, Nayakshin expressed the idea that tidal downsizing capitalized on the best of the core accretion model and competing (though more often challenged) model of gravitational instability, while neutralizing the problems in both.

Gravitational instability allows for the rapid creation of planetesimals at a distance from the star, but it doesn't allow them to migrate inward. As such, it can't account for many of the closer planets seen today.

"Tidal downsizing and core accretion are both mechanisms that can form a wide range of planets," Boley said. "They occur during different stages of a proto-planetary disk's lifetime, and are not mutually exclusive."

Core accretion has a difficult time forming planets in more distant orbits over a long period of time. Gravitational instability quickly forms them farther out, where they remain unless they can migrate inward. Tidal downsizing requires that they migrate inward fast enough to have their envelopes removed by tides from their star.

Nayakshin noted that the models contain similar physical steps, but in different proportions.

"In this sense, the final model is likely to be a composite."

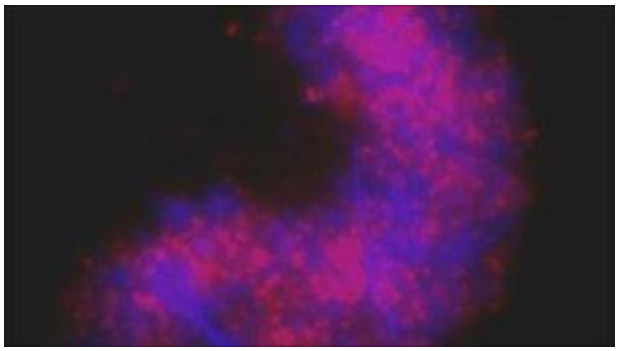
Boley expressed interest in watching the new theory develop, and seeing how well it stood against up to the more popular model of core accretion.

“Progress is made in science by taking testable ideas and trying to use them until they are proved wrong,” he said. *Provided by Astrobio.net*

http://www.bbc.co.uk/news/uk-england-south-yorkshire-14945614

Glowing wound dressing indicates infection

A wound dressing that glows to indicate an infection has been developed.



Scientists at Sheffield University have produced a gel containing molecules that bind to bacteria and activate a fluorescent dye. The dressing emits a pinkish glow under ultraviolet light when harmful levels of bacteria are present. It should help doctors treating chronic wounds such as ulcers. Army medics could also use it to identify soldiers with infected battlefield injuries.

Part of the funding for the research has come from the Defence Science and Technology Laboratory, an agency of the Ministry of Defence.

It is hoped that testing on patients will begin within two years.

The polymers activate a pink fluorescent dye when they come into contact with bacteria

Bugs eradicated

Professor Sheila MacNeil, one of the researchers at the University of Sheffield, said: "If you know you've got infection it's going to change how you treat your soldiers, it's going to change how you're going to treat those patients in the home. "We could get to an early-stage clinical trial in two to three years."

As well as shining a spotlight on bacteria, the gel can rid a wound of up to 80% of surface bugs in about three hours. Currently, it takes several days to determine significant levels of bacterial infection by growing swab samples in the laboratory. Bacteria highlighted by the dressing include those which cause legionella, salmonella, E. coli, MRSA, C difficile, meningitis and peritonitis.

Project leader Dr Steve Rimmer, also from the University of Sheffield, said: "The availability of these gels would help clinicians and wound care nurses to make rapid, informed decisions about wound management, and help reduce the overuse of antibiotics."

http://news.discovery.com/history/zombie-skeletons-ireland-grave-110916.html

Did Zombies Roam Medieval Ireland?

Two 8th-century skeletons with stones shoved in their mouths suggest that the people of the time thought so.

By Rossella Lorenzi | Fri Sep 16, 2011 09:31 AM ET

Two early medieval skeletons were unearthed recently in Ireland with large stones wedged into their mouths - evidence, archaeologists say, that it was feared the individuals would rise from their graves like zombies. The skeletons, which were featured in a British documentary last week, emerged during a series of digs carried out between 2005 and 2009 at Kilteasheen, near Loch Key in Ireland by a team of archaeologists led by Chris Read from the Institute of Technology in Sligo, Ireland and Thomas Finan from the University of St. Louis. The project recovered a total of 137 skeletons, although archaeologists believe that some 3,000 skeletons spanning from 700 to 1400 are still buried at the site.

This 8th-century skeleton was found in Ireland recently with a large stone shoved in its mouth. **Chris Read**

The "deviant burials" were comprised of two men who were buried there at different times in the 700s.

One of the men was between 40 and 60 years old, and the other was a young adult, probably between 20 and 30 years old. The two men were laid side by side and each had a baseball-sized rock shoved in his mouth.

"One of them was lying with his head looking straight up. A large black stone had been deliberately thrust into his mouth," Chris Read, head of Applied Archaeology at IT Sligo, said. "The other had his head turned to the side and had an even larger stone wedged quite violently into his mouth so that his jaws were almost dislocated," he added.

