http://www.bbc.co.uk/news/uk-wales-politics-15611308

Presumed consent organ donation to be Welsh law by 2015

The Welsh government says it plans to have a new law in place for presumed consent of organ donation by 2015.

The legislation would require people to opt out of donating their organs when they die, rather than opting in by signing the donor register. A White Paper setting out a timetable is set to be published this week.

Opponents say they do not believe it will work and it will hit trust in the system but supporters claim it will save more lives.

The Welsh government has told the BBC Wales Politics Show that it is planning a system of "soft" presumed consent where family members would still be consulted after a person's death. A spokesperson said: "We believe we should be progressive on this issue and follow the example of those countries with excellent records on organ donation, where an opt-out system is a key element. "Introducing a soft opt-out system will mean people are more likely to make decisions about donation during their lifetime and to have discussed their wishes with their family."

It is thought that ministers will publish a White Paper later this week which will set out the legislative timetable. Currently people have to opt to join the NHS organ donor register if they want to donate their organs and tissues after death.

Glyn Davies, Conservative MP for Montgomeryshire, said he would be seeking time in Westminster to debate the issue.

Losing people

"I want to spend half an hour explaining in a considered way why this won't work," he said. "It does not deliver but a fraction more organs. "One of the real problems I've got with presumed consent is that it undermines trust. "I don't mind moving towards a presumptive attitude because almost everybody is in favour of organ donation so it's reasonable to have a presumptive attitude. "But if there's presumed consent, then there's a suspicion and I think that does affect trust."

But Roy Thomas, chairman of the Kidney Wales Foundation, claims it will increase the number of organs available for donation by up to 30 percent. "[It] will solve a lot of issues for people who are waiting for a transplant," he added. "We are losing one person each week here in Wales and that's a huge amount of people who are dying and we need to give them hope. "I believe the Welsh government has got this absolutely right and are progressive. Indeed I think the rest of the UK will follow."

http://www.bbc.co.uk/news/health-15581986

Look out for dementia warning signs, families urged

Families are being urged to look out for the warning signs of dementia when they visit their elderly relatives.

By Jane Hughes Health correspondent, BBC News

It is part of a government advertising campaign in England aimed at encouraging early diagnosis.

Experts believe the festive period is a time when many people realise family members may have a memory problem. They are now being warned to act on it and seek help by the Department of Health, which is launching a TV and national press campaign on the issue.

The government advert tells the story of a man in the early stages of dementia, and his daughter, who feels she is losing her father. It highlights the importance of contacting a GP if you have symptoms like memory loss, confusion and anxiety.

"People are afraid of dementia," said care services minister Paul Burstow. "Rather than face the possibility someone we love has the condition, we can wrongly put memory problems down to 'senior moments'," he said.

"Don't wait until a crisis. Being diagnosed with dementia won't make the condition worse, but leaving it untreated will."

Christmas alert

A lot of relatives first notice problems when they visit family members over Christmas, prompting a big increase in calls to the Alzheimer's Society's helpline. This January it had a 43% rise.

Chief executive Jeremy Hughes said: "It's when you see someone you perhaps haven't seen for a while that you can see the difference." "If their memory is going, if they're getting confused, if they have sudden mood changes, that's the time to say 'maybe you should see your doctor'."

More than 800,000 people in the UK have dementia - and many are never diagnosed. There is no cure, but with the right treatment, the symptoms can be slowed down.

"Getting a timely diagnosis is vital," said Professor Alistair Burns, the national clinical director for dementia.

"Knowing about their condition helps people gain control, and allows them and their families to seek the support and services they need."

But GPs say those services are not always available to their patients, and that growing financial pressures in the NHS could mean cuts to the level of support they can offer.

Dr Clare Gerada, of the Royal College of GPs, said: "GPs need to have access to a wide range of resources, such as memory clinics, so they can support people beyond diagnosis, and help them live healthy independent and productive lives for as long as possible." "We have to make sure we're not simply extending the time someone lives with a dementia diagnosis, without giving them the support they need," she added.

Dementia signs
Struggling to remember recent events
Problems following conversations
Forgetting the names of friends or objects
Repeating yourself
Problems with thinking or reasoning
Confusion in familiar places

http://www.eurekalert.org/pub_releases/2011-11/chb-wdh110411.php

Why did healthy children fall critically ill in the 2009 H1N1 flu pandemic?

Largest study to date finds co-infection with MRSA increased death risk 8-fold; Flu vaccination urged

Boston, Mass. - During the 2009 H1N1 influenza pandemic, many previously healthy children became critically ill, developing severe pneumonia and respiratory failure, sometimes fatal. The largest nationwide investigation to date of influenza in critically ill children, led by Children's Hospital Boston, found one key risk factor: Simultaneous infection with methicillin-resistant Staphylococcus aureus (MRSA) increased the risk for flu-related mortality 8-fold among previously healthy children.

Moreover, almost all of these co-infected children were rapidly treated with vancomycin, considered to be appropriate treatment for MRSA. The fact that they died despite this treatment is especially alarming given the rising rates of MRSA carriage among children in the community.

"There's more risk for MRSA to become invasive in the presence of flu or other viruses," says study leader Adrienne Randolph, MD, MsC, of the Division of Critical Care Medicine at Children's Hospital Boston. "These deaths in co-infected children are a warning sign." The researchers hope their findings, published Nov. 7 by the journal Pediatrics, (eFirst pages) will promote flu vaccination among all children aged 6 months and older. (No flu vaccine is currently available for children younger than 6 months.)

"The 2009 H1N1 virus has not changed significantly to date," notes Tim Uyeki, MD, MPH, of the Influenza Division of the National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention (CDC), a senior investigator on the study. "Infections of children in the U.S. with 2009 H1N1 virus are expected this season and need to be prevented and treated appropriately. Influenza vaccination protects against 2009 H1N1 illness."

With emergency funding from the National Institutes of Health, Randolph and her colleagues in the Pediatric Acute Lung Injury and Sepsis Investigator's Network tracked 838 children admitted to 35 pediatric ICUs around the country with probable 2009 H1N1 influenza from April 2009 to April 2010. Their vaccination status wasn't consistently known, but H1N1 vaccine did not become available until September 2009 or later.

The median age of the children critically ill with H1N1 was 6 years. Most had respiratory failure, two thirds required mechanical ventilation, and some required extracorporeal membrane oxygenation (ECMO) for advanced cardiac and respiratory support. Their disease progressed rapidly, and 75 children (9 percent) died, two thirds of them within two weeks of ICU admission. "Some children were quickly overwhelmed, and many died despite centers doing everything to save them," says Randolph. "Early in the pandemic, centers were worried that they would run out of ventilators, that they would run out of ICU beds."

While most of the children critically ill with H1N1 had one or more chronic health conditions that increased their risk, such as asthma, neurologic disorders or compromised immune systems, 251 children (30 percent) were previously healthy. Among these otherwise healthy children, the only risk factor that was identified for death from influenza was a presumed diagnosis of MRSA co-infection in the lung – which increased the risk for mortality 8-fold ($P<0.0001$).

"It is not common in the U.S. to lose a previously healthy child to pneumonia," says Randolph. "Unfortunately, these children had necrotizing pneumonia – eating away at their tissue and killing off whole areas of the lung. They looked like immunocompromised patients in the way MRSA went through their body. It's not that flu alone can't kill – it can – but in most cases children with flu alone survived."

Treatment challenges

Use of antiviral agents for critically ill patients with influenza is now routinely recommended. In this study, 88 percent of the children admitted to the ICU received Tamiflu (oseltamivir) during their stay, but only 6

percent had received it prior to hospital admission. Randolph believes it's possible that earlier antiviral treatment might have saved some of these children, especially those who died of influenza without bacterial co-infection. (Influenza antiviral medications work best when given within the first two days of symptom onset.)

The study also found that most of the MRSA co-infected children who died had received vancomycin promptly at or before ICU admission. The researchers aren't sure why this antibiotic of choice didn't save these children – perhaps it couldn't penetrate the lung, or perhaps the disease moved too rapidly.

Physicians seeing children with serious lower-respiratory-tract disease during flu season are urged to give early antiviral treatment (Tamiflu or zanamivir [Relenza]) and antibiotics covering MRSA and other flu-associated bacteria, even before suspected infections are confirmed in the lab, the researchers say.

But other approaches are urgently needed. "MRSA is hard to develop a vaccine against – researchers have been trying since the 1960s and have been unsuccessful," says Randolph. "So the only way to prevent these severe complications is to get everyone vaccinated against the flu, and do more studies of MRSA colonization so we can prevent it in the community and in kids."

A growing threat

Recent studies point to a rise in the number of children carrying MRSA. A study in Pediatrics in 2010 found that the number of children hospitalized for MRSA infection increased from 2 in 1,000 admissions in 1999 to 21 in 1,000 admissions in 2008. This rise was attributed mostly to community-acquired cases – not cases acquired in the hospital.

Many observers attribute the rise to increased use of antibiotics in both people and animals. "The more antibiotics we take, the more we colonize ourselves with antibiotic-resistant organisms such as MRSA," says Randolph. Influenza appears to suppress the immune response, making children who are already colonized more susceptible to invasive bacterial disease. "Previously, MRSA has not been considered a common cause of pneumonia in kids but this may be changing," Randolph says. "It's likely that flu and other viral infections let MRSA invade and that there's some synergistic reaction between flu and these bacteria."

While recent data show an increase in MRSA co-infection in children dying from seasonal influenza, this is the first study to collect data on a large number of children with no risk factors for severe flu.

The study was funded by the National Institutes of Health, the National Heart Lung and Blood Institute and the Department of Health and Human Services.

http://www.physorg.com/news/2011-11-excess-heavy-metals-china.html

Excess heavy metals in 10% of China's land: report

Pollution from heavy metals is often blamed for poisoning entire villages and crop-growing land in China

Farmers are seen harvesting vegetables on farmland near Shanghai. About 10 percent of China's farmland contains excessive levels of heavy metals due to contaminated water and poisonous waste seeping into the soil, state media said Monday, citing a government survey.

Pollution from heavy metals such as lead, mercury and cancer-causing cadmium is often blamed for poisoning entire villages and crop-growing land in China as factory bosses flout environmental laws and farmers use toxic fertilisers.

The report in the Southern Metropolis Daily said the survey organised by the environmental protection ministry found about 10 percent of farmland had "striking problems of heavy metal levels exceeding (official) limits". "Heavy metal pollution incidents have occurred repeatedly in recent years," Wan Bentai, chief engineer at the ministry, was quoted saying. "From January to August alone there were 11 cases - nine involving lead in the blood."

The report did not say what level of heavy metals was considered excessive or how much of the country's agricultural land contained toxins. China's rapid industrialisation over the past 30 years has enabled it to become the world's number-two economy. But the focus on growth, combined with lax environmental protection, has saddled the country with some of the world's worst water and air pollution that has triggered numerous public health scares and a growing number of protests.

Thousands of residents in the northeastern city of Dalian protested in August against a factory that made paraxylene, a flammable carcinogenic liquid used in the production of polyester films and fabrics.

In September, more than 500 residents living near a plant making solar panels protested for three days in the eastern city of Haining, forcing authorities to temporarily shut the factory. In the same month, authorities in Shanghai halted production at most of the city's lead battery plants after 32 children living near two plants using lead in production reportedly were found to have excessive lead in their blood.

http://www.physorg.com/news/2011-11-easily-re-programmable-cells-key-creation.html

Easily 're-programmable cells' could be key in creation of new life forms

Scientists at the University of Nottingham are leading an ambitious research project to develop an in vivo biological cell-equivalent of a computer operating system.

PhysOrg.com -The success of the project to create a 're-programmable cell' could revolutionise synthetic biology and would pave the way for scientists to create completely new and useful forms of life using a relatively hassle-free approach.

Professor Natalio Krasnogor of the University's School of Computer Science, who leads the Interdisciplinary Computing and Complex Systems Research Group, said: "We are looking at creating a cell's equivalent to a computer operating system in such a way that a given group of cells could be seamlessly re-programmed to perform any function without needing to modifying its hardware." "We are talking about a highly ambitious goal leading to a fundamental breakthrough that will, - ultimately, allow us to rapidly prototype, implement and deploy living entities that are completely new and do not appear in nature, adapting them so they perform new useful functions."

The game-changing technology could substantially accelerate Synthetic Biology research and development, which has been linked to myriad applications - from the creation of new sources of food and environmental solutions to a host of new medical breakthroughs such as drugs tailored to individual patients and the growth of new organs for transplant patients.

The multi-disciplinary project, funded with a leadership fellowship for Professor Krasnogor worth more than £1 million from the Engineering and Physical Sciences Research Council (EPSRC), involves computer scientists, biologists and chemists from Nottingham as well as academic colleagues at other universities in Scotland, the US, Spain and Israel. The project - Towards a Biological Cell Operating System (AUdACiOuS) - is attempting to go beyond systems biology - the science behind understanding how living organisms work - to give scientists the power to create biological systems. The scientists will start the work by attempting to make e.coli bacteria much more easy to program.

Professor Krasnogor added: "This EPSRC Leadership Fellowship will allow me to transfer my expertise in Computer Science and informatics into the wet lab. "Currently, each time we need a cell that will perform a certain new function we have to recreate it from scratch which is a long and laborious process. Most people think all we have to do to modify behaviour is to modify a cell's DNA but it's not as simple as that - we usually find we get the wrong behaviour and then we are back to square one. If we succeed with this AUdACiOuS project, in five years time, we will be programming bacterial cells in the computer and compiling and storing its program into these new cells so they can readily execute them.

"Like for a computer, we are trying to create a basic operating system for a biological cell."

Among the most fundamental challenges facing the scientists will be developing new computer models that more accurately predict the behaviour of cells in the laboratory. Scientists can already programme individual cells to complete certain tasks but scaling up to create a larger organism is trickier.

The creation of more sophisticated computer modelling programmes and a cell that could be re-programmed to fulfil any function without having to go back to the drawing board each time could largely remove the trial and error approach currently taken and allow synthetic biology research to take a significant leap forward.

The technology could be used in a whole range of applications where being able to modify the behaviour of organisms could be advantageous. In the long run, this includes the creation of new microorganisms that could help to clean the environment for example by capturing carbon from the burning of fossil fuel or removing contaminants, e.g. arsenic from water sources. Alternatively, the efficacy of medicine could be improved by tailoring it to specific patients to maximise the effect of the drugs and to reduce any harmful side effects.

Provided by University of Nottingham

http://medicalxpress.com/news/2011-11-group-method-cancer-cells-antibodies.html

Group develops method of killing cancer cells with antibodies and light

The National Cancer Institute has developed a type of photoimmunotherapy that combines a light-sensitive dye and antibodies to target and kill cancer cells when light is shined on them

Medical Xpress - Traditionally, there are three major ways to combat cancer in people: surgical removal, radiation therapy and chemotherapy. And while all three have been proven to be effective in treating some types of cancer, all three also have unpleasant side effects. It’s for this reason that researchers continue to try to find other ways to kill cancer cells. Now, in a paper published in Nature Medicine, a team from the National Cancer Institute in the United States, says that it has developed a type of photoimmunotherapy that combines a light-

sensitive dye that has a special chemical in it and antibodies to target and kill cancer cells when light is shined on them.

Photoimmunotherapy has been tried before, but not in this way, in previous research such antibodies were not nearly so target specific, meaning they tended to kill other cells as well. In this latest research, the team was able to use tumor specific antibodies that would attach themselves to the cancer cells, but would remain dormant. It was only when the same cancer cells were also exposed to a chemical called IR700 and then exposed to light that the antibodies went to work killing the cancer cells.

In their lab studies, the team inserted a type of skin cancer into the skin on the back of a mouse; when given the drug and then exposed to light, the research team found that the size of the tumor in the mouse was significantly reduced compared to control mice. They also found that other cells around the tumor were unaffected and that there didn't appear to be any toxic reactions to the treatment.

It's not yet known if the procedure would work in humans, but further research is likely to be done in a lot of areas, likely including other types of animals before tests can be conducted with human volunteers. Also, research is continuing to see if it might be possible to use antibodies to deliver other sorts of cancer killing agents, such as radiation. If such types of photoimmunotherapy prove workable, millions of people the world over might be spared the pain of surgery and/or the harmful side effects of radiation and chemotherapy.

More information: *Cancer cell–selective in vivo near infrared photoimmunotherapy targeting specific membrane molecules, Nature Medicine (2011) doi:10.1038/nm.2554*

Abstract

Three major modes of cancer therapy (surgery, radiation and chemotherapy) are the mainstay of modern oncologic therapy. To minimize the side effects of these therapies, molecular-targeted cancer therapies, including armed antibody therapy, have been developed with limited success. In this study, we have developed a new type of molecular-targeted cancer therapy, photoimmunotherapy (PIT), that uses a target-specific photosensitizer based on a near-infrared (NIR) phthalocyanine dye, IR700, conjugated to monoclonal antibodies (mAbs) targeting epidermal growth factor receptors. Cell death was induced immediately after irradiating mAb-IR700–bound target cells with NIR light. We observed in vivo tumor shrinkage after irradiation with NIR light in target cells expressing the epidermal growth factor receptor. The mAb-IR700 conjugates were most effective when bound to the cell membrane and produced no phototoxicity when not bound, suggesting a different mechanism for PIT as compared to conventional photodynamic therapies. Target-selective PIT enables treatment of cancer based on mAb binding to the cell membrane.

http://www.physorg.com/news/2011-11-diversity-cabbage-species.html

Diversity of cabbage species explained

Plant scientists guess that there is an extremely large genetic variation in cabbage plants

The cabbage family is well-represented in the vegetable section of the supermarket. The cauliflower, red cabbage and broccoli found there were all bred from the cabbage species Brassica oleraciea. Its sister species Brassica rapa produced vegetables such as the Chinese cabbage and the turnip. But it is not clear quite where this large natural variety came from. Plant scientists guess that there is an extremely large genetic variation in cabbage plants. The genome of the Chinese cabbage, published in this month's Nature Genetics, supports this explanation.

'The genome of the Chinese cabbage, a B. rapa crop, does indeed provide evidence of this', explains Guusje Bonnema, assistant professor of Plant Breeding at Wageningen University and member of the international research team. ´We see a strikingly large number of genes that regulate flowering time. This varies according to crop type from twenty days to as much as two years.´ There is a clear link, then, between gene abundance and diversity. The hypothesis is further supported by the large number of genes involved in the hormonal system, which governs the formation of the plant.

The researchers also have an explanation for the source of these extra genes. It has been known for a while that the brassicas tripled their genetic material between five and nine million years ago. This is quite a common occurrence in plants, and afterwards, 'superfluous' genes mutate and disappear en masse. But a few groups of genes do seem to be kept and this made the eventual diversity of cabbage possible. The newly-mapped DNA sequence provides more than a fundamental insight into the characteristics of cabbage. 'The research is especially of use to the breeding sector', says Bonnema. 'Breeders always need markers'. Such markers in the genome reveal the presence of a particular gene, such as one for virus resistance, for example. Breeders can then select for this gene, making it easier to cross-breed genes into other species.