Initially, Read and colleagues thought they had found a Black Death-related burial ground. Remains of individuals buried at the end of the Middle Ages with stones stuck in their mouths have hinted at vampire-slaying rituals. It was believed that these "vampire" individuals spread the plague by chewing on their shrouds after dying. In a time before germ theory, the stone in the mouth was then used as a disease-blocking trick.

Since the vampire phenomenon didn't emerge in European folklore until the 1500's, the archaeologists ruled out this theory for the 8th century skeletons.

"In this case, the stones in the mouth might have acted as a barrier to stop revenants from coming back from their graves," Read told Discovery News.

Revenants or the "walking dead" tended to be people who lived as outsiders in society, according to Read.

The two Irish men could have been considered potentially dangerous people, such as enemies, murderers, rapists or they could have been ordinary individuals who died suddenly from a strange illness or murder.

Anything outside the norm would have caused the community to fear that these people could have come back to life to harass their loved ones or others against whom they had a grudge.

The mouth was seen as a key part of the body for such a transformation. "It was viewed as the main portal for the soul to leave the body upon death. Sometimes, the soul could come back to the body and re-animate it or else an evil spirit could enter the body through the mouth and bring it back to life," Read said.

According to Kristina Killgrove, a biological anthropologist at the University of North Carolina, the burials' dating is particularly interesting as it appears to predate historical records on revenants.

"I'm also intrigued by the fact that the two males were not buried at the same time but were nonetheless buried side-by-side in this non-traditional manner, which suggests these burials were not accidental or careless," Killgrove told Discovery News.

http://www.newscientist.com/article/dn20926-neutron-star-smashups-may-forge-gold.html

Neutron star smash-ups may forge gold

16:47 16 September 2011 by Celeste Biever

Where did all the gold come from? Violent collisions between dense former stars may be why gold, lead, thorium and other heavy elements exist in such abundance.

Only hydrogen, helium and lithium were present after the big bang. Ordinary stars then fused elements up to the mass of iron. Anything heavier was created when smaller atoms captured neutrons, some of which then decayed into protons. A slow version of this process might occur in massive stars, but that could only account for about half of the remaining heavy elements. Rapid neutron capture is needed to explain the other half, including gold and lead, says Hans-Thomas Janka at the Max Planck Institute for Astrophysics in Garching, Germany. Now new simulations by his team show that mergers of neutron stars can do the trick.

Neutron soup

These remnants of exploded stars contain an ultradense soup of particles, perfect conditions for rapidly squeezing neutrons into nuclei to form heavy elements. And when neutron stars collide in mergers, this element-making material gets thrown out. In the team's simulations, neutron-star mergers produced the required heavy elements in the proportions thought to exist in our galaxy. The absolute amounts of the elements produced per merger were also consistent with existing data and models.

Next the team will simulate mergers between neutron stars and black hole, which may also create the right conditions for rapid neutron capture: although in some cases nothing escapes such a smash, in other mergers the neutron star gets stretched and some of the matter near the far end escapes the gravitational pull of the black hole.

A remaining mystery is how trace amounts of heavier atoms came to be present in ancient stars present at the dawn of the Milky Way. Neutron star mergers are likely not responsible, as the stars tend to take 100 million years or so to spiral towards each other. "We need some other source to produce elements in super-old stars," Janka says. *Journal reference: The Astrophysical Journal Letters, DOI: 10.1088/2041-8205/738/2/L32*

http://www.physorg.com/news/2011-09-bottle-brighten-millions-poor-homes.html

Light from a water bottle could brighten millions of poor homes (w/ video)

As simple as it sounds, a one-liter plastic bottle filled with purified water and some bleach could serve as a light bulb for some of the millions of people who live without electricity.

Originally developed by MIT students, the "solar bottle bulb" is now being distributed by the MyShelter Foundation to homes throughout the Philippines. The foundation's goal is to use this alternative source of daylight to brighten one million homes in the country by 2012.

In order to make the water bottles "light up," holes are cut in the metal roofs of homes and a bottle is placed and sealed into each hole so that its lower half emerges from the ceiling. The clear water disperses the light in all directions through refraction, which can provide a luminosity that is equivalent to a 55-watt electric light bulb, according to the MyShelter Foundation. The bleach prevents mold growth so that the bulbs can last for up to five years.

Screenshot of a solar bottle bulb from the video below. Image credit: Isang Litrong Liwanag

Although the solar bottle bulb only works during the day, it can meet the needs of many of the people in Manila, Philippines, and other cities, where the homes are so close together that very little sunlight can enter through the windows. As a result, the homes are dark even during the day.

The solar bottle bulbs' advantages include sustainability and safety; compared with candles or faulty electrical connections, they aren't a fire hazard. The bulbs are also inexpensive to make and install, and of course have no operating costs while in use.