Provided by Wageningen University

http://medicalxpress.com/news/2011-11-falls.html

Dancing their falls away

Foxtrot, salsa, rumba! Twice weekly ballroom dancing classes for senior citizens could bring back the balance and strength needed to prevent falls in elderly Australians, according to University of Sydney researchers.

A multi-centre project titled The effectiveness of social dancing as a strategy to prevent falls in older people: a cluster randomised controlled trial has been funded by the National Health and Medical Research Council and will be led by Dr Dafna Merom, an Honorary Associate at the University of Sydney's School of Public Health and co-appointee at the University of Western Sydney.

Dr Merom says it is widely acknowledged that falls are one of the most common health problems among older people, and this study has the potential to reduce the incidence of falls for elderly Australians by as much 37 percent. "We know that formal exercise programs, particularly those that include balance challenging training, can help prevent falls, but formal training exercises may not be the best way to optimise results. There are promising alternatives," she says.

Dr Merom is aiming to introduce classic ballroom dance routines including the rumba, foxtrot, salsa, the waltz, and even some 'rock n roll' as twice-weekly recreational activities at 13 aged care centres and retirement villages across Sydney. Often described as 'old time dancing', Merom says these classic dances have the right moves and more.

"Dance is a complex sensory motor rhythmic activity. It also has cognitive and social dimensions. This package as a whole can simultaneously address a wide range of physiological and cognitive risk factors that contribute to falls. Evidence from preliminary study showed what a promising, sustainable alternative to formal exercise programs social and ballroom dancing can be."

"Small-scale randomised controlled trials have shown that all sorts of dance styles can improve measures of balance and mobility in older people. Studies have shown that seniors who do some type of dancing have better balance and gait characteristics than people of a similar age who don't, including those who exercise. Social dancing or ballroom dancing is enjoyable and already available in the community," suggests Dr Merom.

The study will be the first of its kind internationally to test the effectiveness of typical community social dance programs on falls and cognition in older people. The researchers are aiming to recruit 450 older adults who will be engaged in the dance program, which will run for a year. The multi-centre study will include researchers from the University of Sydney, University of Western Sydney, Australian National University, and the University of Hong Kong. *Provided by University of Sydney*

http://medicalxpress.com/news/2011-11-oral-insulin-wont-needle-diabetics.html

Oral insulin won't needle diabetics

A team of researchers at Curtin University have found a substitute for insulin to help treat diabetes orally.

Over 10 years, Professor Erik Helmerhorst and his colleagues looked at millions of compounds on pharmaceutical databases to try to emulate the molecular map of insulin. "On a computer, in silico, we searched three million compound structures for their ability to fit that map," explains Professor Helmerhorst.

In short, they found one, and are developing it as part of their dream to 'take the needle out of diabetes'.

"Our innovation is the development of a new chemical entity, a small drug molecule we have discovered and developed, that can be taken orally as a tablet to replace insulin per se," said Professor Helmerhorst.

Professor Helmerhorst outlined his team's quest at the Univation 2011 conference in Perth this week. The annual conference showcases research from four WA universities, with the aim of getting further backing from investors and commercialisation experts. The research, undertaken with Epichem, has the ability to revolutionise the treatment of diabetes, which is a growing worldwide problem.

Professor Helmerhorst said there was a niche market for their drug molecule to target Type 2 diabetics to help delay to the onset of insulin dependency. He said 95 per cent of diabetics have Type 2 diabetes, who last year spend some $10 billion a year on insulin. "The reality is that nearly one-third of Type 2 diabetics will end up needing insulin therapy at some stage," he said. He said the insulin substitute would appeal to people who were averse to taking insulin via injections or by pumps. Like all the technologies showcased at Univation 2011, the Curtin researchers were seeking funding and investor backing to help develop their technologies to the next level. And it appears they might be on the right track.

"We've had a lot of interest already, including a Chinese and UK group interested in the technology," Professor Helmerhorst said. "Just today, I've had two or three people come up to me and say they'd like to speak to us further."

Univation 2011 focused on technology presentations from four main categories: greentech, ICT, life sciences and the resources sector. It featured work from researchers and start-up companies from Curtin University, Edith Cowan University, Murdoch University and The University of Western Australia. *Source: ScienceNetwork Western Australia*

http://www.eurekalert.org/pub_releases/2011-11/uog-urd110711.php

UGA researchers develop first mouse model to study important aspect of Alzheimer's

Hirano bodies are almost indescribably tiny objects found in nerve cells of people suffering from conditions such as Alzheimer's, mad cow and Lou Gehrig's diseases.

Athens, Ga. – Yet for decades, researchers weren't sure if these structures helped cause the conditions or appeared after onset of the disease and had some other role.

Now, in research at the University of Georgia, a cellular biologist and his colleagues have found that Hirano bodies may play a protective role in the progression of neurodegenerative diseases such as Alzheimer's. And to find out why this may be happening, they have developed the world's first transgenic mouse model that has Hirano bodies, which will open new frontiers on how these poorly understood structures may be involved with some of humankind's most difficult-to-treat diseases.

"This work gives us a first view of the possible effects of Hirano bodies," said Marcus Fechheimer, Josiah Meigs Professor of cellular biology at UGA. "Now we know that Hirano bodies do not kill cells and are not toxic to mice. This new model will allow us to ask whether Hirano bodies have any effect on progression of disease in the brain."

While the research offers no cure for diseases such as Lou Gehrig's and mad cow, it does create a new area of research into understanding how these diseases operate in the human body and why they are so difficult to treat. And the problem is vast: the Alzheimer's Association reports there are 5.4 million sufferers of that disease in the U.S. alone.

The latest research announcing the transgenic mouse model for the formation of Hirano bodies was just published in the journal BMC Neuroscience. Co-authors with Fechheimer include Ruth Furukawa in the Fechheimer lab at UGA, as well as John Wagner and Michael Stramiello of the College of Veterinary Medicine, also at UGA; and Sangdeuk Ha, formerly of UGA and now with Beth Israel Deconess Medical Center at the Harvard Medical School.

Researchers actually discovered Hirano bodies decades ago but studying them in the lab proved so difficult that all the medical community could say was that the bodies were in some way associated with diseases such as Alzheimer's. It was clear that Hirano bodies are composed primarily of filaments of actin, a protein that participates in many important cellular processes. But no one understood their function.

Fechheimer's lab has been at the center of research on Hirano bodies for nearly a decade. In 2002, it reported for the first time a method of inducing the bodies to form. Interestingly, these "inclusions" also show up in autopsies of people suffering from diabetes, alcoholism and cancer. Hirano bodies also are associated with normal aging. So understanding what they do when neurological processes go off the rails could add an important step in understanding how diseases that cause so much suffering progress.

In a companion paper to the new mouse model research, published this year in the journal Neurobiology of Aging, Fechheimer and his co-authors discovered that Hirano bodies may actually act as a "corral" into which more damaging cellular molecules are "rounded up," thus actually promoting cell survival and possibly even slowing the impact of disease. The idea that Hirano bodies may actually help protect cells from such disorders as Alzheimer's came as a surprise to the team, though much research remains to be done to make sure exactly what is happening.

Co-authors on the paper in Neurobiology of Aging were Furukawa and Ha.

"The new results show us that Hirano bodies reduce cell death in a model system in a culture dish," said Fechheimer. "Now we need to know if Hirano bodies have any harmful or protective effects on cells in the brain in a mouse and in human patients. We developed the new mouse model to begin to answer this question."

The new model system will allow Fechheimer and his colleagues to study the impact of Hirano bodies in a living, mammalian system and to investigate the pathways for formation and degradation of the bodies. It will also allow them to test whether Hirano bodies promote or modulate the development of pathology or affect the deterioration of learning and memory that characterize both the human disease and the mouse models of these conditions.

The mouse model research was supported by grants from the Alzheimer's Association and the National Institutes of Health. The NIH and Alzheimer's Association, as well as the National Science Foundation also supported the research reported in Neurobiology of Aging.

http://www.eurekalert.org/pub_releases/2011-11/hu-wcc110411.php

Why cooking counts

Study finds cooking increases energy from meat, may have driven human evolution

Next time you're out to dinner, you may want to think twice before ordering your steak rare.

In a first-of-its kind study, Harvard researchers have shown that cooked meat provides more energy than raw meat, a finding that challenges the current food labeling system and suggests humans are evolutionarily adapted to take advantage of the benefits of cooking. Led by Rachel Carmody, a Ph.D. Candidate in the Department of Human Evolutionary Biology at Harvard's Graduate School of Arts and Sciences, and published online ahead of print this week in the Proceedings of the National Academy of Sciences (PNAS Early Edition), the research bridges the fields of human evolution and modern human nutrition.

"Every day, humans in every global society devote time and energy to processing food - cooking it, grinding it, slicing it, pounding it - yet we don't understand what effect these efforts have on the energy we extract from food, or the role they might have played in our evolution," Carmody said. "It is astonishing, since energy gain is the primary reason we eat."

Though earlier studies had examined how cooking affects specific aspects of the digestive process, surprisingly, Carmody said, none had examined whether cooking affected the overall energy value of meat. In addition, no study had compared the energetic effects of cooking to those of non-thermal processing methods like pounding, whether for meat or starch-rich foods.

"There had been no research that looked at the net effects - we had pieces that we could not integrate," Carmody said. "We knew some of the mechanisms, but we didn't know how they combined."

To examine those effects, the research team designed a unique experiment. Over forty days, they fed two groups of mice a series of diets that consisted of either meat or sweet potatoes prepared in four ways - raw and whole, raw and pounded, cooked and whole, and cooked and pounded.

Over the course of each diet, the researchers tracked changes in each mouse's body mass, controlling for how much they ate and ran on an exercise wheel. The results, Carmody said, clearly showed that cooked meat delivered more energy to the mice than raw meat. The same was true for sweet potatoes. In both foods, the energetic gains from cooking were greater than those from pounding, and cooking increased the energy gained from pre-pounded foods. Preference tests also revealed that hungry mice strongly preferred cooked foods, suggesting that the energetic benefits of a cooked diet were obvious to the subjects themselves.

It's a finding, she said, that holds exciting implications for our understanding of how humans evolved.

Though ancestral humans were eating meat as least 2.5 million years ago, without the ability to control fire, any meat in their diet was raw, though possibly pounded using primitive stone tools. Approximately 1.9 million years ago, however, a dramatic change began to occur. The bodies of early humans grew larger. Their brains increased in size and complexity. Adaptations for long-distance running appeared.

Earlier theories suggested these energetically costly changes were made possible by increased quantities of meat in the diet. However the results of the new research support another, albeit complementary, hypothesis - that cooking allowed humans to extract more energy from the foods they were already eating, both meat and widely available starch-rich tubers.

Although that idea had been proposed years earlier by Richard Wrangham, the Ruth Moore Professor of Biological Anthropology and Master of Currier House, the new study provides the first hard evidence to support it.

"I'm a biologist by training," Wrangham said. "If you want to understand the anatomical, physiological and behavioral features of a species, its diet is the first thing you ask about. If you want to know what makes a giraffe tick, it's the fact that it eats leaves from the tops of trees. If you want to understand the shape of a flea, it's because it eats blood. But with humans, our adaptations have in general been seen as being the result of our ability to use our brains. Because that approach focuses on problem-solving it strays from the fundamental biological concept of species being adapted to a particular type of diet, and lures us into thinking that we have no particular kind of dietary adaptation.

"That's why Rachel's work is so important," he continued. "For the first time, we have a clear answer to why cooking is so important cross-culturally and biologically - because it gives us increased energy. Life is all about energy."

However, the impacts of the study, which Carmody co-authored with Wrangham and Gil Weintraub, then a Harvard undergraduate and now a medical student at UCLA, aren't limited to the early days of human evolution. The findings also lay bare some shortcomings in the Atwater system, the calorie-measurement tool used to produce modern food labels.

"The system is based on principles that don't reflect actual energy availability," Carmody said. "First, the human gastrointestinal tract includes a whole host of bacteria, and those bacteria metabolize some of our food for their own benefit. Atwater doesn't discriminate between food that is digested by the human versus the bacteria. Second, it doesn't account for the energy spent digesting food, which can be substantial" she continued. "In both cases, processing increases the energy accrued to the human. Such evidence suggests that food labels do not properly account for the effects of food processing."

In this way, the new research could help inform how food scientists tackle one of the thorniest of dietary challenges - the prevalence of obesity in Western nations, and malnutrition in developing parts of the world.

"As human evolutionary biologists, we think about energetic gain as being something positive - it allows for growth, maintenance and reproduction, and it is therefore a critical component of a species' evolutionary fitness," Carmody said. "But the question in the modern world is: If we now have the problem of excess as opposed to deficit, is that still a positive?

"This work illuminates that the tools we currently use to understand caloric intake, both in cases of malnutrition and cases of obesity, are suboptimal. They've been based on the assumption that the human body is a perfectly efficient digestion machine, when, in fact, it's not - but we now see that its efficiency is affected by food processing, particularly cooking."

The research was supported by the National Science Foundation, Harvard Department of Human Evolutionary Biology, Harvard Museum of Comparative Zoology and the Stellenbosch Institute of Advanced Study.

http://www.eurekalert.org/pub_releases/2011-11/chb-sts110411.php

Sowing the seeds of the obesity epidemic in babyhood

In large study, gains in weight-for-length on infant growth charts predict obesity at age 5 and 10

Boston, Mass. - The growth charts pediatricians use at well-baby visits can predict a baby's risk for obesity later in life, finds a population-based study from Children's Hospital Boston, Harvard Medical School and Harvard Pilgrim Healthcare.

The study, funded by the Centers for Disease Control and Prevention, tracked more than 44,000 babies and found that those who rose two or more major percentiles in weight-for-length on their growth charts at any time before age 2 doubled their odds of obesity at age 5 and were nearly twice as likely to be obese at age 10. (Weight-for-length percentiles show how a baby's weight compares to that of other babies of the same length.)

The study further found the highest prevalence of later obesity among babies who rose two or more weight-for-length percentiles before 6 months of age, or who were already in a high percentile at their first visit. The report appears in the November Archives of Pediatrics and Adolescent Medicine.

The findings provide specific guidance to help pediatricians recognize when a baby is at true risk of becoming obese later in childhood, which may help stem the obesity epidemic in its earliest stages, says study leader Elsie Taveras, MD, MPH, co-director of the One Step Ahead clinic, a pediatric overweight prevention program at Children's Hospital Boston. Specifically, the study suggests assessing how many weight-for-length percentiles a child crosses during the first two years, and especially in the first 6 months.

"We shouldn't neglect these early gains and think that it's just baby fat, and that these children are going to grow out of it," says Taveras, also co-director of the Obesity Prevention Program at Harvard Medical School and Harvard Pilgrim Health Care Institute. "Crossing two or more percentiles in weight-for-length should trigger a discussion between parents and their pediatric providers of what's contributing to the rapid gains. Infants are different than adults, and we wouldn't put infants on a diet, but we can detect some possible early risk factors that could be targets for counseling. "

Taveras and colleagues analyzed weight and height data from 44,622 babies making well-child visits at Harvard Vanguard Medical Associates/Atrius Health in eastern Massachusetts from 1980 through 2008, tracking the children until age 5 or 10.

In general, they observed:

Of all babies tracked, 11.6 percent were obese at the age of 5, and 16.1 percent at age 10. (Obesity was defined as a body mass index at or above the 95th percentile for age and sex.)

Babies who were overweight anytime during the first 2 years of life were more likely to be obese at age 5 or age 10.

Increases in weight-for-length were common: 43 percent of the infants rose 2 or more weight-for-length percentiles during their first 6 months, and 64 percent had such rises during their first 24 months.

More specifically:

The higher the weight-for-length percentile at the first visit and at any time in the first 24 months of life, the greater the prevalence of obesity at 5 or 10 years.

Babies who rose 2 or more weight-for-length percentiles any time in their first 24 months were twice as likely as other babies to be obese at age 5 and 75 percent more likely to be obese at age 10.

The more percentiles babies rose (0, 1, and 2 or more) in their first 24 months, the greater the prevalence of later obesity.

Infants rising 2 or more weight-for-length percentiles in the first 6 months of life nearly always had higher rates of obesity than infants who had such rises later in babyhood.

"There's something about excess gains in those first 6 months that, in many cases, persists, that's not going away," Taveras says.

The combination of where a baby is on the growth charts and how much he or she gains in the next 6 months tells the most complete story (see figure and table 4). For example, obesity prevalence at age 5 years was lowest (4.1 percent) among infants who were below the 25th weight-for-length percentile at 1 month of age and remained there at 6 months, and highest (33 percent) among infants who started in the 75th to 90th percentile and rose 2 or more percentiles in their first 6 months of life. The pattern was similar for obesity at age 10.

Taveras hopes the findings will put an end to the idea that large gains in adiposity are normal for babies. That notion is based on an earlier CDC study that observed lots of fluctuations in weight-for-length among babies under 2 years, but did not track outcomes at later ages.

Although other studies have concluded that infants at the high end for weight or body mass index, and those who grow most rapidly, are more likely to be obese later in life, none have translated this information into the growth charts that pediatric providers and parents use at well-child visits.

While not advocating putting babies on a diet, Taveras suggests the following measures to prevent obesity, many of which also appear in a June 2011 report from the Institute of Medicine, to which Taveras contributed:

Breastfeeding infants as long as possible

Paying more attention to infants hunger and satiety cues

Avoiding sugar-sweetened beverages

Not introducing solid foods before 4 months

Ensuring infants get enough sleep (12 hours or more in a 24-hour period)

Giving babies more opportunity to move, rather than confining them to strollers and baby seats

Avoiding exposure to food marketing and limiting screen time

The study was funded by the Centers for Disease Control and Prevention and the Robert Wood Johnson Foundation, which supported Taveras. Its senior author was Matthew Gillman, MD, SM, of the Obesity Prevention Program at Harvard Medical School and Harvard Pilgrim Health Care Institute.

http://nyti.ms/teboKc

Really? The Claim: Drink Eight Glasses of Water a Day to Protect the Kidneys

THE FACTS *The old saw about drinking eight glasses of water a day for overall health is widely considered a myth.*

By ANAHAD O'CONNOR

But research over the years has suggested that drinking extra water helps the kidneys clear sodium, urea and toxins from the body. And in the past year, two large studies found a lower risk of long-term kidney problems among people who drink more water and other fluids daily.

In a report published in the journal Nephrology in March, researchers at the University of Sydney in Australia and elsewhere followed more than 2,400 people older than 50. Those who drank the most fluids, about three liters daily, had a “significantly lower risk” of chronic kidney disease than those who drank the least.

And in a study published last month in The Clinical Journal of the American Society of Nephrology, Canadian scientists followed 2,148 healthy men and women, average age 46, for seven years. They looked at markers of kidney function and health and used urine volume to determine how much fluid the subjects drank daily. After controlling for diabetes, smoking, medication and other factors, they found that those who had the highest urine volume - in other words, those who drank the most fluids - were least susceptible to declines in kidney function.

The findings, the authors said, do not support “aggressive fluid loading,” which can cause side effects. But they do provide evidence that moderately increased fluid intake, above two liters daily, “may in fact benefit the kidney.”

“Believe it or not, there now does seem to be some merit and evidence to support the ‘myth’ that eight large glasses of fluid a day is good for your kidneys,” said Dr. William Clark, an author of the study and a nephrologist at the London Health Sciences Center in Ontario.

THE BOTTOM LINE A moderately increased intake of fluids may protect the kidneys.

http://news.discovery.com/earth/mount-doom-dont-say-we-didnt-warn-you-111108.html

Mount Doom: Don't Say We Didn't Warn You

One of today's most dangerous volcanoes is one you've probably never heard about.

By Sarah Simpson

The North Koreans call it Paektu; the Chinese call it Changbai. In a headline Friday, Science called it Mount Doom. The picturesque, lake-topped peak, which straddles the border between North Korea and China, "explodes to life every 100 years or so, the last time in 1903," reports Science's Richard Stone, who visited Mount Doom in September with two volcanologists from the U.K.

A crater lake at Tianchi, atop Changbai-Paektu volcano. **(Wikimedia Commons)**

The volcano's most dramatic eruption rivaled the famous 1815 Tambora eruption in Indonesia, Stone writes, and it could unleash more of the same:

"Around 1000 years ago, the volcano rained tephra - pumice and ash - across 33,000 square kilometers of northeast China and Korea, dumping 5 centimeters of ash as far away as Japan…. Because Changbai's silica-rich magma is viscous and gassy, allowing pressure to build, the next eruption should be explosive."

If a similar eruption occurred today, 100,000 people would be vulnerable to avalanches of superheated gas, rock and ash called pyroclastic flows. Even a much smaller eruption could catastrophically drain the deep lake that now sits atop the mountain. Mixed with rocks, mud and vegetation, all that water would become a soupy stew called a lahar, which would hurtle down the lake's single outlet, a narrow valley on the Chinese side where 60,000 people reside.

University of Oregon supervolcano expert Ilya Bindeman has had his eye on Changbai-Paektu for some time. "It's not quite a supervolcano, but close," he told Discovery News. Like Tambora, Changbai-Paektu is a 7 on the scale of known eruptions; a true supervolcano is an 8. Bindeman says only five regions have experienced supereruptions in the past two million years: Yellowstone and Long Valley in the western U.S., Toba in Sumatra, Taupo in New Zealand and Kamchatka in Russia, which Bindeman and his colleagues only recently discovered.

In recent months, Changbai-Paektu has show signs of restlessness - elevated temperatures of hot springs on its flanks, for example - but most scientists apparently agree that no magma is rising to the surface. So, an eruption there is not imminent. But scientists on both sides of the border are scrambling to predict when the sleeping giant will awaken.

Making the volcano all the more fascinating are Stone's firsthand descriptions of the mountain, scientists and observatories up close. Stone and his companions were the first westerners ever to visit the field stations in North Korea; that part of the volcano had been largely off limits to foreigners and modern equipment until now.

The two volcanologists, James Hammond of Imperial College, London, and Clive Oppenheimer of the University of Cambridge, were there to demonstrate a new digital broadband seismometer, an instrument that can track small earthquakes, which become more frequent when an eruption is at hand.

An opportunity to do science like this in North Korea, particularly with an instrument that can pick up the rumble of nuclear detonations, is a big deal. Stone describes one reason for North Korea's sensitivity about seismic measurements:

"In September 2006, several days before its first nuclear test, North Korea asked China to turn off its seismometers near the border. They repeated the request before their second test in 2009."

The story's headline, Vigil at Mount Doom, calls to mind another intrepid trio and their treacherous trek through Mordor, but Stone never gives in to that narrative temptation. Rather he tells a direct and informative tale of North Korea's and China's mutual desire and ambitious efforts to understand this beast slumbering between them. Both the volcano and the story are well worth a closer look.

http://medicalxpress.com/news/2011-11-physically-affects-decision-making.html

Which way you lean - physically - affects your decision-making

We're not always aware of how we are making a decision. Unconscious feelings or perceptions may influence us. Another important source of information - even if we're unaware of it - is the body itself.

Medical Xpress - "Decision making, like other cognitive processes, is an integration of multiple sources of information - memory, visual imagery, and bodily information, like posture," says Anita Eerland, a psychologist at Erasmus University Rotterdam in the Netherlands. In a new study, Eerland and colleagues Tulio Guadalupe and Rolf Zwaan found that surreptitiously manipulating the tilt of the body influences people's estimates of quantities, such as sizes, numbers, or percentages. The findings will appear in an upcoming issue of Psychological Science, a journal published by the Association for Psychological Science.

When we count, we think of smaller numbers to the left and larger ones to the right. The researchers surmised that leaning one way or the other - even imperceptibly - might therefore nudge people to estimate lower or higher. To test this hypothesis, study participants - 33 undergraduates - stood on a Wii Balance Board that imperceptibly manipulated their posture to tilt left or right or stay upright while they answered estimation questions appearing on a screen. The participants were told they probably didn't know the answers and therefore would have to estimate; they were also instructed to stand upright throughout the trials. A representation on the screen, below the question, of the person's posture showed it to be upright even when it was not. The participants answered the questions one by one verbally.

In the first experiment, the estimations were of different kinds of quantities - e.g., the height of the Eiffel Tower or percentage of alcohol in whiskey. In the second, the quantities were all of the same kind - How many grandchildren does Queen Beatrix of the Netherlands have? How many Number 1 hits did Michael Jackson have in the Netherlands? The answers were all between 1 and 10.

As expected, participants gave smaller estimations when leaning left than when either leaning right or standing upright. There was no difference in their estimates between right-leaning and upright postures.

The researchers point out that body posture won't make you answer incorrectly if you know the answer. "Your body posture may nudge your estimates in a particular direction," says Zwaan. Adds Eerland: "Posture doesn't overwrite knowledge."

Still, says Zwaan, we should not mistake our cognitive processes as perfectly and consciously rational. "Decision-making is not a pristine process. All sources of information creep into it, and we are just beginning to explore the role of the body in this." ***More information***

http://www.eurekalert.org/pub_releases/2011-11/uomh-rif110711.php

Routine iron fortification of infant formula linked to poorer development

Follow-up study lead by University of Michigan shows need for defining optimal amount of iron in infant formula

CHICAGO - A 10-year follow-up study examining iron-fortified vs. low-iron infant formula suggests that infants with high hemoglobin levels who received iron fortified infant formula have poorer long-term developmental outcomes. The study, conducted in Santiago, Chile, was published online today ahead of print in the Archives of Pediatrics & Adolescent Medicine and raises questions about the optimal amount of iron in infant formula.

"The high prevalence of iron deficiency in infancy has led to routine iron fortification of infant formula and foods in many countries," says lead study author Betsy Lozoff, M.D., a behavioral pediatrician at the University of Michigan Health System and research professor at the University of Michigan Center for Human Growth and Development.

"These interventions help reduce iron-deficiency anemia and iron deficiency without anemia. However, the optimal amount of iron in such products, especially infant formula, is debated," she says.

Iron deficiency affects roughly 25 percent of the world's babies. Some also have iron deficiency anemia in which a lack of iron causes problems with hemoglobin - the compound that red blood cells use to transport oxygen through the bloodstream.

Lozoff has conducted award-winning research on functional development and iron deficiencies for more than 25 years in India, Costa Rica and Chile. Iron deficiency is the world's single most common nutrient deficiency.

The recent study provides a 10-year follow-up on 835 healthy, full-term infants living in urban areas around Santiago. They were randomized in the trial at 6 months of age to receive formula with or without iron.

The follow-up assessment included 473 children and researchers measured IQ, spatial memory, arithmetic achievement, visual-motor integration, visual perception and motor functioning.

Compared to the low-iron group, the iron-fortified group scored lower on every 10-year outcome measured.

Of the seven tests administered at the 10-year follow-up, two (spatial memory and VMI) showed statistically significant lower scores in the iron-fortified group compared to the low-iron group, and four (IQ, visual perception, motor coordination and arithmetic achievement) showed suggestive trends that did not reach statistical significance.

No statistically significant differences were found in iron status at 10 years, and only one child had iron-deficiency anemia. Less than 10 percent of infants in the iron-fortified group met criteria for iron deficiency.

The authors also found that children with the highest hemoglobin levels at 6 months of age had lower 10-year scores if they had received the iron-fortified formula, but those with the lowest 6-month hemoglobin levels had higher scores.

"In conclusion, this study indicates poorer long-term developmental outcome in infants with high hemoglobin concentrations who received formula fortified with iron at levels currently used in the United States," the study authors write. "Optimal amounts of iron in infant formula warrant further study."

In an accompanying editorial, Parul Christian, Dr.P.H., M.Sc., of the Johns Hopkins Bloomberg School of Public Health, in Baltimore, writes that the importance of the study "lies in its evaluation of the long-term developmental outcomes of an early-infancy iron intervention."

He notes, however, that, "Caution is needed in generalizing the results of the follow-up study by Lozoff et al, which stands, as yet, alone in showing small-sized negative consequences on developmental outcomes among iron-sufficient children exposed to iron-fortified vs. low-iron formula during infancy.

"Whether iron deficiency in infancy, manifest largely due to deficiency in utero, can be overcome with supplementation during infancy for improving central nervous system development and function needs to be further examined in rigorous studies of short and long duration," he writes.

Additional authors: *Katy M. Clark, M.A., U-M Center for Growth and Human Development; Marcela Castillo, Ph.D., Institute of Nutrition and Food Technology, University of Chile, JP Alessandri, Chile; Julia B. Smith, Ed.D., Oakland University, Rochester, Mich.*

Reference: *Archives of Pediatrics & Adolescent Medicine, Nov. 7, 2011, doi:10.1001/archpediatrics.2011.203.*

http://www.eurekalert.org/pub_releases/2011-11/uops-tsb110411.php

The story behind the science

Penn physicians point to patient narratives to bolster the case of evidence-based medicine

PHILADELPHIA - Doctors should consider the use of narrative - in the form of patient stories and testimonials - as a powerful tool for translating and communicating evidence-based policies to the public to buoy buy-in on important health issues such as cancer screenings and vaccination mandates, according to two physicians from the Perelman School of Medicine at the University of Pennsylvania writing this week in JAMA. They suggest two strategies: The use of so-called "counternarratives," which can play a role in neutralizing personal stories often promoted by celebrities via the news media - that support disproven theories, and narratives about the process of scientific study and discovery, to unmask the often hidden work of researchers and guidelines committees.

The role of narrative in medicine rose up this fall, when both Rudy Giuliani and Joe Torre spoke out against the new U.S. Preventive Services Task Force recommendations against routine prostate cancer screening for healthy men. Giuliani and Torre, both high-profile prostate cancer survivors, claimed the prostate-specific antigen (PSA test) "saved their lives," and that moving away from routine screening would imperil the lives of millions of men. The physicians working to educate the public about the science behind the new recommendations struggled to control the discussion in the face of these emotional, fear-based appeals.

"As physicians, we use narratives all the time to communicate information so our patients can make the best possible individual health decisions. Why should we stop at the facts and figures when it comes to translating and communicating medical science? " asks lead author Zachary Meisel, MD, MPH, MS, an assistant professor of Emergency Medicine and a senior fellow in the Leonard Davis Institute of Economics. "Just like we use stories to help patients make sense of illnesses, we can use stories to help people truly understand medical science and science policy."

In a commentary published in the November 9 issue of JAMA, Meisel and Jason Karlawish, MD, a professor of Medicine and Medical Ethics and a senior fellow in the Leonard Davis Institute of Health Economics, outline their ideas about how physicians can themselves incorporate narrative into the promotion of new evidence-based health care information. Their recommendations – suggesting a close link between data and personal stories that bring it to life - have broad implications for the way in which medical experts communicate about new study results, FDA decisions, and new guidelines such as the option to wait until age 50 for routing screening mammograms.

"Scientific reports are genuinely dispassionate, characterless, and ahistorical," they write. "But their translation and dissemination should not be. Stories are an essential part of how individuals understand and use evidence." Just as the media often uses the personal experiences of patients to put a face on new medical research in their reports, the authors suggest physicians themselves should employ this strategy in a way that

buoys the credibility of otherwise dry or confusing statistics – especially when they anticipate new science or guidelines will prompt confusion or negative reactions from the public.

Claims questioning vaccine safety, for example, are an area where the authors believe counternarratives would add substantial weight to evidence produced via rigorous scientific study. Actress Jenny McCarthy's public proclamation that she does not need studies to prove that the MMR vaccine caused her son's autism because her "son is her science," for instance, could have been be abutted by counternarratives such as a story from parents whose infant, too young to be vaccinated against measles himself, became sick after exposure to an unvaccinated child. And to Michele Bachmann's recent televised comments about a woman who, she said, told her that the HPV vaccine caused her daughter to become "mentally retarded," physicians may have been able to work with women who developed cervical cancer following HPV infection – which is estimated to infect as many as 80 percent of sexually active Americans at some point in their lives – to add their voices to the public discussion and play a role in de-stigmatizing the vaccine.

Shedding light on the process of scientific discovery and the creation of guidelines can also be valuable tool in helping the public have faith in the work physicians do in the interest of health promotion. Since, as in the case of the U.S Preventive Screen Task Force's newest recommendations on screening mammography for breast cancer detection, the process of developing guidelines is often fraught – with disagreement among experts, political pressures and gaps in data – the public would likely benefit from hearing stories about how science evolves, and the difficulties experts often face in making decisions that are best for the population as a whole.

Narratives have a place not only in illuminating science's successes, but also its disappointments, as in the case of the failed promise of the drug Avastin, which the FDA recently ruled could not be approved for use in breast cancer treatment since it failed to prove its efficacy and was, in fact, associated with serious side effects, including death. "Real and personal narratives can be told that embody, with characters and action, the evidence of a risky intervention," the authors write. "The public needs to hear the stories of patients, and their families, who encountered a drug that offered hope but was ultimately ineffective and even dangerous."

In addition to their work as physicians and researchers, Meisel and Karlawish are also themselves storytellers: Meisel writes Time.com's "Medical Insider" column and Karlawish is the author of, most recently, the historical novel "Open Wound: The Tragic Obsession of Dr. William Beaumont."

http://www.eurekalert.org/pub_releases/2011-11/afps-wtb110811.php

What the brain sees after the eye stops looking

When we gaze at a shape and then the shape disappears, a strange thing happens: We see an afterimage in the complementary color.

Now a Japanese study has observed for the first time an equally strange illusion: The afterimage appears in a "complementary" shape - circles as hexagons, and vice-versa.

"The finding suggests that the afterimage is formed in the brain, not in the eye," the author, Hiroyuki Ito of Kyushu University, wrote in an email. More specifically, the illusion is produced in the brain's shape-processing visual cortex, not the eye's light-receiving, message-sending retina. The findings appear in an upcoming issue of Psychological Science, a journal published by the Association for Psychological Science.

Ito conducted three experiments with 82, 92, and 44 participants respectively. In the first two, he showed participants yellow circles or hexagons – outlined or filled, static or rotating on a gray ground. In each, after they observed the images for 10 seconds, the images disappeared, leaving only the blank gray field. The observers were asked to indicate which of seven shapes, on a piece of paper, the afterimage most resembled.

In the third experiment, Ito split the visual field between the two eyes. In the left eye, participants saw rotating circles and hexagons, as well as rotating asterisk-like "stars" - shapes that were neither round nor angular. The right eye viewed static circles in all conditions. When the circles, hexagons, and stars disappeared, the left field was black, which suppressed the formation of afterimages, and the right was white, which heightened it.

In Experiments 1 and 2, participants tended to see circles after hexagons and hexagons after circles. In the third, the right eye produced the most angular afterimages when rotating circles had been projected in the left eye; the most rounded ones after the rotating hexagons; and after the "stars," images that were neither circular nor edged.

How did Ito infer that the brain, not the eye, was producing these afterimages? He eliminated the theory that the afterimage was a manifestation of "retinal bleaching" - when the photoreceptors on the retina become ineffective or fatigued through prolonged exposure to light. Viewing static circles or hexagons produce circular or hexagonal bleached areas on the retina. However, the afterimage shapes were not in the bleached shapes. A spinning circle or hexagon produces a circular trace of light on the retina, causing circular shape of retinal

bleaching just as painting on the retina. However, spinning circles produced hexagonal afterimages and vice versa.

Retinal bleaching could not produce "an afterimage shape different from the [typical] retinal bleaching shape." Neither could the retina transfer information taken in by the left eye to produce an afterimage in the right eye. "The only site that can happen is the brain."

The research adds to science's understanding of the role of the brain in vision. "People tend to think that afterimages are meaningless by-products arising from the physiological characteristics of the eye," wrote Ito. "But I think that the afterimages reflect brain activities and provide us the means to know those activities in a directly visible form."

For more information about this study, please contact: Hiroyuki Ito at ito@design.kyushu-u.ac.jp.

http://www.eurekalert.org/pub_releases/2011-11/uowo-rtb110311.php

Research targets brain region affected by Parkinson's

Eliminating specific neurotransmitter may improve motor function

A team of researchers at The University of Western Ontario has demonstrated that elimination of one of the neurotransmitters in the part of the brain associated with Parkinson's disease may improve brain function without major adverse effects. The research has been published in the November edition of the prestigious journal PLoS Biology.

Marco Prado, Vania Prado and a team of researchers at the Schulich School of Medicine & Dentistry's Robarts Research Institute used unique genetically-modified mice developed at Western and high-level behaviour and imaging techniques to study the function of neurons and neurotransmitters in the striatum, which is the region of the brain affected in Parkinson's, Huntington's, and other motor diseases. The research team was particularly interested in the neurotransmitter acetylcholine, and what effect it has on brain function.

By using state-of-the-art genetic techniques to eliminate the secretion of acetylcholine in mice, the researchers were able to show that neurons that use acetylcholine are also responsible for a secondary function. "The surprise was that these neurons in the striatum actually do two different jobs," says Marco Prado, a scientist at Robarts with joint appointments in the Department of Physiology & Pharmacology and Anatomy & Cell Biology at Schulich. These neurons release acetylcholine, but they also secrete a neurotransmitter called glutamate. Prado and his colleagues found that they could get rid of acetylcholine secretion without disturbing brain function. "This suggests that perhaps glutamate secreted by these neurons plays a more important role in this part of the brain than was originally suspected," he says.

The researchers also showed that acetylcholine, glutamate and dopamine have a special relationship; they found that the elimination of acetylcholine secretion boosted the actions of dopamine. This may have important applications to Parkinson's disease because increased function of dopamine has been previously shown to improve motor symptoms in the disease.

Prado says the next steps in their research will be to eliminate acetylcholine secretion in Parkinson's disease mouse models to see if there are improvements in the motor symptoms. "We suspect there will be improvement because in Parkinson's disease, in addition to the loss of dopamine, this group of neurons that secrete acetylcholine becomes abnormally hyperactive," he says. The hope is to eventually produce a drug to block acetylcholine release selectively in the striatum. If their suspicions are correct, this should help in Parkinson's disease by blocking the activity of these neurons without having any other negative effects on brain function.

The research was funded by the Canadian Institutes of Health Research, the Canada Foundation for Innovation and the Ontario Research Fund.