The MyShelter Foundation is promoting the solar bottle bulbs as the Isang Litrong Liwanag ("A Liter of Light") project. In Manila, the city government paid for the bulbs while the foundation is training residents on how to make and install them.

http://www.nytimes.com/2011/09/16/health/16hip.html

Metal Hips Failing Fast, Report Says

By BARRY MEIER

In a troubling development for people with all-metal artificial hips, a registry that tracks orthopedic implants in Britain reported on Thursday that the failure rate of the devices was increasing.

The National Joint Registry for England and Wales said that an all-metal artificial hip once sold by Johnson & Johnson had failed in an estimated one-third of the patients who had been followed for the longest time. The device was recalled by the company last year. The British registry also found that the early failure rate of some other "metal-on-metal" hips - ones in which both the ball and the socket components of an artificial joint are made of metal - was significantly higher than for those made from other materials, including a combination of metal and plastic.

While the patients tracked by the British registry are not in the United States, doctors and patients here pay close attention to the registry's findings because no such body exists in this country, where there is far greater use of artificial hips and knees. Australia also keeps a registry.

There was already heightened concern in the United States about the all-metal hips. In the first six months of this year, the Food and Drug Administration received more reports about problems with the all-metal hips than it had in the previous four years combined, according to an analysis by The New York Times. In May, the F.D.A. took the unusual step of ordering producers of the devices to study how frequently they were failing and to examine the health implications for patients.

While traditional artificial hips typically last 15 years or more before they need to replaced, some of the all-metal models are failing in large numbers of patients within just a few years. Early failure rates for all-metal devices were far higher in women than in men, the British report found.

According to the report, the highest failure rates involved the Johnson & Johnson device, which is known as the Articular Surface Replacement, or the A.S.R. The registry is following about 2,100 patients who received a version of the device that is used as a traditional hip implant. That is also how the A.S.R. was used in this country. Of those patients in the British group who received the device six years ago, about 29 percent have since had it replaced. The percentage is slightly lower, about 17 percent, in patients who got the device five years ago, but that number could rise over the next year.

Asked for a comment about the report, Lorie Gawreluk, a spokeswoman for DePuy, the division of Johnson & Johnson that made the device, said in an e-mail that the six-year replacement rate "should be interpreted with caution because it is based on a small number of cases." DePuy officials recalled the A.S.R. last year around the time that the previous report of the British registry was released.

Along with a traditional hip model, another version of the device was sold outside this country for use in an alternative hip replacement technique known as "resurfacing." It was also recalled.

While it is difficult to draw direct comparisons between device failure rates in Britain and in the United States, the new registry findings appear to bode ill for patients here who received an A.S.R. About 40,000 of the 90,000 units sold worldwide were used in this country.

The British data suggests that complaints will continue to grow in the United States in coming years because the A.S.R. was used overseas before its adoption here. The British data also shows that the failure rate for all-metal devices as a group, even when the A.S.R. is excluded, is accelerating faster than for traditional hip replacements.

Though immediate problems with the hip implants are not life-threatening, some patients have suffered crippling injuries caused by tiny particles of cobalt and chromium that were shed by the metal devices as they wore. Such debris generation is also believed to be a cause of earlier device failure.

Until a recent sharp decline in their use, all-metal hip implants accounted for nearly one-third of the estimated 250,000 replacements performed in this country each year. According to one estimate, some 500,000 patients in this country have received an all-metal replacement hip.

In the case of devices used for hip resurfacing, which is popular among younger patients, a model known as the Birmingham Hip Resurfacing device had the lowest replacement rate at five years, the registry found.

However, the report noted that further studies needed to be performed to determine whether hip resurfacing conferred true advantages over standard hip replacement.

http://www.newscientist.com/article/mg21128304.800-brain-cancer-fits-halted-by-gut-drug.html

Brain cancer fits halted by gut drug

A DRUG for Crohn's disease is proving adept at blocking seizures caused by brain tumours.

Many people with brain cancers called gliomas experience epileptic-like seizures. Fits occur because the transport machinery that gliomas use to move an essential amino acid into the tumour also secretes glutamate, which causes surrounding neurons to fire uncontrollably.

Harald Sontheimer's team at the University of Alabama in Birmingham injected human glioma cells into 14 mice. Eight were given sulphasalazine, a drug which blocks the transport machinery; the rest a control.

Sulphasalazine halved the number of fits (Nature Medicine, DOI: 10.1038/nm.2453). Since sulphasalazine is approved for treating Crohn's disease, and well tolerated by patients, it could be used to treat glioma immediately, says Sontheimer.

http://medicalxpress.com/news/2011-09-miracle-boosting-health-sierra-leone.html

'Miracle' plant boosting health in Sierra Leone

A tropical plant said to be nutritional dynamite is being plugged by Sierra Leone's government as a natural cure-all in the country, which has some of the worst health indicators in the world.

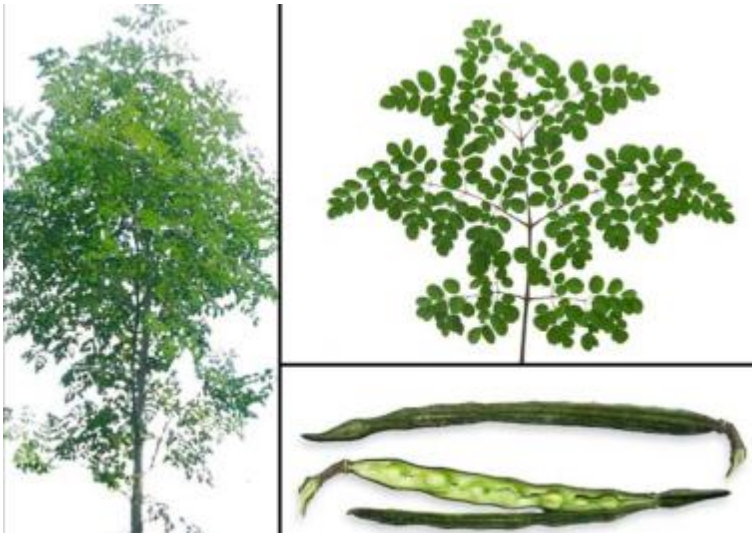
The Moringa plant, native to northern India, has been called the "tree of life" and its use is spreading in Africa, advocates say, where it can prevent diseases and malnutrition and even boost development by creating job opportunities. In Sierra Leone, President Ernest Koroma himself regularly takes Moringa oil, one form of the plant, boasts Jonas Coleman of the country's Moringa Association.

In a recent interview with AFP, Agriculture Minister Sam Sesay described Moringa as "the most nutritious plant on earth, and each and every part of it has nutritional and medicinal values that have the propensity to cure over 300 diseases, including hypertension and diabetes."

"Very soon, the cultivation of the Moringa tropical plant in Sierra Leone may likely put some medical practitioners out of business," he quipped.

Doctors may not agree with that, but they do agree on the value of Moringa.

"It sure is a good herbal plant complementing our medical practice. Anything that provides good health is worth our nod," said private practitioner Harry Sankoh in the northern city of Makeni.



Moringa oleifera ワサビノキ

In Sierra Leone, where some 70 percent live on less than a dollar a day, only one in four children live to see their fifth birthday, according to UN figures. The country, which was ravaged by a decade-long war which ended in 2002, has one doctor for every 17,000 people and one nurse for every 8,000, according to health ministry statistics. It is unclear how the plant first came to Sierra Leone.

The United Methodist Committee on Relief (UMCOR) which has promoted its use in Ghana and Liberia says it first brought the seeds to Sierra Leone in 2001, later training some 150 farmers on how to cultivate it.

Freetown botanist Christian Jones, says: "It is likely that it was one Pakistani soldier serving in the UN Peace mission who discovered the presence of Moringa in the 1990s in the back yard of a house in the capital."

Catholic NGO Caritas recently led a campaign to popularise the use of Moringa by distributing samples in the northern city Makeni, urging some 2,000 residents to replant them in their back yards and farms.

Coleman said "a total of 250,000 seeds were distributed to people across the country last year to engage people in some form of economic venture."

Makeni, however remains the hub of Moringa production where a factory has been established and is marketing the commodity to other parts of the country.

District Forest Officer Fomba James, who has over 15 years of herbal experience, describes Moringa as "a powerhouse of nutritional values. It contains seven times the vitamin C found in oranges, four times the calcium in milk, four times the vitamin A in carrots and three times the potassium in banana," he told AFP.

According to UMCOR's website, the plant contains some 46 antioxidants and is loaded with phytonutrients, which flush toxins from the body, purify the liver and bolster the immune system.

Alimamy Lahai is a Moringa door-to-door salesman, who sells Moringa products in Freetown.

"It is a profitable business as sales are now high given the recent publicity of the product. I sell the powder which is packaged in sachets for about two dollars and the teabags for about four dollars."

In the northern town of Port Loko, tribal headman Jimmy Lagbo told AFP by telephone: "We see it as a cure-all and many folks in my community are no longer visiting the local clinics as they are now using either moringa teabags or sprinkling the powder on their daily meals." *(c) 2011 AFP*

http://www.telegraph.co.uk/news/worldnews/europe/spain/8765346/Neanderthal-man-lived-on-seafood-far-earlier-than-previously-thought.html

Neanderthal man lived on seafood far earlier than previously thought

Neanderthal man lived on a diet of seafood in the caves of southern Spain much longer ago than previously thought, new archaeological findings show.

By Fiona Govan, Madrid

Much as modern day man enjoys tucking into a plateful of seafood paella when visiting the Costa del Sol, Neanderthals living on the Iberian coast 150,000 years ago supplemented their diet with molluscs and marine animals. Archaeological examination of a cave in Torremolinos unearthed early tools used to crack open shellfish collected off rocks along the Iberian coast and found fossilised remains of the early meals.