The research team also included Monica Guzman, Xavier De Jaeger, Sanda Raulic, Ivana Souza, Alex Li, Susanne Schmid, Ravi Menon and Robert Bartha from Western, Marc Caron from Duke University Medical Center and Raul Gainetdinov from the Italian Institute of Technology.

http://news.discovery.com/tech/fruit-label-dissolves-soap-111108.html

Fruit Labels Dissolve Into Organic Soap

A New York-based electrical engineer, who has an idea that could literally clean up the apple's act

By Nic Halverson | Tue Nov 8, 2011 09:32 AM ET

As the preferred gift of teacher's pets and the daily, apotropaic fruit that keeps doctors away, apples have somewhat of a goody-two shoes reputation. But actually, they've got a dirty side to them. Just ask these guys who recently ranked apples atop their list of fruits and veggies most contaminated with pesticides.

And those pesky stickers that always leave a gluey residue if you can even pick them off with your fingernail...no wonder apples got biblically tagged as the forbidden fruit.

Enter Scott Amron, a New York-based electrical engineer, who has an idea that could literally clean up the apple's act. His Fruitwash stickers, when put under the water faucet, would dissolve into organic fruit soap that removes pesticides, fungicides and that annoying water-resistant wax.

"I've always been discontent with fruit labels and felt they could do more than just display product info and be difficult to peel off," Amron told Gizmag. "We buy, wash and eat fruit. So, the wash step was the next thing the label should help with."

Amron is keeping his Fruitwash ingredients under wraps, be he said they're designed to "outlast the fruit they label." He added: The "best thing is the labels help make the fruit cleaner. And, there's no label to peel off and throw away unless you choose to peel the label off and throw it away."

Wash-label-apple-622 **Image: Amron Experimental**

Amron Experimental is currently selling a 10 percent stake in the Fruitwash Label's patents and hopes to market the soapy stickers within the next six to nine months. ***From Gizmag***

apo·tro·pa·ic *adj \ˌa-pə-trō-ˈpā-ik*

Definition of APOTROPAIC: designed to avert evil <an apotropaic ritual> - apo·tro·pa·i·cal·ly adverb

Origin of APOTROPAIC Greek apotropaios, from apotrepein to avert, from apo- + trepein to turn First Known Use: 1883

http://www.scientificamerican.com/podcast/episode.cfm?id=hybrid-grapefruit-busts-drug-intera-11-11-08

Hybrid Grapefruit Busts Drug Interactions

Common grapefruits have a compound that can negatively interact with some medications. A new hybrid grapefruit solves the problem. Katherine Harmon reports

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Grapefruits are off-limits for people on certain medications. The tangy fruits contain compounds called furanocoumarins, which can dangerously increase the effective dosage of some blood pressure and heart medications. But scientists at the University of Florida have bred a new type of grapefruit that should enable people on meds to enjoy the fruit without the drug interaction.

"There are certain relatives of grapefruit that we call pummelo, some of which are very, very low or have no furanocoumarins in them at all. And we've crossed these with ordinary grapefruit." Fred Gmitter, a citrus geneticist at the University of Florida.

These new hybrid grapefruits have even less of the compounds than do other foods that don't get special warnings. "Doctors don't generally tell their patients not to drink lemonade or not to eat celery. So these should be as safe or safer than lemons or celery."

The findings are described in the Journal of the American Society for Horticultural Science. [Chunxian Chen et al., "Characterization of furanocoumarin profile and inheritance toward selection of low furanocoumarin seedless grapefruit cultivars"]

The new fruits are also seedless. Which should make them an easy switch for consumers to swallow.

- Katherine Harmon [The above text is a transcript of this podcast.]

http://medicalxpress.com/news/2011-11-surgical-procedure-subsequent-mini-stroke.html

Surgical procedure does not appear to reduce risk of subsequent stroke after 'mini-stroke'

Patients with blockage of the internal carotid artery and hemodynamic cerebral ischemia who had surgery to improve blood flow did not have a reduced rate of stroke after 2 years

Patients with thickening and blockage of the internal carotid artery (supplies blood to the brain) and hemodynamic cerebral ischemia (insufficient blood flow to the brain, sub-type of stroke) who had a surgical procedure performed to improve blood flow in the artery did not have a reduced rate of stroke after 2 years compared to similar patients who received medical therapy alone, according to a study in the Nov. 9 issue of JAMA.

"Atherosclerotic internal carotid artery occlusion (AICAO) causes approximately 10 percent of transient ischemic attacks [TIAs; temporary cessation or reduction of blood supply to part of the brain, resulting in brief neurologic dysfunction that usually persists for less than 24 hours; often referred to as 'mini-stroke'] and 15 percent to 25 percent of ischemic strokes in the carotid territory. The 2-year risk of subsequent ipsilateral [on the same side of the previous stroke] ischemic stroke while a patient receives medical therapy is 10 percent to 15 percent," according to background information in the article. Extracranial-intracranial (EC-IC; outside, within the skull) arterial bypass surgery was developed to prevent subsequent stroke by improving blood flow

to the blocked artery with revascularization. A previous trial regarding use of this surgery failed to demonstrate benefit, though "this trial was criticized for failing to identify the subgroup of patients with hemodynamic cerebral ischemia due to poor collateral circulation for whom surgical revascularization might be of greatest benefit."

William J. Powers, M.D., of the University of North Carolina School of Medicine, Chapel Hill, and colleagues conducted the Carotid Occlusion Surgery Study (COSS) to determine whether EC-IC bypass surgery, added to best medical therapy, reduces subsequent ipsilateral ischemic stroke at 2 years in patients with recently symptomatic AICAO and hemodynamic cerebral ischemia identified by positron emission tomography (PET). Of 195 patients who were randomized, 97 were randomized to receive surgery and 98 to no surgery. Antithrombotic therapy and risk factor intervention were recommended for all participants. The randomized trial was conducted from 2002 to 2010 at 49 clinical centers and 18 PET centers in the United States and Canada.

The primary measured outcome for all participants randomized to the surgical group who received surgery was the combination of (1) all stroke and death from surgery through 30 days after surgery and (2) ipsilateral ischemic stroke within 2 years of randomization. For the nonsurgical group and for those randomized to the surgical group who did not receive surgery, the primary measured outcome was the combination of (1) all stroke and death from randomization to randomization plus 30 days and (2) ipsilateral ischemic stroke within 2 years of randomization.

Median (midpoint) follow-up for the surgical group was 723 days; for the nonsurgical group, it was 722 days. The trial was terminated early due to futility. The researchers found that the two-year rates for the primary end point were 21.0 percent (20 events) for the surgical group and 22.7 percent (20 events) for the nonsurgical group, a difference of 1.7 percent. At 30 days, the rates of ipsilateral ischemic stroke were 14.4 percent (14/97) in the surgical group and 2.0 percent (2/98) in the nonsurgical group, a difference of 12.4 percent.

"The lower stroke risk observed in the COSS for the nonsurgical group is similar to the better outcomes observed in more recent studies of patients with medically treated asymptomatic carotid artery stenosis, ascribed to improvements in medical therapy. These observations reaffirm the hazard of using even the most carefully studied historical controls to infer therapeutic efficacy and the necessity of performing randomized controlled trials to establish clinical benefit. Although improved hemodynamics in participants who survived EC-IC bypass surgery without perioperative stroke was associated with low risk of recurrent stroke, the better-than-expected efficacy of medical therapy in the nonsurgical group was sufficient to nullify any overall benefit of surgery," the authors write.

In an accompanying editorial, Joseph P. Broderick, M.D., of the University of Cincinnati College of Medicine, and Philip M. Meyers, M.D., of Columbia University, New York, write regarding the reimbursement for procedures and devices in clinical practice without evidence of clinical effectiveness.

"Clinical science and reimbursement for delivery of clinical stroke care must be balanced and aligned. Physicians who provide care for patients with stroke must recognize the current lack of evidence for clinical efficacy of endovascular therapy and enroll patients in randomized trials. The review process of the Food and Drug Administration and Centers for Medicare & Medicaid Services (CMS) must be harmonized and should require higher standards of evidence for clinical efficacy prior to clearance or approval of devices for stroke and subsequent reimbursement. Long-term and ongoing reimbursement should be predicated on evidence for equivalent or superior clinical efficacy, and cost-effectiveness should be an important consideration for clinically equivalent therapies. For example, if intravenous tissue plasminogen activator (IV t-PA) is clinically equivalent to endovascular therapy, society will have to weigh the substantially increased costs for equal clinical benefit. If these devices produce better clinical outcomes, appropriate reimbursement, even for more expensive endovascular interventions, should be promptly instituted so appropriate changes in delivery of care for patients with acute stroke can be expedited."

More information: JAMA. 2011;306[18]:1983-1992. Provided by JAMA and Archives Journals

http://www.eurekalert.org/pub_releases/2011-11/ru-mmb110911.php

Methane may be answer to 56-million-year question

Rice researchers show ocean could have contained enough methane to cause drastic climate change

The release of massive amounts of carbon from methane hydrate frozen under the seafloor 56 million years ago has been linked to the greatest change in global climate since a dinosaur-killing asteroid presumably hit Earth 9 million years earlier. New calculations by researchers at Rice University show that this long-controversial scenario is quite possible.

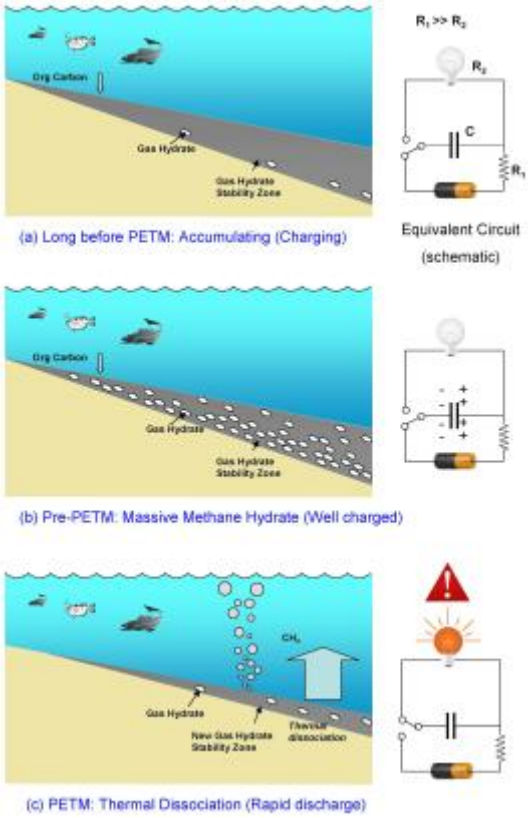
Nobody knows for sure what started the incident, but there's no doubt Earth's temperature rose by as much as 6 degrees Celsius. That affected the planet for up to 150,000 years, until excess carbon in the oceans and atmosphere was reabsorbed into sediment.

Earth's ecosystem changed and many species went extinct during the Paleocene-Eocene Thermal Maximum (PETM) 56 million years ago, when at least 2,500 gigatonnes of carbon, eventually in the form of carbon dioxide, were released into the ocean and atmosphere. *(The era is described in great detail in a recent National Geographic feature.)*

A new report by Rice scientists in Nature Geoscience suggests that at the time, even though methane-containing gas hydrates – the "ice that burns" – occupied only a small zone of sediment under the seabed before the PETM, there could have been as much stored then as there is now.

This is a concern to those who believe the continued burning of fossil fuels by humans could someday trigger another feedback loop that disturbs the stability of methane hydrate under the ocean and in permafrost; this change could warm the atmosphere and prompt the release of large amounts of methane, a more powerful greenhouse gas than carbon dioxide.

Some who study the PETM blame the worldwide burning of peat, volcanic activity or a massive asteroid strike as the source of the carbon, "but there's no crater, or any soot or evidence of the burning of peat," said Gerald Dickens, a Rice professor of Earth science and an author of the study, who thinks the new paper bolsters the argument for hydrates.



The lead author is graduate student Guangsheng Gu; co-authors are Walter Chapman, the William W. Akers Professor in Chemical Engineering; George Hirasaki, the A.J. Hartsook Professor in Chemical Engineering; and alumnus Gaurav Bhatnagar, all of Rice; and Frederick Colwell, a professor of ocean ecology and biogeochemistry at Oregon State University.

In the ocean, organisms die, sink into the sediment and decompose into methane. Under high pressure and low temperatures, methane molecules are trapped by water, which freezes into a slushy substance known as gas hydrate that stabilizes in a narrow band under the seafloor.

Warmer oceans before the PETM would have made the stability zone for gas hydrate thinner than today, and some scientists have argued this would allow for much less hydrate than exists under the seafloor now. "If the volume – the size of the box – was less than today, how could it have released so much carbon?" Dickens asked. "Gu's solution is that the box contains a greater fraction of hydrate."

"The critics said, 'No, this can't be. It's warmer; there couldn't have been more methane hydrate,'" Hirasaki said. "But we applied the numerical model and found that if the oceans were warmer, they would contain less dissolved oxygen and the kinetics for methane formation would have been faster."

With less oxygen to consume organic matter on the way down, more sank to the ocean floor, Gu said, and there, with seafloor temperatures higher than they are today, microbes that turn organic matter into methane work faster. "Heat speeds things up," Dickens said. "It's true for almost all microbial reactions. That's why we have refrigerators." The result is that a stability zone smaller than what exists now may have held a similar amount of methane hydrate. "You're increasing the feedstock, processing it faster and packing it in over what could have been millions of years," Dickens said.

While the event that began the carbon-discharge cycle remains a mystery, the implications are clear, Dickens said. "I've always thought of (the hydrate layer) as being like a capacitor in a circuit. It charges slowly and can release fast – and warming is the trigger. It's possible that's happening right now."

That makes it important to understand what occurred in the PETM, he said. "The amount of carbon released then is on the magnitude of what humans will add to the cycle by the end of, say, 2500. Compared to the geological timescale, that's almost instant."

"We run the risk of reproducing that big carbon-discharge event, but faster, by burning fossil fuel, and it may be severe if hydrate dissociation is triggered again," Gu said, adding that methane hydrate also offers the potential to become a valuable source of clean energy, as burning methane emits much less carbon dioxide than other fossil fuels.

The calculations should encourage geologists who discounted hydrates' impact during the PETM to keep an open mind, Dickens said. "Instead of saying, 'No, this cannot be,' we're saying, 'Yes, it's certainly possible.'"

The United States Department of Energy supported the research.
Read the abstract at http://www.nature.com/ngeo/journal/vaop/ncurrent/abs/ngeo1301.html

http://www.eurekalert.org/pub_releases/2011-11/wtsi-mah110711.php

Malaria's Achilles' heel revealed?

Parasite requires a single receptor to invade human red blood cells

Researchers have today revealed a key discovery in understanding how the most deadly species of malaria parasite, Plasmodium falciparum, invades human red blood cells. Using a technique developed at the Wellcome Trust Sanger Institute, they have found that the parasite relies on a single receptor on the red blood cell's surface to invade, offering an exciting new focus for vaccine development.

Malaria kills approximately one million people every year, mostly children under the age of five in sub-Saharan Africa. Currently no licensed vaccine is available.

The blood stage of Plasmodium's lifecycle begins when the parasite invades human red blood cells, and it is this stage that is responsible for the symptoms and mortality associated with malaria. Researchers have tried for many years to develop a vaccine to prevent the parasite gaining entry into our red blood cells, but so far they have been unsuccessful. One of the challenges is that the parasite is adaptable – although several red blood cell receptors had been previously identified, none were shown to be essential: when entry through one receptor is prevented, the parasite is able to switch to another. This new research has found a single receptor that is absolutely required by the parasite to invade.

"Our findings were unexpected and have completely changed the way in which we view the invasion process," says Dr Gavin Wright, senior co-author from the Wellcome Trust Sanger Institute. "Our research seems to have revealed an Achilles' heel in the way the parasite invades our red blood cells. It is rewarding to see how our techniques can be used to answer important biological problems and lay the foundations for new therapies."

The interaction between the parasite protein and the host receptor was discovered using a technique called AVEXIS (Avidity-based Extracellular Interaction Screen). This technology, created by Dr Gavin Wright's team at the Sanger Institute, was specifically designed to detect extracellular receptor-ligand interactions of this type.

As well as identifying the interaction, the researchers demonstrated that disrupting this interaction completely blocked the parasite from gaining entry into the red blood cell. Importantly, this was true across all parasite strains tested, making it appear that the receptor is a universal entry pathway. It is hoped that the parasite's dependency on this one protein can now be exploited to develop new and effective vaccines.

"By identifying a single receptor that appears to be essential for parasites to invade human red blood cells, we have also identified an obvious and very exciting focus for vaccine development," says Dr Julian Rayner, senior co-author from the Sanger Institute. "The hope is that this work will lead towards an effective vaccine based around the parasite protein."

Vaccinating against malaria will be the most cost-effective and simplest way to protect populations against the disease. However, for such an approach to work at the population scale, the vaccine needs to be highly effective so that the vast majority of those vaccinated are immune to the disease. This new research identifies an exciting candidate for such a vaccine.

"Recent reports of some positive results from ongoing malaria vaccine trials in Africa are encouraging, but in the future more effective vaccines will be needed if malaria is ever to be eradicated," says Professor Adrian Hill, Wellcome Trust Senior Investigator at the Jenner Institute, Oxford. "The discovery of a single receptor that can be targeted to stop the parasite infecting red blood cells offers the hope of a far more effective solution."

Crosnier et al BASIGIN is a receptor essential for erythrocyte invasion by Plasmodium falciparum. Nature doi:10.1038/nature10606
This work was supported by the Wellcome Trust, National Institutes of Health, Center for Disease Control and Epidemiology of Infectious Disease and Biodefense

http://www.eurekalert.org/pub_releases/2011-11/uoc - ald110711.php

Ancient lunar dynamo may explain magnetized moon rocks

A team of scientists has proposed a novel mechanism that could have generated a magnetic field on the moon

SANTA CRUZ, CA - The presence of magnetized rocks on the surface of the moon, which has no global magnetic field, has been a mystery since the days of the Apollo program. Now a team of scientists has proposed a novel mechanism that could have generated a magnetic field on the moon early in its history.

The "geodynamo" that generates Earth's magnetic field is powered by heat from the inner core, which drives complex fluid motions in the molten iron of the outer core. But the moon is too small to support that type of dynamo, according to Christina Dwyer, a graduate student in Earth and planetary sciences at the University of California, Santa Cruz. In the Nov. 10 issue of Nature, Dwyer and her coauthors - planetary scientists Francis Nimmo at UC Santa Cruz and David Stevenson at the California Institute of Technology - describe how an ancient lunar dynamo could have arisen from stirring of the moon's liquid core driven by the motion of the solid mantle above it. "This is a very different way of powering a dynamo that involves physical stirring, like stirring a bowl with a giant spoon," Dwyer said.

Dwyer and her coauthors calculated the effects of differential motion between the moon's core and mantle. Early in its history, the moon orbited the Earth at a much closer distance than it does today, and it continues to gradually recede from the Earth. At close distances, tidal interactions between the Earth and the moon caused the moon's mantle to rotate slightly differently than the core. This differential motion of the mantle relative to the core stirred the liquid core, creating fluid motions that, in theory, could give rise to a magnetic dynamo.