The discovery is the earliest of its kind in northern Europe and shows that early man were fish eaters in Europe some 100,000 years earlier than previously thought. The findings suggest that early coastal cavemen supplemented their hunter/gatherer diet of nuts, fruits and meat from animals such as antelopes and rabbits with seafood.

A team of archaeologists from Seville University and scientists from the National Council for Scientific Investigation (CSIC) published their research this week after a lengthy investigation involving the scientific dating of fossilised remains from the cave. The Cueva Bajondillo on Andalusia's southern coast near Malaga contained remains of burned mussel shells and barnacles indicating that Middle Paleolithic hominids had collected and cooked the shellfish for consumption.

The discovery suggests that Neanderthals in Europe and Archaic Homo sapiens in Africa were following parallel behavioural trajectories but with different evolutionary outcomes, the paper claims. "It provides evidence for the exploitation of coastal resources by Neanderthals at a much earlier time than any of those previously reported," said Miguel Cortés Sanchez who led the Seville University team. "The use of shellfish resources by Neanderthals in southern Spain started some 150,000 years ago," the paper concluded. "It was almost contemporaneous to Pinnacle Point (in South Africa) when shellfishing is first documented in archaic modern humans."

http://medicalxpress.com/news/2011-09-link-diabetes-drugs-pancreatic-cancer.html

Study suggests possible link between two Type 2 diabetes drugs and pancreatic cancer

Two newer drugs used to treat Type 2 diabetes could be linked to a significantly increased risk of developing pancreatitis and pancreatic cancer, and one could also be linked to an increased risk of thyroid cancer, according to a new UCLA study.

Researchers from the Larry L. Hillblom Islet Research Center at UCLA examined the U.S. Food and Drug Administration's database for adverse events reported between 2004 and 2009 among patients using the drugs sitagliptin and exenatide. They found a six-fold increase in the odds ratio for reported cases of pancreatitis with these drugs, compared with four other diabetes therapies they used as controls. They also found that patients who took the two drugs were more likely to have developed pancreatic cancer than those who were treated with the other therapies. The study is published in the journal Gastroenterology.

"We undertook these studies because several studies in animal models by several investigators had suggested that this form of therapy may have unintended actions to promote growth of the ducts (tubes) in the pancreatic gland that convey digestive juices from the pancreas to the gut," said Dr. Peter Butler, director of the Hillblom Center and a study co-author. "This is a concern if it happens in humans since it might be expected to increase the risk for pancreatitis and pancreatic cancer. While the FDA data base has limitations, it does have advantages in being very large, openly accessible and independent from companies that market the drugs. “Taken together the animals studies and the FDA data base analysis suggest that further work needs to be undertaken to at least

rule out that this now widely available new drug class for diabetes does not increase the risk of pancreatic cancer," Butler, who is also a member of UCLA's Jonsson Comprehensive Cancer Center, added.

Sitagliptin and exenatide are drugs that enhance the actions of a gut hormone known as glucagon-like peptide 1 (GLP-1), which has been shown to be effective in lowering blood sugar in individuals with Type 2 diabetes. Sitagliptin, marketed as Januvia by Merck & Co. Inc., works by inhibiting dipeptidyl peptidase-4 (DDP-4), an enzyme that degrades GLP-1. Exenatide, manufactured by Amylin Pharmaceuticals and sold as Byetta, mimics the action of GLP-1 and resists DDP-4 degradation. Previous research by UCLA Hillblom Center researchers suggested there might be a link between drugs that enhance the actions of GLP-1 and pancreatitis, possibly resulting from an increase in the rate of formation of cells that line the pancreatic ducts. That research, based on studies in rats, was published in 2009 in the journal Diabetes.

In addition to the six-fold increase in reported cases of pancreatitis, the researchers also found a 2.9-fold greater rate of pancreatic cancer in patients using exenatide and a 2.7-fold higher rate of pancreatic cancer in patients on sitagliptin, compared with the other therapies. Additionally, they found a statistically significant increase in the risk of thyroid cancer among the exenatide group, but not among the sitagliptin group.

The FDA data did not indicate links between the two diabetes drugs and any other form of cancer.

The researchers caution that the FDA's adverse events database "is not the ideal mechanism to compare adverse event rates between drugs," given its known limitations, such as incomplete data and reporting biases. They stress that more study is needed.

"Randomized, controlled clinical trials remain the gold standard for such assessment," the researchers wrote.

Provided by University of California - Los Angeles

http://www.eurekalert.org/pub_releases/2011-09/elf-lyi091511.php

Low-fat yogurt intake when pregnant may lead to child asthma and hay fever

Eating low-fat yoghurt whilst pregnant can increase the risk of your child developing asthma and allergic rhinitis (hay fever), according to recent findings.

Amsterdam, The Netherlands: The study aimed to assess whether fatty acids found in dairy products could protect against the development of allergic diseases in children. The researchers assessed milk and dairy intake during pregnancy and monitored the prevalence of asthma and allergic rhinitis using registries and questionnaires in the Danish National Birth Cohort. The study will be presented at the European Respiratory Society's (ERS) Annual Congress in Amsterdam on 25 September 2011. All the abstracts for the ERS Congress will be publicly available online from today (17 September 2011).

The results showed that milk intake during pregnancy was not associated with increased risk of developing asthma and it actually protected against asthma development. However, women who ate low-fat yoghurt with fruit once a day were 1.6-times more likely to have children who developed asthma by age 7, compared with children of women who reported no intake. They were also more likely to have allergic rhinitis and to display current asthma symptoms. The researchers suggest that non-fat related nutrient components in the yoghurt may play a part in increasing this risk. They are also looking at the possibility that low-fat yoghurt intake may serve as a marker for other dietary and lifestyle factors.

Ekaterina Maslova, lead author from the Harvard School of Public Health, who has been working with data at the Centre for Fetal Programming at Statens Serum Institut, said: "This is the first study of its kind to link low-fat yoghurt intake during pregnancy with an increased risk of asthma and hay fever in children. This could be due to a number of reasons and we will further investigate whether this is linked to certain nutrients or whether people who ate yoghurt regularly had similar lifestyle and dietary patterns which could explain the increased risk of asthma."

http://www.bbc.co.uk/news/science-environment-14948730

Dwarf galaxies suggest dark matter theory may be wrong

By Leila Battison Science reporter, Bradford

Scientists' predictions about the mysterious dark matter purported to make up most of the mass of the Universe may have to be revised.

Research on dwarf galaxies suggests they cannot form in the way they do if dark matter exists in the form that the most common model requires it to. That may mean that the Large Hadron Collider will not be able to spot it. Leading cosmologist Carlos Frenk spoke of the "disturbing" developments at the British Science Festival in Bradford.

The current theory holds that around 4% of the Universe is made up of normal matter - the stuff of stars, planets and people - and around 21% of it is dark matter. The remainder is made up of what is known as dark energy, an even less understood hypothetical component of the Universe that would explain its ever-increasing expansion.

Scientists' best ideas for the formation and structure of the Universe form what is called the "cosmological standard model", or lambda-CDM - which predicts elementary particles in the form of cold dark matter (CDM).

These CDM particles are believed to have formed very early in the Universe's history, around one millionth of a second after the Big Bang, and they are "cold" in the sense that they are not hypothesised to be particularly fast-moving.

The existence of the particles has not yet been proven, as they are extremely difficult to detect - they cannot be "seen" in the traditional sense, and if they exist, they interact only very rarely with the matter we know.

Various experiments are being carried out in deep mines in Yorkshire, on the Fermi Space Telescope, and in the Large Hadron Collider (LHC) in Switzerland to try and detect these elusive particles, or indirect evidence of their effects. So far, none of these experiments has conclusively spotted them.

Scientists working on the problem have recently expressed dismay at the universally negative results coming from the LHC, and this has led some to consider that the standard model may be wrong.

'Disturbing possibilities'

Prof Carlos Frenk at Durham University, working with the Virgo Consortium, now has data suggesting that our understanding of the formation and composition of the Universe is incomplete.

These data come from an unlikely source: dwarf galaxies, a "halo" of which surrounds our own Milky Way.

These dwarf galaxies are believed to be mostly made up of dark matter, and contain just a few stars. Their dimness has made them difficult to study in the past.

But the Virgo Consortium has created computer simulations to visualise how the dwarf galaxies formed, using their assumptions about CDM. The team found that the final results of these simulations did not at all match what we observe. The models showed many more small galaxies in a wide halo around the Milky Way, whereas in reality there are fewer, larger dwarf galaxies.

Prof Frenk explained that there were two "equally disturbing possibilities" for why this is the case. One idea is that many dwarf galaxies formed as in the simulation, but there were violent supernova explosions during their formation that radically changed the structure of the dwarf galaxy halo. "If this were the case, it would mean that galaxy formation is a much more exciting process than we thought," said Prof Frenk.

But there are still uncertainties over whether the small fraction of normal matter in the Universe (4%) could have such a fundamental effect on the structure of the dark matter.

An alternative cause for the discrepancies between the modelled data and what we observe is much more fundamental: that CDM does not exist, and the predictions of the standard model relating to it are false.

Prof Frenk said that after working for 35 years with the predictions of the standard model, he is "losing sleep" over the results of the simulations.

Warmer Universe

But he believes he has found a solution to the CDM problem. He proposes that instead of "cold" dark matter that formed within the first one millionth of a second after the Big Bang, the Universe may instead be filled with warm dark matter (WDM). The WDM would have formed later, up to minutes after the Big Bang, and is described as "warm" as the particles would be lighter and more energetic. When simulations of galaxy formation are run with the later-forming WDM instead of CDM, the halo of dwarf galaxies has the same structure as we observe in reality.

The WDM solution is "remarkably elegant", Prof Frenk said, and it means that "the standard model is by no means dead".