"The moon wobbles a bit as it spins - that's called precession - but the core is liquid, and it doesn't do exactly the same precession. So the mantle is moving back and forth across the core, and that stirs up the core, " explained Nimmo, a professor of Earth and planetary sciences at UCSC.

The researchers found that a lunar dynamo could have operated in this way for at least a billion years. Eventually, however, it would have stopped working as the moon got farther away from the Earth. "The further out the moon moves, the slower the stirring, and at a certain point the lunar dynamo shuts off," Dwyer said.

Rocks can become magnetized from the shock of an impact, a mechanism some scientists have proposed to explain the magnetization of lunar samples. But recent paleomagnetic analyses of moon rocks, as well as orbital measurements of the magnetization of the lunar crust, suggest that there was a strong, long-lived magnetic field on the moon early in its history.

"One of the nice things about our model is that it explains how a lunar dynamo could have lasted for a billion years," Nimmo said. "It also makes predictions about how the strength of the field should have changed over the years, and that's potentially testable with enough paleomagnetic observations."

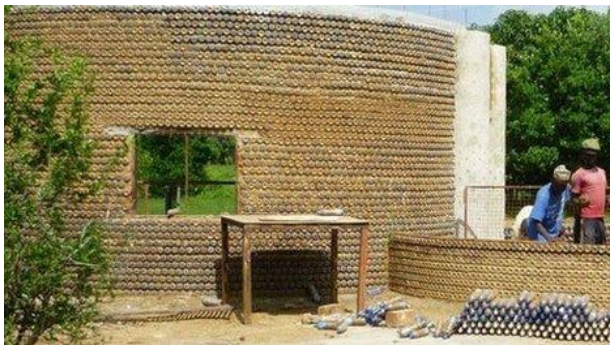
More detailed analysis is needed, however, to show that stirring of the core by the mantle would create the right kind of fluid motions to generate a magnetic field. "Only certain types of fluid motions give rise to magnetic dynamos," Dwyer said. "We calculated the power that's available to drive the dynamo and the magnetic field strengths that could be generated. But we really need the dynamo experts to take this model to the next level of detail and see if it works." A working model of a lunar dynamo, combined with more detailed paleomagnetic analysis of moon rocks, could give scientists a powerful tool for investigating the history of the moon, Dwyer said. In addition, the study presents a novel mechanism for generating a magnetic field not only on the moon, but also on other small bodies, including large asteroids.

http://www.bbc.co.uk/news/world-africa-14722179

Nigeria's plastic bottle house

Nigeria's first house built from discarded plastic bottles is proving a tourist attraction in the village of Yelwa.

By Sam Olukoya BBC Africa, Yelwa



Nigeria's first house built from discarded plastic bottles is proving a tourist attraction in the village of Yelwa.

Hundreds of people - including government officials and traditional leaders - have been coming to see how the walls are built in the round architectural shape popular in northern Nigeria.

The bottles, packed with sand, are placed on their side, one on top of the other and bound together with mud.

"I wanted to see this building for myself as I was surprised to hear it was built from plastic bottles," said Nuhu Dangote, a trader who travelled from the state capital, Kaduna, to see the house.

"They were saying it in the market that it looks like magic, that you will be amazed when you see it, that is why I have come here to feed my eyes. "The whole world should come and look at it."

The real beauty of the house is its outside wall as the round bottoms of the exposed bottles produce a lovely design. But for those behind the project, its environmental benefits are what are most important.

'Bullet-proof'

Twenty-five houses, which will be available to rent, are being built on this estate on land donated by a Greek businessman and environmentalist. Each house - with one bedroom, living room, bathroom, toilet and kitchen - uses an estimated 7,800 plastic bottles.

This "bottle brick" technology started nine years ago in India, South and Central America, providing a cost-effective, environmentally-friendly alternative to conventional building bricks.

Yahaya Ahmed of Nigeria's Development Association for Renewable Energies, estimates that a bottle house will cost one third of what a similar house made of concrete and bricks would cost.

It is also more durable. "Compacted sand inside a bottle is nearly 20 times stronger than bricks," he says. "We are even intending to build a three-storey building." The bottle houses are also ideally suited to the hot Nigerian climate because the sand insulates them from the sun's heat, helping to keep room temperatures low. And because of the compact sand, they are bullet-proof - which may also prove another attraction in more insecure parts of the north.

A firm concrete foundation is laid to ensure that the structure is firm and stable - and the sand is sieved to make sure it is compact. "You need to sieve it to remove the stones otherwise it will not be nice and it would not be able to pass through the mouth of the bottle," explains Dolly Ugorchi, who has been trained in bottle house building.

Some have expressed concern about the amount of sand needed for the new houses.

"My fear is that this building method will increase the demand for sand and even lead to an increase in the price of sand," says Mumuni Oladele, a mason in the southern city of Lagos

"At the moment people looking for sand to build houses dig everywhere to get the sand. You can imagine what will happen when the demand for sand goes up to build bottle houses."

According to market research company Zenith International, most water in Nigeria is sold in small plastic bags, but it says the bottled water market is growing - accounting for about 20-25% of official sales, the equivalent of up to 500m litres a year. This means discarded plastic bottles are actually sought after in Nigeria where they are often used for storage or by street vendors to sell produce like peanuts. The bottles for these houses are currently being sourced from hotels, restaurants, homes and foreign embassies.

The project is also hoping to help to remove children who do not go to school from their life on the streets.

"I don't want to be a beggar, I want to work and get paid - that is why I am doing this job," says 15-year-old Shehu Usman, who is working on the building site. "When I grow old I want to build myself a house with bottles," he says.

After the 25 houses have been completed, the next construction project for the Development Association for Renewable Energies will be a school on the estate, which street children like Shehu will be able to attend.

http://www.sciencedaily.com/releases/2011/11/111109125737.htm

Big, Little, Tall and Tiny: Learning Spatial Terms Improves Children's Spatial Skills

Preschool children who hear their parents describe the size and shape of objects and then use those words themselves perform better on tests of their spatial skills, researchers at the University of Chicago have found.

ScienceDaily - The study is the first to show that learning to use a wide range of spatial words predicts children's later spatial thinking, which in turn is important in mathematics, science and technology. Children who heard and then produced 45 additional spatial terms saw, on average, a 23 percent increase in their scores on a non-verbal assessment of spatial thinking.

"Our results suggest that children's talk about space early in development is a significant predictor of their later spatial thinking," said Susan Levine, a psychologist at UChicago, who co-authored the paper in the current issue of Developmental Science.

The finding provides further evidence for the importance of exposing children to words related to mathematical concepts. In earlier work, Levine, the Stella M. Rowley Professor in Psychology, and colleagues showed that talking about mathematics with children at an early age greatly improved their performance in math.

"In view of findings that show spatial thinking is an important predictor of STEM (Science, Technology, Engineering and Mathematics) achievement and careers, it is important to explore the kinds of early inputs that are related to spatial thinking," Levine and colleagues write in the article, "Children's Spatial Thinking: Does Talk About the Spatial World Matter?" Spatial language may encourage children to adopt a habit of mind when looking at the world that increases their attention to spatial relations.

Joining Levine in writing the article were lead author Shannon Pruden, assistant professor of psychology at Florida International University and former postdoctoral fellow at UChicago, and Janellen Huttenlocher, the William S. Gray Professor Emeritus in Psychology at UChicago.

For the study, the research team videotaped children between ages 14 and 46 months who were accompanied by their primary caregivers. They videotaped the caregivers, primarily the children's mothers, as they interacted with their children during their normal, everyday activities. The 90-minute sessions were conducted at four-month intervals. The study group included 52 children and 52 caregivers from an economically and ethnically diverse set of homes in the Chicago area.

The researchers recorded words that were related to spatial concepts used by both children and caregivers. They noted the use of names for two- and three-dimensional objects, such as "circle" or "triangle"; words that described size, such as "tall" and "wide"; and words that described the features of shapes such as "bent," "edge" and "corner."

As was the case in their research on the use of mathematical words, the researchers found a wide variation in the number of spatial words parents and children used. On average, parents used 167 words related to spatial concepts during the 13.5 hours of recorded time during the period of 14 to 46 months, but the range was very wide - from 5 to 525 spatial words.

Among children, there was a similar variability, with children producing an average of 74 spatial related words and using a range of 4 to 191 spatial words during the study period. The children who used more spatial terms were more likely to have caregivers who used those terms.

Moreover, when the children were four-and-a-half years old, the team assessed them for their spatial skills, to see how well they could mentally rotate objects, copy block designs and do spatial analogies, which involved picking out the same spatial relations when different objects were involved.

The researchers found that the children who were exposed to more spatial terms during their everyday activities and produced these words themselves performed much better on spatial tests at four-and-a-half years of age than children who did not hear and produce as many of these spatial terms. Importantly, this was true, even controlling for children's overall productive vocabulary.

The impact was greatest for children's performance on the spatial analogies and mental rotation tasks. For every 45 additional spatial words children produced during spontaneous talk with their parents, they saw, on average, a 23 percent increase in their scores on the spatial analogies task and a 15 percent increase in their performance on the mental rotation task.

The increased use of spatial language may have prompted the children's attention to spatial information and improved their ability to solve spatial problems, the researchers said. Spatial language also may reduce the mental load involved in transforming shapes and help children represent the spatial relations used on the spatial analogies task, they added.

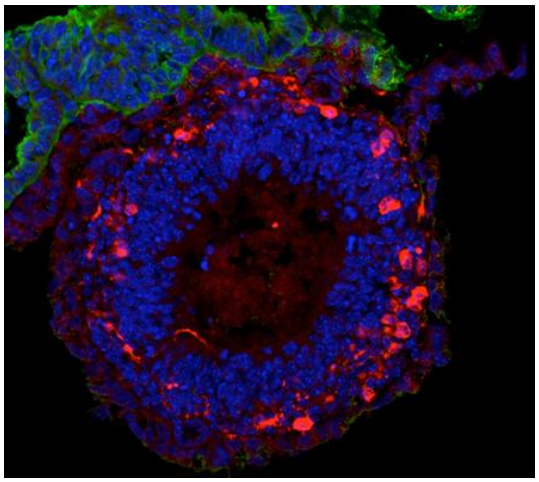
The research was supported by the National Institute of Child Health and Human Development and an award from the National Science Foundation's Science of Learning Center program to the University's Spatial Intelligence and Learning Center.

http://www.sciencenews.org/view/generic/id/335977/title/A_gland_grows_itself

A gland grows itself

Pituitary develops in a lab dish with chemical coaching

By Tina Hesman Saey



Researchers have grown a mouse pituitary gland for the first time from embryonic stem cells. Or rather, the pituitary gland grew itself, after Japanese researchers coaxed embryonic stem cells to form the type of tissues that normally surround the gland.

The accomplishment, reported online November 9 in Nature, could be the first step toward replacement pituitary glands for people. Self-made glands growing in lab dishes may also help researchers learn how the organs develop inside the body.

“There’s a lot in it to be excited about, whether you’re a developmental biologist or interested in clinical applications,” says Sally Camper, a developmental geneticist at the University of Michigan in Ann Arbor. Camper has tried, and failed, to coax embryonic stem cells to form pituitary glands.

“It’s a gorgeous piece of work, and it’s just really, really exciting,” she says.

Japanese researchers grew this pituitary gland in the laboratory from embryonic stem cells. Here, hormone-producing cells called pituitary endocrine cells (tagged to glow red) are making a hormone called adrenocorticotropin. **Yoshiki Sasai, RIKEN Center for Developmental Biology**

Scientists have persuaded stem cells to form particular types of tissues before, but growing a whole organ in a lab dish has been an elusive goal, says pediatric endocrinologist Mehul Dattani of the University College London Institute of Child Health and Great Ormond Street Hospital for Children in London.

What allowed Yoshiki Sasai of the RIKEN Center for Developmental Biology in Kobe, Japan, and colleagues to succeed where others have failed is that the group recreated conditions that exist in the part of the brain where the pituitary normally grows. The researchers used chemicals to coax mouse embryonic stem cells to form two types of brain tissue in a lab dish. Where those two tissues meet in the brain is where the pituitary forms, so the researchers manipulated conditions such that the tissues would form side-by-side.

The researchers then gave the tissues a dose of Hedgehog, an important protein that directs development of many different tissues. A fold of tissue called Rathke's pouch spontaneously formed between the two tissues and eventually grew into a pituitary gland, complete with five different types of hormone-producing cells normally found in a naturally formed gland.

And, the dish-grown gland actually works. It secretes a hormone, called adrenocorticotropic hormone, both in a lab dish and when transplanted near the kidney in mice, which is more practical than trying to put the gland in its normal spot at the base of the brain. The pituitary also makes many other hormones that regulate growth, blood pressure, water retention, sex organ and thyroid function and pregnancy and milk production. Sasai says his group is testing to see if lab-grown glands can make all of the hormones.

Details of how the tissue's interactions produce a pituitary gland are still a bit murky, says Dattani. "We're beginning to get some idea, but we're still a long way away. There's still a lot of players left to be identified."

Sasai hopes to produce human pituitary glands from human embryonic stem cells or from reprogrammed stem cells within the next three years.

http://medicalxpress.com/news/2011-11-eeg-awareness-people-previously-thought.html

EEG can detect awareness in people previously thought to be in permanently vegetative state

A study shows that using a cheap, portable electroencephalography device awareness can be detected in people previously thought to be in a permanently vegetative state

A study published Online First by the Lancet shows that - using a cheap, portable electroencephalography (EEG) device - awareness can be detected in people previously thought to be in a permanently vegetative state. The article is by Professor Adrian M Owen and Dr. Damian Cruse, Centre for Brain and Mind, University of Western Ontario, London, ON, Canada, and colleagues.

Although functional MRI (fMRI) studies have shown that some of these patients are consciously aware, issues of expense and accessibility preclude the use of fMRI assessment in most of these individuals. However, the physical stress incurred by patients when they are transferred to a suitably equipped fMRI facility is substantial. Movement artifacts often occur in imaging datasets from patients who are unable to remain still. And metal implants, including plates and pins, which are common in traumatically injured people, can completely rule out use of fMRI. In this new study, the authors assessed the effectiveness of a portable EEG device to detect awareness.

The trial involved 16 patients at two European centres: Addenbrooke's Hospital, Cambridge, UK and University Hospital of Liege, Belgium. Each patient had either traumatic brain injury (5) or non-traumatic brain injury (11), and had been diagnosed using official criteria for vegetative state. Patients were asked to imagine movements of their right-hand and toes (a novel approach to detecting awareness in patients who lack any ability to respond physically). The authors assessed the 16 patients diagnosed in the vegetative state, and also 12 healthy controls. Three (19%) of 16 patients could repeatedly and reliably generate appropriate EEG responses to two distinct commands, despite being behaviourally entirely unresponsive. Two of these three had traumatic brain injury and the other one had non-traumatic brain injury. No significant relationship was observed between patients' clinical histories (age, time since injury, cause, and behavioural score) and their ability to follow commands. The authors say: "Our findings show that this EEG method can identify covert awareness in patients diagnosed in the vegetative state with a similar degree of accuracy to other methods of detection; it is a considerably cheaper and more portable bedside technique…this method could reach all vegetative patients and fundamentally change their bedside assessment."

They add: "The degrees of freedom provided by EEG could take this technique beyond binary responses to allow methods of communication that are far more functionally expressive, based on many forms of mental state classification. The development of techniques for the real-time classification of these forms of mental imagery will enable routine two-way communication with some of these patients, allowing them to share information about their inner worlds, experiences, and needs."

In a linked Comment, Professor Morten Overgaard, Cognitive Neuroscience Research Unit (CNRU), Aalborg and Aarhus University, Denmark, and Rikke Overgaard, CNRU Centre of Functionally Integrative Neuroscience and MindLab, Aarhus University, Denmark, say: "A new classification system is necessary if the goal is to understand the cognitive functioning of patients in the vegetative or minimally conscious states. Such a system should begin with a much more explicit attempt to use objective methods that have been correlated with reports of subjective experience in healthy individuals."

More information: ***Paper online***

http://www.eurekalert.org/pub_releases/2011-11/uoc - kdl110711.php

Kawasaki disease linked to wind currents

First evidence that long-range wind transport of an infectious agent might result in human disease

Kawasaki Disease (KD) is a severe childhood disease that many parents, even some doctors, mistake for an inconsequential viral infection. In fact, if not diagnosed or treated in time, it can lead to irreversible heart damage. After 50 years of research, including genetic studies, scientists have been unable to pinpoint the cause of the disease.

Now, surprising findings of an international team of scientists organized by Jane C. Burns, MD, professor and chief, Division of Allergy, Immunology, and Rheumatology at the University of California, San Diego School of Medicine's Department of Pediatrics and Rady Children's Hospital-San Diego, suggest that KD cases are linked to large-scale wind currents that track from Asia to Japan and also traverse the North Pacific.

"Our findings suggest an environmental trigger for Kawasaki disease that could be wind-borne," Burns said.

Signs of KD include prolonged fever associated with rash, red eyes, mouth, lips and tongue, and swollen hands and feet with peeling skin. The disease causes damage to the coronary arteries in a quarter of untreated children and may lead to serious heart problems in early adulthood. There is no diagnostic test for Kawasaki disease, and current treatment fails to prevent coronary artery damage in at least one in 10 to 20 children and death in one in 1,000 children.

While seasonality of the disease has been noted in many regions – particularly in Japan, the country of highest incidence for KD – the search for factors that might contribute to epidemics and fluctuations in KD occurrence has been elusive. A study of KD cases in Japan since 1970 showed three dramatic nationwide epidemics, each lasting several months and peaking in April 1979 (6,700 cases), May 1982 (16,100 cases) and March 1986 (14,700 cases). These three peaks represent the largest KD epidemic events ever recorded in the world.

To investigate a possible influence from large-scale environmental factors, researchers including Daniel R. Cayan, Climate Atmospheric Science and Physical Oceanography (CASPO) at Scripps Institution of Oceanography in La Jolla, and Xavier Rodo and Joan Ballester, of the Institut Català de Ciències del Clima and the Institució Catalana de Recerca (IC3) in Barcelona, Spain, investigated a set of atmospheric and oceanographic measures, which revealed a link to pressure patterns and associated wind flow from the surface to mid-tropospheric atmospheric levels during the summer months prior to onset of the epidemics.

"The Japanese dataset revealed that a low number of KD cases were reported prior to the epidemics, a period coinciding with southerly winds which blew across Japan from the Pacific Ocean during the summer months," said Rodo, the study's first author. "However, the numbers rapidly mounted all over Japan when winds turned and blew in a southwesterly direction. After the peaks, the winds again shifted, blowing from the south when the number of cases again decreased."

"Importantly, subsequent to the three epidemics, years with increased numbers of Kawasaki disease cases in Japan were significantly associated with enhanced local northwesterly winds, as a result of low pressure centered to the north," said Cayan.

To assess whether such variations in wind patterns were associated with KD case fluctuations on the other side of the North Pacific, similar analyses were conducted for San Diego. According to the scientists, the atmospheric connection from continental Asia to Japan and San Diego is intermittent and can take different routes. However, it was possible from their analysis to identify the major anomalous yearly peaks of KD cases occurring in San Diego from 1994 to 2008 as belonging to two main atmospheric configurations.

In fact, the major fluctuations in KD case numbers in Japan, Hawaii and San Diego were linked to a seasonal shift in winds that exposed Japan to air masses from Central Asia. One key pattern simultaneously exposed Hawaii and California to air masses from the western North Pacific.

"The linkage to the wind currents, which can cross the Pacific in less than one week, may explain why KD case numbers recorded in Japan, San Diego and Hawaii show a nearly synchronized seasonal peak in disease activity from November through March," Rodo said.

Burns reports that the findings could be significant in efforts to isolate the cause of this devastating childhood disease. "It could be that an infectious agent is transported across the ocean by strong air currents developing in the upper troposphere," she said, adding that while this would seem the most plausible explanation for the findings, the role of pollutants or other inert particles must be considered.

These hypotheses are currently being investigated. A research aircraft carrying an engineer from the Catalonian team used a custom-built air sampling apparatus to collect tropospheric air samples from over Japan in March 2011, and the entire biome of the tropospheric dust collection is being sequenced in the laboratory of W.Ian Lipkin, MD, at Columbia University in New York City. Lipkin is one of the leading "molecular detectives" who uses sequencing to find new infectious agents. On the other side of the U.S., teams of pediatric doctors from hospitals from California to Alaska and Hawaii have initiated real-time reporting of KD cases to Scripps Institution of Oceanography via the Web. There, Cayan and his team are analyzing cases in relation to regional climate and tropospheric wind patterns.

While links between human respiratory disease and large-scale dust transport are well-documented, to date there has been no evidence of long-range wind transport of an infectious agent causing human disease.

Additional contributors to the study include Marian E. Melish, John A. Burns School of Medicine, Kapiolani Medical Center, Honolulu, Hawaii; Yoshikazu Nakamura and Ritei Uehara, Jichi Medical School, Japan.

Funding for the study was provided in part by a grant from the National Heart, Lung and Blood Institute, part of the National Institutes of Health, by the NOAA Regional Integrated Sciences and Assessments program, and by a grant to Rodo from.La Marató de TV3 Foundation.

http://www.eurekalert.org/pub_releases/2011-11/uos-wmm111011.php

Whiskers marked milestone in evolution of mammals from reptiles

Research from the University of Sheffield comparing rats and mice with their distance relatives the marsupial, suggests that moveable whiskers were an important milestone in the evolution of mammals from reptiles.

Using high-speed digital video recording and automatic tracking, the research team, which was led by Professor Tony Prescott from the University's Department of Psychology, have shed light on how rodents such as mice and rats move their whiskers back-and-forth at high speed and in varying ways to actively sense the environment around them in a behaviour known as whisking. Whisking allows mice or rats to accurately determine the position, shape and texture of objects, make rapid and accurate decisions about objects, and then use the information to build environmental maps.

When running in a straight line, rats and mice move their whiskers back-and-forth the same amount on both sides. However when turning, they bias their whisker movements in the direction of the turn, and when the whiskers on one side of the head contact an object, those on the opposite side sweep round to gather more information. These active sensing strategies boost the information gained by the whiskers helping the animals to better understand their world through touch.

In their latest research, the team have shown that whisking like that of rodents, using these active sensing strategies, is also seen in a small South American marsupial - the grey short-tailed opossum. This animal has many similarities to an early mammal that would have lived more than 125 million years ago; that is, around the same time that the evolutionary lines leading to modern rodents and marsupials diverged.

This evidence suggests that some of the first mammals may also have whisked like a modern mouse or rat, and that the appearance of moveable whiskers was pivotal in the evolution of mammals from reptiles. The research is published in Philosophical Transactions of the Royal Society B on 12 November 2011 and will also be presented on the same day at the Society for Neuroscience conference.

The earliest mammals were nocturnal, and tree-living. In order to successfully move around and thrive in this challenging environment these animals needed to effectively integrate information from multiple senses - sight, sound, smell, and touch. Facial whiskers provided mammals with a new tactile sense not available to reptiles that could help them to get around in the dark.

In addition to continuing to investigate the similarities and differences between rodents and marsupials, the team is also using these insights from biological whisker sensing to develop animal-like robots that can use artificial whiskers to navigate without vision. These robots could have applications in search-and-rescue, particularly in environments, such as disaster sites, where vision is compromised by smoke or dust.

Professor Tony Prescott said: "This latest research suggests that alongside becoming warm-blooded, giving birth to live young, and having an enlarged brain, the emergence of a new tactile sense based on moveable facial whiskers was an important step along the evolutionary path to modern mammals. Although humans no longer have moveable whiskers they were a critical feature of our early mammalian ancestors."

The paper entitled 'Active vibrissal sensing in rodents and marsupials' will be available to read in full in Philosophical Transactions of the Royal Society B on Saturday 12 November 2011.

http://www.eurekalert.org/pub_releases/2011-11/ason-sao110211.php

Studies agree on the best blood glucose levels for diabetics with kidney failure

Diabetics with kidney failure shouldn't lower their blood glucose as much as diabetics without kidney failure

Highlights

Diabetic patients with kidney failure benefit the most when their hemoglobin A1C levels, which reflect blood glucose levels, are between 7% and 8%.

For diabetics who need dialysis, hemoglobin A1C levels of 8% or greater or less than 7% put them at increased risk of dying prematurely compared to patients with levels between 7.0% and 7.9%.

Two separate studies presented during the American Society of Nephrology's Annual Kidney Week agree that diabetics with kidney failure shouldn't lower their blood glucose levels as much as diabetics without kidney failure.

For most patients with diabetes, taking medication to lowering blood levels of hemoglobin A1C, which reflect average blood glucose levels, to <7% can lower their risk of developing certain complications. Sylvia Paz Ramirez, MD (Arbor Research Collaborative For Health) and her colleagues wondered whether this holds true for diabetic patients who have developed kidney failure.

The researchers analyzed data from 8,437 dialysis patients from 12 countries who had diabetes. They found that the lowest risk of death during the study occurred when hemoglobin A1C levels were between 7% and 8%. Both high and low levels were linked with increased rates of death, particularly for patients with levels of 9% or higher or less than 5%. Among patients with A1C levels below 7%, death rates were higher among patients taking diabetes medications.

In a similar study, Miklos Molnar MD, PhD (Semmelweis University, in Budapest, Hungary) and his team examined death rates among 54,757 diabetic patients treated at DaVita dialysis clinics from July 2001 through June 2006 with follow-up through June 2007. They found a link between high death rates and hemoglobin A1C levels of 8% or greater. Very low levels also increased patients' risk of dying during the study.

These results indicate that unlike for most patients with diabetes, diabetics with kidney failure benefit the most when their hemoglobin A1C levels are between 7% and 8%, although clinical trials are needed to definitely determine the optimal range.

Study authors for "Hemoglobin A1C Levels and Mortality in the ESRD Population: Findings from the DOPPS" (abstract TH-OR065) include Sylvia Paz Ramirez, MD, Jyothi Thumma, Francesca Tentori, MD, Brenda Gillespie, PhD, Masaaki Inaba, MD, PhD, Robert Nelson, MD, PhD, Ronald Pisoni, PhD, and Bruce Robinson, MD.

Study authors for "Glycemic Control and Mortality in Hemodialysis Patients with Diabetes Mellitus: A Six Year Cohort Study" (abstract TH-OR085) include Miklos Molnar, MD, PhD, Joni Ricks, Csaba Kovesdy, MD, Anuja Shah, MD, Allen Nissenson, MD, Mark Williams, MD, and Kamyar Kalantar-Zadeh, MD, PhD.

http://www.eurekalert.org/pub_releases/2011-11/sri-qpe111011.php

Giant planet ejected from the solar system

Just as an expert chess player sacrifices a piece to protect the queen, the solar system may have given up a giant planet and spared the Earth, according to an article recently published in The Astrophysical Journal Letters.

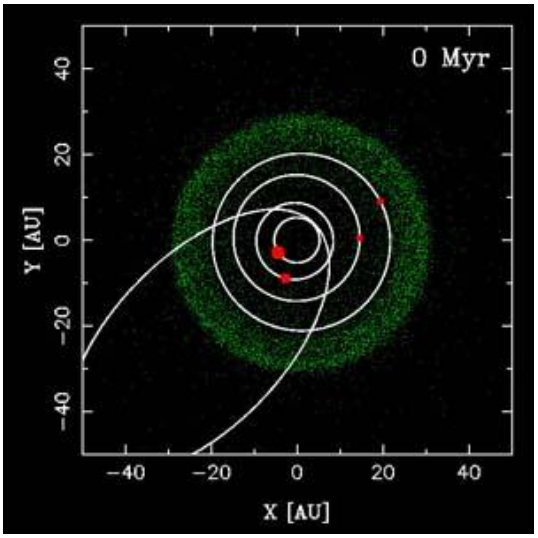
"We have all sorts of clues about the early evolution of the solar system," says author Dr. David Nesvorny of the Southwest Research Institute. "They come from the analysis of the trans-Neptunian population of small bodies known as the Kuiper Belt, and from the lunar cratering record." These clues suggest that the orbits of giant planets were affected by a dynamical instability when the solar system was only about 600 million years old. As a result, the giant planets and smaller bodies scattered away from each other.

Some small bodies moved into the Kuiper Belt and others traveled inward, producing impacts on the terrestrial planets and the Moon. The giant planets moved as well. Jupiter, for example, scattered most small bodies outward and moved inward.

This scenario presents a problem, however. Slow changes in Jupiter's orbit, such as the ones expected from interaction with small bodies, would have conveyed too much momentum to the orbits of the terrestrial planets. Stirring up or disrupting the inner solar system and possibly causing the Earth to collide with Mars or Venus.

"Colleagues suggested a clever way around this problem," says Nesvorny. "They proposed that Jupiter's orbit quickly changed when Jupiter scattered off of Uranus or Neptune during the dynamical instability in the outer solar system." The "jumping-Jupiter" theory, as it is known, is less harmful to the inner solar system, because the orbital coupling between the terrestrial planets and Jupiter is weak if Jupiter jumps.

Nesvorny conducted thousands of computer simulations of the early solar system to test the jumping-Jupiter theory. He found that, as hoped for, Jupiter did in fact jump by scattering from Uranus or Neptune. When it jumped, however, Uranus or Neptune was knocked out of the solar system. "Something was clearly wrong," he says.



Motivated by these results, Nesvorny wondered whether the early solar system could have had five giant planets instead of four. By running the simulations with an additional giant planet with mass similar to that of Uranus or Neptune, things suddenly fell in place. One planet was ejected from the solar system by Jupiter, leaving four giant planets behind, and Jupiter jumped, leaving the terrestrial planets undisturbed.

"The possibility that the solar system had more than four giant planets initially, and ejected some, appears to be conceivable in view of the recent discovery of a large number of free-floating planets in interstellar space, indicating the planet ejection process could be a common occurrence," says Nesvorny.

This animation shows the evolution of giant planets from 20 million years before the instability to 30 million years after the instability (the actual simulation covered a much longer time span). Five initial planets are shown by red circles, small bodies are in green. The fifth planet is ejected at the instability causing a general disorder. The system of the remaining four planets stabilizes after a while, and looks like the outer solar system in the end, with giant planets at 5, 10, 20 and 30 astronomical units. This is just one of more than 6,000 simulations performed to study the likelihood of planet ejection. **Animation courtesy of Southwest Research Institute**

This research was funded by the National Lunar Science Institute and the National Science Foundation. The paper, "Young Solar System's Fifth Giant Planet?" by Dr. David Nesvorny was published online by The Astrophysical Journal Letters.

http://www.sciencedaily.com/releases/2011/11/111110142104.htm

Why Do Neurons Die in Parkinson's Disease?

Study of Hereditary Parkinson's Finds That Mitochondria Can't Be Cleared out When Damaged

ScienceDaily - Current thinking about Parkinson's disease is that it's a disorder of mitochondria, the energy-producing organelles inside cells, causing neurons in the brain's substantia nigra to die or become impaired. A study from Children's Hospital Boston now shows that genetic mutations causing a hereditary form of Parkinson's disease cause mitochondria to run amok inside the cell, leaving the cell without a brake to stop them. Findings appear in the Nov. 11 issue of Cell.

Mitochondrial movement is often a good thing, especially in neurons, which need to get mitochondria to cells' periphery in order to fuel the axons and dendrites that send and receive signals. However, arresting this movement is equally important, says senior investigator Thomas Schwarz, PhD, of Children's F.M. Kirby Neurobiology Center, since it allows mitochondria to be quarantined and destroyed when they go bad.

"Mitochondria, when damaged, produce reactive oxygen species that are highly destructive, and can fuse with healthy mitochondria and contaminate them, too," Schwarz says. "It's the equivalent of an environmental disaster in the cell."

Studying neurons from fruit flies, rats and mice, as well as cultured human cells, Schwarz and colleagues provide the most detailed understanding to date of the effects of the gene mutations, which encode the proteins Parkin and PINK1. They demonstrate how these proteins interact with proteins responsible for mitochondrial movement - in particular Miro, which literally hitches a molecular motor onto the organelle.

Normally, when mitochondria go bad, PINK1 tags Miro to be destroyed by Parkin and enzymes in the cell, the researchers showed. When Miro is destroyed, the motor detaches from the mitochondrion. The organelle, unable to move, can then be disposed of: The cell literally digests it.

But when either PINK1 or Parkin is mutated, this containment system fails, leaving the damaged mitochondria free to move about the cell, spewing toxic compounds and fusing to otherwise healthy mitochondria and introducing damaged components.

The study's findings are consistent with observed changes in mitochondrial distribution, transport and dynamics in other neurodegenerative diseases such as Huntington's disease, Alzheimer's disease, amyotrophic lateral sclerosis (Lou Gehrig's disease), and Charcot-Marie-Tooth disease, the researchers note.

Although the team studied a rare hereditary form of Parkinson's, the findings may shed light on what's going on in the more common sporadic form of the disease, Schwarz says.

"Whether it's clearing out damaged mitochondria, or preventing mitochondrial damage, the common thread is that there's too much damage in mitochondria in a particular brain region," he says.

While Schwarz sees potential in gene therapy to restore normal PINK1 or Parkin to neurons, he is more interested in the possibility of helping neurons flush out bad mitochondria or make enough new, healthy mitochondria to keep them viable. "We may need to do both," he says.

The study was funded by the Ellison Medical Foundation, the Hartman Foundation for Parkinson's Research, the National Institutes of Health and a LSRF Novartis Fellowship. Xinnan Wang, PhD, of the F.M. Kirby Neurobiology Center at Children's, was first author.

Journal Reference: *Xinnan Wang, Dominic Winter, Ghazaleh Ashrafi, Julia Schlehe, Yao Liang Wong, Dennis Selkoe, Sarah Rice, Judith Steen, Matthew J. LaVoie, Thomas L. Schwarz. PINK1 and Parkin Target Miro for Phosphorylation and Degradation to Arrest Mitochondrial Motility. Cell, 2011; 147 (4): 893-906 DOI: 10.1016/j.cell.2011.10.018*

http://www.eurekalert.org/pub_releases/2011-11/e-la111111.php

Lutetia: A rare survivor from the birth of the Earth

A team of astronomers has created the most complete spectrum of an asteroid ever assembled

A team of astronomers from French and North American universities have studied the unusual asteroid Lutetia in detail at a very wide range of wavelengths [1] to deduce its composition. Data from the OSIRIS camera on ESA's Rosetta spacecraft [2], ESO's New Technology Telescope (NTT) at the La Silla Observatory in Chile, and NASA's Infrared Telescope Facility in Hawaii and Spitzer Space Telescope were combined to create the most complete spectrum of an asteroid ever assembled [3].

This spectrum of Lutetia was then compared with that of meteorites found on Earth that have been extensively studied in the laboratory. Only one type of meteorite - enstatite chondrites - was found to have properties that matched Lutetia over the full range of colours.

This image of the unusual asteroid Lutetia was taken by ESA's Rosetta probe during its closest approach in July 2010. Lutetia, which is about 100 kilometres across, seems to be a leftover fragment of the same original material that formed the Earth, Venus and Mercury. It is now part of the main asteroid belt, between the orbits of Mars and Jupiter, but its composition suggests that it was originally much closer to the Sun.
Credit: ESA 2010 MPS for OSIRIS Team MPS/UPD/LAM/IAA/RSSD/INTA/UPM/DASP/IDA

Enstatite chondrites are known to be material that dates from the early Solar System. They are thought to have formed close to the young Sun and to have been a major building block in the formation of the rocky planets [4], in particular the Earth, Venus and Mercury [5]. Lutetia seems to have originated not in the main belt of asteroids, where it is now, but much closer to the Sun. "But how did Lutetia escape from the inner Solar System and reach the main asteroid belt?" asks Pierre Vernazza (ESO), the lead author of the paper.

Astronomers have estimated that less than 2% of the bodies located in the region where Earth formed, ended up in the main asteroid belt. Most of the bodies of the inner Solar System disappeared after a few million years as they were incorporated into the young planets that were forming. However, some of the largest, with diameters of about 100 kilometres or more, were ejected to safer orbits further from the Sun.

Lutetia, which is about 100 kilometres across, may have been tossed out from the inner parts of the young Solar System if it passed close to one of the rocky planets and thus had its orbit dramatically altered [6]. An encounter with the young Jupiter during its migration to its current orbit could also account for the huge change in Lutetia's orbit [7].

"We think that such an ejection must have happened to Lutetia. It ended up as an interloper in the main asteroid belt and it has been preserved there for four billion years," continues Pierre Vernazza.

Earlier studies of its colour and surface properties showed that Lutetia is a very unusual and rather mysterious member of the asteroid main belt. Previous surveys have shown that similar asteroids are very rare and represent less than 1% of the asteroid population of the main belt. The new findings explain why Lutetia is different - it is a very rare survivor of the original material that formed the rocky planets.

"Lutetia seems to be the largest, and one of the very few, remnants of such material in the main asteroid belt. For this reason, asteroids like Lutetia represent ideal targets for future sample return missions. We could then study in detail the origin of the rocky planets, including our Earth," concludes Pierre Vernazza.

[1] The electromagnetic spectrum represents the complete range of wavelengths covered by the different types of electromagnetic radiation (http://www.eso.org/public/outreach/glossary/glossary_e.html#electromagnetic_radiation). Visible light is the most familiar form, but many others exist. Many of these types of radiation are used in everyday life, such as radio waves, microwaves, infrared and ultraviolet light and X-rays.

[2] The Rosetta spacecraft, on its way to comet 67P/Churyumov-Gerasimenko, flew past Lutetia on 10 July 2010.