But if all dark matter is WDM and not CDM, this poses major problems for our current attempts to detect it.

The LHC is designed to recreate the conditions one millionth of a second after the Big Bang. If WDM is the dominant dark matter, however, the facility will not see a trace of the particles.

Other possibilities exist for trying to detect WDM. The most likely WDM particle, the "sterile neutrino", could be identified by the X-rays it emits; but much more sensitive X-ray detectors would be needed.

Alternatively, the James Webb Space Telescope, which is designed to peer into space to look for the earliest stars, and is due to be launched in 2018 pending funding agreements, could be used to prove the non-existence of CDM.

If WDM is the dark matter holding galaxies together, then at the very earliest stages of the Universe, the telescope will see nothing, because the WDM and its accompanying galaxies would not have yet formed.

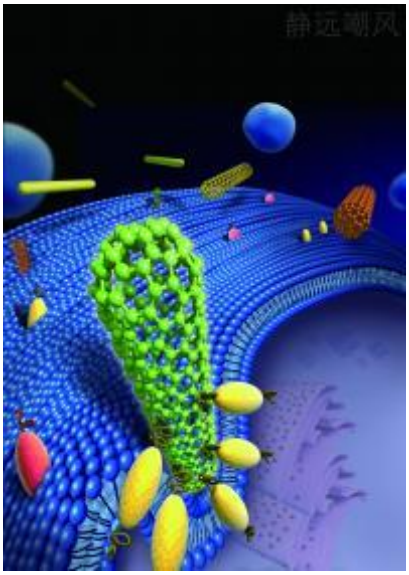
Prof Frenk explained that there is no definitive proof yet that the dark matter theories need a "paradigm shift", but he remains positive that an answer will be found soon.

"Dark matter is poised for big developments in the next few months," he said.

http://www.eurekalert.org/pub_releases/2011-09/bu-wcn091411.php

Why carbon nanotubes spell trouble for cells

It's been long known that asbestos spells trouble for human cells.



PROVIDENCE, R.I. [Brown University] — Scientists have seen cells stabbed with spiky, long asbestos fibers, and the image is gory: Part of the fiber is protruding from the cell, like a quivering arrow that's found its mark.

But scientists had been unable to understand why cells would be interested in asbestos fibers and other materials at the nanoscale that are too long to be fully ingested.

Now a group of researchers at Brown University explains what happens. Through molecular simulations and experiments, the team reports in Nature Nanotechnology that certain nanomaterials, such as carbon nanotubes, enter cells tip-first and almost always at a 90-degree angle. The orientation ends up fooling the cell; by taking in the rounded tip first, the cell mistakes the particle for a sphere, rather than a long cylinder. By the time the cell realizes the material is too long to be fully ingested, it's too late. "It's as if we would eat a lollipop that's longer than us," said Huajian Gao, professor of engineering at Brown and the paper's corresponding author. "It would get stuck."

Cells ingest things by engulfing them. When a long perpendicular fiber comes near, the cell senses only its tip, mistakes it for a sphere, and begins engulfing something too long to handle. **Huajian Gao Lab, Brown University** **Video Here**

The research is important because nanomaterials like carbon nanotubes have promise in medicine, such as fully understand how nanomaterials interact with cells, then they can conceivably design products that help cells rather than harm them. "If we can fully understand (nanomaterial-cell dynamics), we can make other tubes that can control how cells interact with nanomaterials and not be toxic," Gao said. "We ultimately want to stop the attraction between the nanotip and the cell."

Like asbestos fibers, commercially available carbon nanotubes and gold nanowires have rounded tips that often range from 10 to 100 nanometers in diameter. Size is important here; the diameter fits well within the cell's parameters for what it can handle. Brushing up against the nanotube, special proteins called receptors on the cell spring into action, clustering and bending the membrane wall to wrap the cell around the nanotube tip in a sequence that the authors call "tip recognition." As this occurs, the nanotube is tipped to a 90-degree angle, which reduces the amount of energy needed for the cell to engulf the particle.

Once the engulfing — endocytosis — begins, there is no turning back. Within minutes, the cell senses it can't fully engulf the nanostructure and essentially dials 911. "At this stage, it's too late," Gao said. "It's in trouble and calls for help, triggering an immune response that can cause repeated inflammation."

The team hypothesized the interaction using coarse-grained molecular dynamic simulations and capped multiwalled carbon nanotubes. In experiments involving nanotubes and gold nanowires and mouse liver cells and human mesothelial cells, the nanomaterials entered the cells tip-first and at a 90-degree angle about 90 percent of the time, the researchers report.

"We thought the tube was going to lie on the cell membrane to obtain more binding sites. However, our simulations revealed the tube steadily rotating to a high-entry degree, with its tip being fully wrapped," said Xinghua Shi, first author on the paper who earned his doctorate at Brown and is at the Chinese Academy of Sciences in Beijing. "It is counter-intuitive and is mainly due to the bending energy release as the membrane is wrapping the tube."