[3] Rosetta's OSIRIS camera provided data in the ultraviolet, ESO's NTT provided data in visible light, while NASA's Infrared Telescope Facility in Hawaii and Spitzer Space Telescope provided data in the near-infrared and mid-infrared respectively.
[4] The enstatite chondrites (E chondrites) are a unique class of meteorites that account for only about 2% of the recovered meteorite falls. The unusual mineralogy and chemistry of E chondrites is consistent with formation relatively close to the Sun. This is further supported by isotope measurements (verified for oxygen, nitrogen, ruthenium, chromium and titanium): E chondrites are the only groups of chondrites that have the same isotopic composition as the Earth and Moon system. This strongly suggests that the Earth formed from enstatite chondrite-type materials and also that E chondrites formed at about the same distance from the Sun as the Earth. In addition it has been recently shown that formation from enstatite chondrite bodies can explain Mercury's unusual and previously inexplicable composition. This suggests that Mercury - like the Earth - largely accreted from enstatite chondrite-like materials.
[5] Although they all formed from similar material, it remains a mystery why the inner three planets are so different.
[6] This process is very much like the gravitational assist methods used to change the direction and speed of space probes by arranging for them to fly close to a planet.
[7] Some astronomers think that the gaseous giant may have been closer to the Sun in the early days of the Solar System, before moving outwards to its current position. This would have caused havoc in the orbits of other objects of the inner Solar System due to the huge gravitational pull of Jupiter.

http://www.newscientist.com/article/dn21156-gene-tweak-creates-supermouse - and-prevents-diabetes.html

Gene tweak creates supermouse – and prevents diabetes

Knocking out a particular gene in muscle lets mice run twice as far as normal

13:05 11 November 2011 by Andy Coghlan

Faster, longer, further… fatter? Knocking out a particular gene in muscle lets mice run twice as far as normal. Knocking out the same gene in fat cells allows the animals to put on weight without developing type-2 diabetes.

The discoveries could lead to new treatments for diabetes or for invigorating muscles in elderly people and in those with wasting diseases, say Johan Auwerx of the Federal Polytechnic School of Lausanne, Switzerland, and colleagues. Auwerx warns that cheats may exploit the potential for increase athletic performance, however.

Auwerx and his colleagues used a targeted virus to knock out the gene that makes a protein called nuclear receptor corepressor 1 (NCoR1) in the muscle of mice. Without NCoR1, mitochondria, which power cells, keep working at full speed. "Effectively, the mice go further, faster, on the same amount of gas," says Auwerx. "The treated mice ran an average of 1600 metres in 2 hours, compared with 800 metres for untreated mice," he says.

Fattened up

In a separate experiment, Auwerx found that knocking out NCoR1 in fat cells exclusively made the mice get fatter, but they didn't develop type-2 diabetes. He hopes that by giving drugs that control NCoR1 in fat to people who are already obese, it may be possible to stop them developing diabetes as well.

Auwerx has already identified fatty acids in common foods that suppress NCoR1. If similar compounds can be found that target specific tissues, then it may be possible to treat diseases specific to muscle or fat.

Auwerx warns athletes not to try to grow their muscles and stamina illicitly by somehow targeting the NCoR1 protein, however. "We only know what happens if it's knocked out either in fat or muscle, and it could have serious side effects on other organs," he says. Also, he points out that without NCoR1, all fetuses perish, so it plays a vital but undiscovered role in fetal development.

Journal references: Cell, DOI: 10.1016/j.cell.2011.10.017; 10.1016/j.cell.2011.09.050

http://www.scientificamerican.com/article.cfm?id=sickle-cell-anemia-mystery

Sickle-cell mystery solved

Researchers discover how carriers of the sickle-cell anaemia gene are protected from malaria.

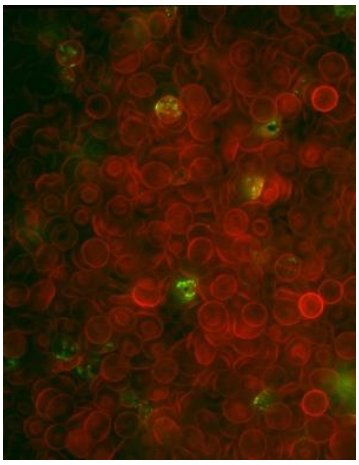
Meredith Wadman

It has been a medical mystery for 67 years, ever since the British geneticist Anthony Allison established that carriers of one mutated copy of the gene that causes sickle-cell anaemia are protected from malaria[1]. The finding wasn't trivial: in equatorial Africa, where Allison did his work, up to 40% of people are carriers of this mutated gene. Since then, scientific sleuths have wondered how exactly the gene protects them.

With a paper published today in Science[2], the answer - or a large part of it - seems to be at hand.

Michael Lanzer and his colleagues at Heidelberg University in Germany and the Biomedical Research Center Pietro Annigoni in Ouagadougou, Burkina Faso, used powerful electron microscopy techniques to compare healthy red blood cells both with 'normal' cells infected with the malaria parasite Plasmodium falciparum and with infected cells from people carrying the mutated "S" gene that causes sickle-cell disease, as well as another mutation, dubbed "C," which occurs at the same spot. Both mutations lead to the substitution of a single amino acid in the hemoglobin molecule, causing the haemoglobin to aggregate abnormally inside the cell. In people with two copies of the S mutation, they deform into a half-moon shape - the 'sickle cells' that give the disease its name..

The researchers saw that in healthy red cells, very short pieces of actin filament - threads of protein crucial to maintaining the pliable internal 'skeleton' that lets the red blood cell squeeze through tiny blood vessels - are clustered just under the cell's outer membrane. But in infected cells, they observed that the malaria parasite steals this actin and uses it to construct an intracellular bridge to transport a parasite-made protein to the cell surface. This protein, called adhesin, makes the infected red blood cells 'sticky', causing them to adhere to each other and to the vessel wall to cause the widespread microvascular inflammation characteristic of malaria.



Evolution to the rescue

The parasite doesn't get everything its own way, however. Enter the sickle-cell factor. In red blood cells containing the aberrant sickle-cell haemoglobin, Lanzer and his team observed that the hijacking of actin filaments by the parasite was hobbled. The actin bridge was cut off from the intracellular depot of adhesin, and the vesicles that would normally transport the adhesin to the cell surface were floating free in the cytoplasm.

Sickle cells infected with Plasmodium falciparum (green) collapse and prevent the parasite from interfering with the cell's actin proteins, protecting the host against malaria. Science/AAAS

Further experiments led the team to hypothesize that ferryl haemoglobin, produced when the mutant haemoglobin reacts with oxygen, subverts the parasites' efforts to reorganize their host cells' actin by preventing the actin proteins polymerizing to form long filaments.

The take-home message, says Lanzer, "is that the parasite, in order to survive within the red blood cell, has to remodel the host actin - and that evolutionary pressure has resulted in mutations in human haemoglobin that prevent this remodelling." People who carry just one mutated copy of the sickle-cell gene still make enough normal haemoglobin and so are largely asymptomatic. So being a carrier confers a survival advantage in countries where malaria is endemic.

The finding is a big breakthrough, says David Sullivan, an associate professor at the Johns Hopkins Malaria Research Institute in Baltimore, Maryland. "This was a holy grail in the hunt for the pathogenesis of malaria."

Sullivan notes that other recent work[3, 4] has established that adhesin-containing 'knobs' on the surface of parasite-infected cells are abnormal in number and distribution when the cells have the mutated haemoglobin, and that the 'stickiness' of infected cells is diminished accordingly. "This kind of nails how that might happen," he says.

Rick Fairhurst, a malaria expert at the National Institute of Allergy and Infectious Diseases in Bethesda, Maryland, and an author on both of those papers, says the new study takes the work "a huge step forward". He says that Lanzer, with his "absolutely fabulous" images, "clearly beat us to the next step".

In the meantime, Lanzer says, a logical next step will be to try to identify the factors in the parasite that allow it to coopt the host cell's actin for its own ends. "If we can identify them," he says, "one can envision developing inhibitors. But it is a very long shot."

Nature doi:10.1038/nature.2011.9342 ***References***

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Diseased hearts to heal themselves in future

Oncostatin M regulates the reversion of heart muscle cells into precursor cells and is vitally important for the self-healing powers of the heart

Cellular reversion processes arise in diseases of the heart muscle, for example myocardial infarction and cardiomyopathy, which limit the fatal consequences for the organ. Scientists from the Max Planck Institute for Heart and Lung Research in Bad Nauheim and the Schüchtermann Klinik in Bad Rothenfelde have identified a protein which fulfils a central task in this reversion process by stimulating the regression of individual heart muscle cells into their precursor cells. It is now planned to improve the self-healing powers of the heart with the help of this protein.

In order to regenerate damaged heart muscle as caused by a heart attack, for example, the damaged muscle cells must be replaced by new ones. The number of cells to be replaced may be considerable, depending on the extent of the damage caused. Simpler vertebrates like the salamander adopt a strategy whereby surviving

healthy heart muscle cells regress into an embryonic state. This process, which is known as dedifferentiation, produces cells which contain a series of stem cell markers and re-attain their cell division activity. Thus, new cells are produced which convert, in turn, into heart muscle cells. The cardiac function is then restored through the remodelling of the muscle tissue.

An optimised repair mechanism of this kind does not exist in humans. Although heart stem cells were discovered some time ago, exactly how and to what extent they play a role in cardiac repair is a matter of dispute. It has only been known for a few years that processes comparable to those found in the salamander even exist in mammals.

Thomas Braun's research group at the Max Planck Institute for Heart and Lung Research in Bad Nauheim has now discovered the molecule responsible for controlling this dedifferentiation of heart muscle cells in mammals. The scientists initially noticed the high concentration of oncostatin M in tissue samples from the hearts of patients suffering from myocardial infarction. It was already known that this protein is responsible for the dedifferentiation of different cell types, among other things. The researchers therefore treated cultivated heart muscle cells with oncostatin M in the laboratory and were then able to trace the regression of the cells live under the microscope: "Based on certain changes in the cells, we were able to see that almost all heart muscle cells had been dedifferentiated within six days of treatment with oncostatin M," explains Braun. "We were also able to demonstrate the presence of various stem cell markers in the cells. This should be understood as an indicator that these cells had been switched to a repair mode."

Using a mouse infarct model, the Max Planck researchers succeeded in demonstrating that oncostatin M actually does stimulate the repair of damaged heart muscle tissue as presumed. One of the two test groups had been modified genetically in advance to ensure that the oncostatin M could not have any effect in these animals. "The difference between the two groups was astonishing. Whereas in the group in which oncostatin M could take effect almost all animals were still alive after four weeks, 40 percent of the genetically modified mice had died from the effects of the infarction," says Braun. The reason for this was that oncostatin M ensured clearly quantifiable better cardiac function in the unmodified animals.

The scientists in Bad Nauheim would now like to find a way of using oncostatin M in treatment. The aim is to strengthen the self-healing powers of the damaged heart muscle and to enable the restoration of cardiac function for the first time. The downside, however, is that oncostatin M was also observed to be counterproductive and exacerbated the damage in an experiment on a chronically diseased heart. "We believe that oncostatin M has considerable potential for efficiently healing damaged heart muscle tissue. What we now need is to be able to pinpoint the precise window of application to prevent any possible negative effects," says Braun.

Original publication:

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http://www.sciencedaily.com/releases/2011/11/111111094556.htm

Birth Weight Predicts Physical Functioning at Age 60

Low birth weight and slow growth increased the risk of poor physical functioning at the age of 60 years

ScienceDaily- Low birth weight and slow growth progressing to greater body mass in pre-adolescence significantly increased the risk of poor physical functioning at the age of 60 years, a new Finnish study published in the American Journal of Epidemiology found.

- The risk of poor functioning was particularly high among those individuals whose birth weight was low but who had a high body mass index at 11 years of age, says Dr. Mikaela von Bonsdorff from the Gerontology Research Centre at the University of Jyväskylä. Babies who are born thin lack muscle. This is a result of fetal development where an undernourished fetus secures the development of vital organs such as the brain at the expense of less important tissue such as muscle tissue, according to the Barker hypothesis.

The study by Dr. von Bonsdorff and her colleagues showed for the first time that the effect of unfavorable fetal development can be seen in physical functioning among people in their sixties.

This finding is disturbing, since fetal under-nutrition is still prevalent both in Western and developing countries. At the same time obesity is rapidly increasing in all age groups.

In the present study, 1999 persons were assessed at age 60 years as part of the larger Helsinki Birth Cohort. Their birth and childhood growth data were extracted from medical records and matched with these data. The child welfare system established already in the 1920's in Finland enabled the collection of this unique dataset.

The study was conducted in collaboration between Finnish and British researchers from the Gerontology Research Centre at the University of Jyväskylä, the University of Helsinki, the National Institute of Health and Welfare and the University of Southampton. Professor David JP. Barker, the founder of the Barker hypothesis, is a member of the Helsinki Birth Cohort study group.

The study was funded by the Academy of Finland and the University of Jyväskylä, the University Alliance of Finland.

http://www.scientificamerican.com/article.cfm?id=the-mystery-of-the-magnetic-cows

Magnetic Cows Finding Disputed by Researchers

Researchers disagree over replication of study showing that cows line up with Earth's magnetic field.

By Daniel Cressey of Nature magazine

In 2008, the world's media was captivated by a study apparently showing that cows like to align themselves with magnetic fields. But attempts to replicate this finding have left two groups of researchers at loggerheads, highlighting the problems faced by scientists working to replicate unusual findings based on new methods of data analysis.

Magneto-reception has been detected in animals from turtles to birds. Three years ago, Hynek Burda, a zoologist at the University of Duisburg-Essen, Germany, and his colleagues added cattle to the magnetic family with a paper in Proceedings of the National Academy of Sciences. The team used data from Google Earth to show that domestic cattle seem to prefer to align their bodies along Earth's magnetic field lines nd showed a similar phenomenon in field observations of deer.

Cow conundrum

Earlier this year, a group of Czech researchers reported their failed attempt to replicate the finding using different Google Earth images. The Czech team wrote in the Journal of Comparative Physiology A: "Two independent groups participated in our study and came to the same conclusion that in contradiction to the recent findings of other researchers, no alignment of the animals and of their herds along geomagnetic field lines could be found."

"When in 2008 the authors started to announce their surprising findings in [the] mass media, we got the impression that this is not the way science should be made and we took a closer look. We found out that it is not as fantastic as it was presented," says Lukas Jelinek, a researcher in the electromagnetic-field department at the Czech Technical University in Prague and one of the authors of the replication attempt.

In response, Burda and his colleagues reanalyzed the replication attempt by Jelinek and his colleagues4. Burda says that half of the Jelinek team's data should be excluded because some of the pastures are on slopes or near high-voltage power lines, for example, or because the images are too poor to make out cattle, or appear to contain hay bales or sheep instead. "One half of their data is just noise," says Burda.

In addition, Burda's group looked at herds as a whole, whereas Jelinek's team analyzed individual cows. "Of the data that were useable, they looked only at 50 percent of the cows. It's very subjective," Burda adds. His team's reanalysis of the Jelinek data actually does support the theory that cattle can magneto-sense, says Burda.

Picture problem

In a response to the reanalysis, Jelinek and colleagues say that in some cases they suspect each team may have inadvertently looked at different pictures, owing to mistakes in coordinates. The Jelinek team says that it only looked at cows far from power lines, and that the slopes are few and could not cause a statistical bias. They write: "Sheep, horses, hay bales, rocks, cows with unsatisfactory resolution, cows near a track, settlement or feeder, were not taken [in the analysis]."

Sönke Johnsen, who studies magneto-reception at Duke University in Durham, North Carolina, says that at least some of the images in question should probably not have been analyzed. He also suggests that the proper unit of evaluation is probably the herd, as the alignment of individual cows in herds is unlikely to be independent. Overall, he says that the original results, "while mysterious, still stand."

Jelinek says that his team does not intend to pursue any more research on this topic. Meanwhile, Burda's team is already looking at magneto-reception in other animals.

http://www.physorg.com/news/2011-11-methane-habitable-zone.html

The methane habitable zone

Saturn's smoggy moon Titan makes scientists question the possibilities for methane-based life

In the search for life elsewhere, many studies focus on finding liquid water. But what if life could exist with some other solvent? Saturn's smoggy moon Titan makes scientists question the possibilities for methane-based life in the galaxy.

The search for life is largely limited to the search for water – we look for exoplanets at the correct distance from their stars for liquid water to splash and flow freely on their surfaces, we 'follow the water' on the red planet Mars, and SETI scans radio frequencies in the 'water hole' between the 1,420MHz emission line of neutral hydrogen and the 1,666MHz hydroxyl line.

There are two very good reasons why our attention is so strongly focused on water. First, it's an efficient solvent for biological chemistry, allowing molecules to move around in cells, and has properties that are friendly to life – a high heat capacity, the ability to remain in liquid form across a wide temperature range, and a molecular density that forces molecules to organize themselves, rather than the water organizing around the molecules. Secondly, the biosignatures of a water-based chemistry are a lot easier for us to identify remotely.

Moreover, the most important fact about water's relationship with life is that it is here on Earth. "Some argue that is the only important thing about water," says Chris McKay of NASA's Ames Research Center. McKay is an astrobiologist and planetary scientist who specializes in hunting down alien environments and then asking the question, 'could something live here?', rather than deciding what is and isn't habitable beforehand.

"We live on a planet where water is a liquid and we have adapted and evolved to work with that liquid," he says. "Life has very cleverly used the properties of water to do things not just in terms of solution, but in using the strong polarity of that solution to its advantage in terms of hydrophobic and hydrophilic bonds, and using the very structure of water to help align molecules."

Suppose, though, that life needn't be constrained to a water-based chemistry; would we be able to recognize the signatures of such life and the habitats in which it lives? From one perspective, water seems such a good match for life because it may be the only match – no other liquid has the properties or abundance that water has. On the other hand there is another point of view that says there is more to the story, and that life simply works with whatever materials it has at hand. On Earth, that material is water, but on other planets it may be something else. Already we have discovered another world, in our Solar System, where rivers and lakes are made with a quite different liquid.

Titan's Liquid for Life?

One point four billion kilometers from the Sun orbits Saturn, the majestic ringed planet. Saturn is a gaseous world with an atmosphere of hydrogen and helium, and no discernible rocky surface below. However, among its retinue of icy moons is Titan, bigger than the planet Mercury and swathed in a dense cloak of hydrocarbon smog suspended in its nitrogen-rich atmosphere. It's the only moon in the Solar System to have an atmosphere, and it has intrigued astronomers ever since Gerard Kuiper detected methane there in 1944.

Sunlight glints off a methane lake at near Titan's north pole in this five-micron infrared image taken by the Cassini spacecraft. Image: NASA/JPL/University of Arizona/DLR

When the joint NASA–ESA Cassini–Huygens mission arrived in the Saturnian system in 2004, the truth about Titan was revealed. Infrared cameras and radar on Cassini showed a world riven by black, oily rivers and lakes, whilst the Huygens probe plunged through the opaque atmosphere to land on a soggy floodplain, but not one damp with water. On Titan, where the temperature is just 94 degrees above absolute zero (–179 degrees Celsius) water is as solid as rock and liquid methane runs through the river valleys and into the high latitude polar lakes. Instead of a water cycle, Titan has a methane cycle, and a complex molecular soup formed from reactions in the upper atmosphere between ultraviolet radiation from the Sun and methane.

Suppose life could exist in an environment like this; it would be a whole new category of habitable planet, one where liquid methane replaces liquid water, consequently leading to an entirely different habitable zone, one that is farther out from a star than the liquid water zone.