The team would like to study whether nanotubes without rounded tips — or less rigid nanomaterials such as nanoribbons — pose the same dilemma for cells. "Interestingly, if the rounded tip of a carbon nanotube is cut off (meaning the tube is open and hollow), the tube lies on the cell membrane, instead of entering the cell at a high-degree-angle," Shi said.

Agnes Kane, professor of pathology and laboratory medicine at Brown, is a corresponding author on the paper. Other authors include Annette von dem Bussche from the Department of Pathology and Laboratory Medicine at Brown and Robert Hurt from the Institute for Molecular and Nanoscale Innovation at Brown.

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http://www.eurekalert.org/pub_releases/2011-09/bc-mtp091611.php

Milking the pigeon: extracting the mechanisms involved

Production of crop milk, a secretion from the crops of parent birds, is rare among birds and, apart from pigeons, is only found in flamingos and male emperor penguins.

Essential for the growth and development of the young pigeon squab, pigeon 'milk' is produced by both parents from fluid-filled cells lining the crop that are rich in fat and protein. Research published in BioMed Central's open access journal BMC Genomics uses new technology to study the genes and proteins involved in pigeon 'milk' production and shows that pigeon 'milk' contains antioxidants and immune-enhancing proteins.

Researchers from CSIRO Livestock Industries and Deakin University, Australia, compared the global gene expression profiles of the crops of four 'lactating' and four 'non-lactating' female pigeons. As the pigeon genome has not yet been sequenced, they used a chicken microarray to find the genes involved. Genes predominantly over-expressed in 'lactating' birds were those involved in stimulating cell growth, producing antioxidants and in immune response. They also found genes associated with triglyceride fat production, suggesting the fat in the 'milk' is derived from the pigeon's liver.

Lead author, Meagan Gillespie, says, "It is possible that if antioxidant and immune proteins are present in pigeon 'milk', they are directly enhancing the immune system of the developing squab as well as protecting the parental crop tissue". She continues, "This study has provided a snap-shot view of some of the processes occurring when 'lactation' in the pigeon crop is well established. Due to the unusual nature of 'lactation' in the pigeon it would be interesting to investigate the early stages of the differentiation and development of the crop in preparation for 'milk' production to further ascertain gene expression patterns that characterize crop development and 'lactation' in the pigeon." She concludes, "This mechanism is an interesting example of the evolution of a system with analogies to mammalian lactation, as pigeon 'milk' fulfills a similar function to mammalian milk".

Notes to Editors *1.* ***Histological and global gene expression analysis of the 'lactating' pigeon crop*** *Meagan J Gillespie, Volker R Haring, Kenneth A McColl, Paul Monaghan, John A Donald, Kevin R Nicholas, Robert J Moore and Tamsyn M Crowley BMC Genomics (in press)*

http://www.scientificamerican.com/article.cfm?id=missing-global-heat-may-hide-in-dee

"Missing" Global Heat May Hide in Deep Oceans

The mystery of Earth's missing heat may have been solved: it could lurk deep in oceans, temporarily masking the climate-warming effects of greenhouse gas emissions, researchers reported on Sunday.

(Reuters) - Climate scientists have long wondered where this so-called missing heat was going, especially over the last decade, when greenhouse emissions kept increasing but world air temperatures did not rise correspondingly. The build-up of energy and heat in Earth's system is important to track because of its bearing on current weather and future climate.

The temperatures were still high - the decade between 2000 and 2010 was Earth's warmest in more than a century - but the single-year mark for warmest global temperature was stuck at 1998, until 2010 matched it.

The world temperature should have risen more than it did, scientists at the National Center for Atmospheric Research reckoned. They knew greenhouse gas emissions were rising during the decade and satellites showed there was a growing gap between how much sunlight was coming in and how much radiation was going out. Some heat was coming to Earth but not leaving, and yet temperatures were not going up as much as projected.

So where did the missing heat go?

Computer simulations suggest most of it was trapped in layers of oceans deeper than 1,000 feet during periods like the last decade when air temperatures failed to warm as much as they might have. This could happen for years at a time, and it could happen periodically this century, even as the overall warming trend continues, the researchers reported in the journal Nature Climate Change.

"This study suggests the missing energy has indeed been buried in the ocean," NCAR's Kevin Trenberth, a co-author of the study, said in a statement. "The heat has not disappeared and so it cannot be ignored. It must have consequences."

Trenberth and the other researchers ran five computer simulations of global temperatures, taking into account the interactions between the atmosphere, land, oceans and sea ice, and basing the simulations on projected human-generated greenhouse gas emissions.

These simulations all indicated global temperature would rise several degrees this century. But all of them also showed periods when temperatures would stabilize before rising. During these periods, the extra heat moved into deep ocean water due to changes in ocean circulation, the scientists said.

(Reporting by Deborah Zabarenko in Washington, editing by Chris Wilson)