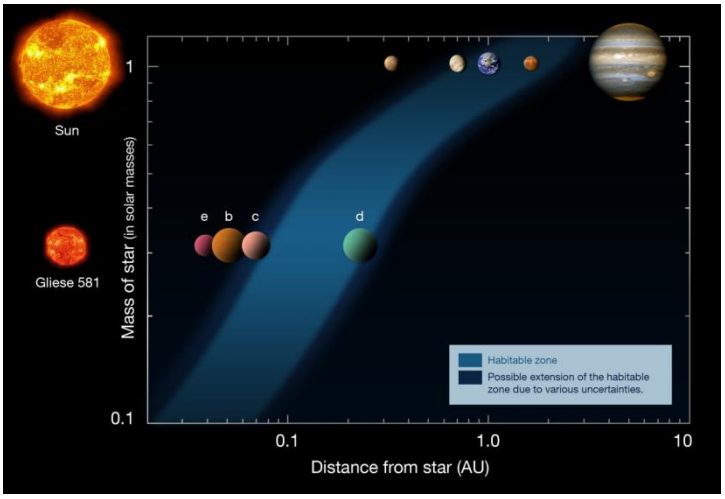
McKay is already ahead of the game. Along with Ashley Gilliam of NASA Ames and the University of California, Santa Cruz, he published a paper in the journal Planetary and Space Science in April that describes where a world with temperatures suitable for liquid methane could be found around a red dwarf star.

Methane Worlds

Red dwarfs – also called M-dwarfs after of their classification on the Hertzsprung–Russell diagram – are stars that are smaller and cooler than our Sun, and therefore the planetary systems around them are scaled down accordingly. McKay and Gilliam calculate that a planet would have a surface temperature of –179 degrees Celsius in a zone between 0.63 and 1.66 astronomical units (99 million and 248 million kilometers around the star Gliese 581, an M3-type red dwarf located 20.5 light years away. Four planets have already been confirmed orbiting Gliese 581, but none within the 'liquid methane habitable zone'. Two more planets have been claimed to exist in the system, and one of these would fall within the zone, at 0.76 astronomical units, but evidence for the existence of this world has proven highly controversial. Alternatively, the liquid methane habitable zone

around a cooler M4 type red dwarf would be even closer in, between 0.084 astronomical units and 0.23 astronomical units (12.6 million kilometers to 34.4 million kilometers.

Cold, methane-dominated worlds could easily exist around Sun-like stars, and Titan is proof of that. But there are advantages to finding these worlds around red dwarfs instead. First, their small orbital radii make them easier to detect, whether by transits or via radial velocity Doppler shifts. Second, Titan's atmosphere is opaque to blue and ultraviolet light, but transparent to red and infrared light, and red dwarfs produce more of the latter than the former. If Titan orbited a red dwarf, more red light would seep through to its surface, warming the planet and extending the range of the liquid methane habitable zone. (Interestingly, a red giant, which is close to the endpoint in the life cycle of a Sun-like star, produces light of similar red wavelengths. When our Sun expands into a bloated red giant in about five billion years, engulfing all the planets up to Earth and possibly Mars, Titan may well reap the benefits – for a short while at least before the red giant puffs away to leave behind a white dwarf star.)



Comparison of the habitable zone in the Solar System and the habitable zone around Gliese 581. Because Gliese 581 is a cooler red dwarf, its liquid water habitable zone is closer in, while its liquid methane habitable zone would be between 0.63 and 1.66 astronomical units. **Image: ESO**

Comparison of the habitable zone in the Solar System and the habitable zone around Gliese 581. Because Gliese 581 is a cooler red dwarf, its liquid water habitable zone is closer in, while its liquid methane habitable zone would be between 0.63 and 1.66 astronomical units. Image: ESO

Red dwarfs are also often highly magnetically active, and experience large stellar flares that emit powerful bursts of ultraviolet radiation. While these flares should not irreversibly damage exoplanet atmospheres, according to research led by Antigona Segura of Universidad Nacional Autonoma de Mexico, they could have a different kind of impact on Titan-esque atmospheres, disassociating molecules to create a haze like we see shrouding Saturn's largest moon. The more active the red dwarf, the more hazy the atmosphere of a Titan-like planet becomes, and the thicker the haze, the colder the surface and the closer to the star the liquid methane habitable zone has to be.

Greater or lesser haze also would alter the outward appearance of such a world, and if we are to one day hunt for habitable planets in the liquid methane habitable zone, we'll need to know what they will look like, as well as what biosignatures to search for. It is here that the main stumbling block lies.

"We just don't know what the tell-tale signs for life would be in such an atmosphere because it is so vastly different from ours," says Lisa Kaltenegger, who conducts research into habitable exoplanets at the Max Planck Institute in Germany and at the Harvard–Smithsonian Center for Astrophysics. "That said, it will change in a flash if Chris [McKay] finds life on Titan and can tell us what it produces and what we could look for remotely with a telescope."

Proof of Life

However, McKay already has a few suggestions and, tantalizingly, there may even be supporting evidence from Titan. In 2005 he published a paper with Heather Smith of the International Space University in Strasbourg, building on work by Steven Benner of the University of Florida, describing how methane-based life forms on Titan ('methanogens') could consume hydrogen, acetylene and ethane, and exhale methane instead of carbon-dioxide. If such a life form existed, it could reveal itself through a depletion of hydrogen, acetylene and ethane at the surface.

Amazingly, this is what studies of this moon have actually shown, but McKay himself is dubious that these measurements necessarily mean there is life on Titan. Rather, he points to other, more likely explanations including mistakes in the modeling of Titan's atmosphere upon which these measurements are partially derived, to unknown physical processes occurring on Titan that are not related to life. In regards to using this formula to search for life elsewhere, the depletion of hydrogen, acetylene and ethane on the surface of a hazy planet are not conducive to remote spectroscopic imaging from many light years away.

"It's not clear that we would be able to see the depletion of hydrogen over interstellar distances," says McKay. "On Earth, of course, the big biosignature that is visible over interstellar distances is the build-up of

oxygen, but even that is not an unambiguous indicator for life, because for most of Earth's history there has been life but no build-up of oxygen."

Nevertheless, Jonathan Lunine of the University of Arizona has speculated that there are many more exo-Titans than exo-Earths out there. If Chris McKay is right about methane-based life, such habitats could vastly outnumber planets with water-based life. The trouble is, the cold temperatures in which liquid methane exists would result in life forms with very slow metabolisms. Life would be sluggish. Is there any way it could be warmed up?

"You would have to invoke a lot of pressure to keep methane liquid at warmer temperatures," says Kaltenegger. "And if you think about it, water and carbon are extremely abundant. So if you make the planet warmer, you are much more likely to get carbon dioxide than methane, and methane would go out of its liquid phase so you wouldn't have the triple point [where for a given temperature and pressure a material can exist as a liquid, solid or gas] like the triple point of water on Earth."

Other Solutions

If warm liquid methane is out of the question, what other potential substitutes for water are there? Hydrogen fluoride comes close to the properties of liquid water, but fluoride is relatively rare in the Universe and so is unlikely to play a major factor in life. More common is salt: if temperatures are hot enough, salts will become liquid. "I can imagine a world where there is sodium chloride liquid and salt is somehow the basis for life," says McKay, but he admits it is speculative. Rather than spending too much time on outlandish ideas, he believes it's better to search for the environments first, and then ask, can anything live there?

Lisa Kaltenegger shares the same philosophy. "First we have to figure out using models what it takes for a planet to be habitable, and then we look at the data that comes in about such worlds and see how far we can stretch the habitable definition."

Yet of the nearly 700 confirmed exoplanets so far (not counting all the unconfirmed candidate worlds detected by NASA's Kepler mission) only two are potentially suitable for liquid water, and that's only on the condition that circumstances on the planets themselves are perfect. As for liquid methane, without some hard data on the properties of methane-based life, astronomers are going to err on the side of caution. Even McKay still favors searching for water-based life and habitats.

"We know water works, it's something that we understand," he says. "Although I argue that we should consider liquid methane, we don't know that it works. In that sense we're still guessing."

We may be kept guessing until the next mission to Titan, which may not happen until the 2030s. Just as Earth is the template for water-based habitats, Titan is the template for methane-based habitats. However, unless life can be shown to exist there, liquid methane habitable zones will always be passed over in favor of watery zones. Unfortunately, we may be missing a huge chunk of life in the process.

Source: Astrobio.net

http://www.bbc.co.uk/news/science-environment-15694973

'Smog-eating' material breaking into the big time

Titanium dioxide does a couple of clever tricks that mean we may well be seeing a lot of it in the future

By Jason Palmer Science and technology reporter, BBC News

What material can you find in toothpaste, sunscreen, solar cells, on the baseline at Wimbledon, in a Roman church, and along a tunnel in Brussels?

Full marks if you guessed titanium dioxide, a nearly ubiquitous but wholly unsung material.

Its brilliant white has made it a staple in pigments - hence Wimbledon - but its eco-credentials are still coming to the fore. Titanium dioxide does a couple of clever tricks that mean we may well be seeing a lot of it in the future: it's self-cleaning, and it breaks down pollutants in the air. And the fact that thin films of it are clear is the reason that a number of manufacturers use it in glass applications such as skylights.

Paving the way

The self-cleaning aspect comes about because one processed form of titanium dioxide is what is called superhydrophilic - literally, "water-loving", which means that when water hits a dirty titanium dioxide surface, that surface will draw in a whisper-thin sheet of water across its whole surface, displacing grime that then washes neatly away. But its second trick of removing pollutants is what has made it an increasingly popular choice for environmentally-minded building projects.

A bit of the ultraviolet light in sunlight frees up electrons from the material, creating "free radicals" that actively break down pollutants including so-called NOx gases (molecules of varying proportions of nitrogen and oxygen) or VOCs (volatile organic compounds).

A number of pilot projects around the world have seen the material used in, for example, concrete - hence the Jubilee Church in Rome. In Japan, Mitsubishi markets a brand of titanium dioxide-treated paving stones and Toto makes coated ceramic tiles. The material hit the news again this week when the aluminium firm Alcoa announced its new product Ecoclean, a titanium dioxide coating on aluminium panels for cladding buildings.

The firm claims that 1,000 square metres of the coated panels eat up the equivalent NOx output of four cars.

"What we see, especially in Europe, is more and more legislation... about the air quality in cities, and I think that Ecoclean is a product that can really help mitigate the effects of emitters such as cars by its air-cleansing characteristics," Alcoa spokesman Jasper Van Zon told BBC News.

Ecology of scale

The fact that such a large manufacturer has joined the ranks could mean that the real-world use of the material can finally be assessed on a large scale, says Anne Beeldens of the Catholic University Leuven in Belgium.

Dr Beeldens has been working with colleagues for years to establish, with rigorous experiments, the full scope of titanium dioxide's effects in a built environment. "We were really sceptical when we started with this, but it really works on the extraction of pollutants out of the air," she told BBC News.

"The problem is that you have so many parameters that it's sometimes hard to prove it. We got some promising results in the lab, but it was still in the lab; I think now it's all shifting to real applications."

Dr Beeldens is involved with the European project Photopaq, which has among other experiments coated the interior of the Leopold II tunnel in Brussels, carrying out detailed measurements of the before-and-after effects over the course of two weeks. While the propensity of titanium dioxide to break down NOx and VOCs is well established, the full circle of chemistry that takes place is not entirely known.

"We will see from those results if any extra pollutant is formed by the reaction; you have to look not only at the reduction of the pollutants, but also to see if nothing more harmful is produced," she explained.

Laboratory experiments have shown, for example, that the breakdown of NOx chemicals can result in the creation of other pollutants such as nitrous acid or ozone. But Dr Beeldens said that real-world tests in Japan had not shown significant production of the chemicals. The data from the tunnel test will help settle the question. And as large building projects make use of titanium dioxide-coated products, such as "The Iceberg" in Aarhus, Denmark, further large-scale experiments can be carried out.

Dr Beeldens said: "When I look at it in the last year, a lot of projects are starting where there's a link between application of the material and real air measurements, and I think once that link is really made, then it will start to be used all over the place."

http://medicalxpress.com/news/2011-11-australian-sues-surgical.html

Australian man sues over surgical mistake

An Australian man endured seven rounds of chemotherapy and had 80 percent of his stomach removed after being told he had cancer, only to later learn it was a misdiagnosis, reports said Sunday.

Graham Lord, 59, is suing health officials over the ordeal which has left him 20 kilograms lighter and unable to eat sitting down following a 2009 biopsy taken after a reflux complaint.

Lord was told that one of the areas biopsied had an aggressive cancer and he underwent seven rounds of chemotherapy before having most of his stomach removed in January 2010.

But post-surgery review of his tissues showed no sign of cancer and doctors at Sydney's Royal North Shore Hospital told him the initial biopsy diagnosis, made at a regional pathology laboratory, had been incorrect.

"To find out I didn't have cancer, it was just devastating. I was numb, I just couldn't believe it," Lord told the Sunday Telegraph newspaper.

"I am still very angry."

Lord's lawyer Anna Walsh, said he has filed a Supreme Court case against the Central Coast Health District, where the incorrect diagnosis and chemotherapy treatment occurred.

"He would be seeking an apology from the hospital in terms of an admission of liability and compensation for his injuries," Walsh told ABC Radio.

"There are nutritional issues and that leads to the need to have ongoing medical assistance as well as the need to have psychological counselling to help him get over this terrible event," she added.

The health district is yet to file its defence in the case.

http://www.sciencenews.org/view/generic/id/336064/title/Mirrors_can_alleviate_arthritis

Mirrors can alleviate arthritis

Swapped-hand illusion produces drop in pain ratings, preliminary study shows

By Laura Sanders

WASHINGTON - Tricking people with severe arthritis into thinking their sore hand is healthy dampens their pain, a new study suggests. If confirmed, the preliminary results may offer a powerful and inexpensive way to fight persistent arthritis pain.

"The results are really exciting," said pain expert Candy McCabe of the University of Bath in England, who wasn't involved in the study. "The whole thing is visual trickery, but the science behind it is strong."

The new technique, described November 12 at the annual meeting of the Society for Neuroscience, is a type of mirror therapy, in which the illusion of a pain-free hand makes people feel better. So far, visual feedback from mirrors has been shown to reduce some kinds of chronic pain, notably the pain felt in "phantom limbs" of amputees. But it was unclear whether mirror therapy could reduce pain produced by arthritic, inflamed joints.

In the new work, Laura Case, V.S. Ramachandran and colleagues at the University of California, San Diego recruited eight volunteers who had osteo- or rheumatoid arthritis. The volunteers saw a reflection of Case's healthy hand in the same place where their sore hand should have been. To strengthen the sensation of the hand-swap, the researchers simultaneously touched Case's hand and the volunteer's hand, creating a unified sensation of seeing and feeling the touch. The volunteer then mimicked a series of slow hand movements made by the researcher.

After experiencing the illusion, volunteers reported a reduction in pain by an average of about 1.5 points on a 10-point scale, with 10 being the worst pain possible. Some people's pain ratings dropped as much as three points, Case said. "What it tells us is the power of vision," McCabe said. "In this case, vision is somehow overriding what we think of as the strongest sense- pain."

Usually, mirror therapy is done with a person's own healthy hand. But since both of the participants' hands were swollen and appeared painful, the team used healthy hands from the experimenter. Simply seeing a gnarled, sore hand might have a profound effect on feeling pain, Case said.

Because the current experiment tested pain only immediately before and after the illusion, the researchers don't know whether the method could produce lasting relief. The results are preliminary, Case emphasized, and the team plans to conduct more studies to figure out the most effective form of treatment.

If the results are confirmed, the method may offer a cheap and effective way of alleviating chronic arthritis pain, without the side effects of drugs. "This is something that is easily accessible," McCabe said. "No matter where in the world you are, there are mirrors."

http://www.eurekalert.org/pub_releases/2011-11/mhif-pwh111011.php

Patients with hypertrophic cardiomyopathy live into their 90s

Hypertrophic cardiomyopathy is consistent with survival to normal life expectancy, with demise ultimately largely unrelated to this disease

Hypertrophic cardiomyopathy (HCM) is consistent with survival to normal life expectancy, including particularly advanced age into the tenth decade of life, with demise ultimately largely unrelated to this disease, according to a study being presented Nov. 13 at the American Heart Association (AHA) scientific sessions in Orlando, Fla.

HCM is the most common cause of sudden death in the young, but survival to a particularly advanced age is less well understood. "In the past, this disease has been associated with a grim prognosis, due to the deadly nature in young people, but we have learned through this analysis that those assumptions were inaccurate," said the study's lead author Barry J. Maron, MD, director of the Hypertrophic Cardiomyopathy Center at the Minneapolis Heart Institute Foundation. "We are continuing to learn about this unique disease state."

In the study, Maron and colleagues assessed the prevalence, clinical features and demographics of HCM patients surviving to the age of 90 years or older through an interrogation of the Minneapolis Heart Institute Foundation's HCM Center database. Of the 1,297 HCM patients, 26 had achieved the age of at least 90 years; 69 percent were women. The age at which HCM was diagnosed ranged from 61 to 92 years, with disease recognition under fortuitous circumstances by detection of a heart murmur or during family screening (six patients), or after onset of new symptoms (20 patients).

At the most recent evaluation (or death) patients were 90.0 to 96.7 years of age, with six presently alive at 90 to 96 years of age. Maron noted that HCM did not appear to be the primary cause of demise in any patient.

HCM-related complications occurred in18 patients, including heart failure symptoms, atrial fibrillation and non-fatal embolic stroke. Although no patient died suddenly, 13 still carried conventional HCM markers of risk.

Interestingly, a greater proportion of these HCM patients reached the age 90 years of older (2 percent) than expected in the general population (0.8 percent).

"We showed that hypertrophic cardiomyopathy—the most common cause of death among young people—is associated not only with normal life, but also extended longevity," Maron said. "These findings underscore a principle of the disease that has been falsely assumed; namely, that this disease will lead to an early demise in all patients." Finally, these data can reassure mainly patients who are diagnosed with HCM that their lives will not necessarily be cut short, Maron concluded.

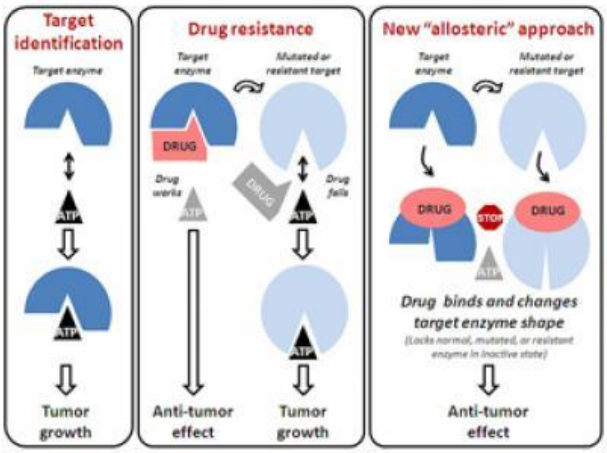
http://www.eurekalert.org/pub_releases/2011-11/uoc--nwt111011.php

New way to target – and kill – proliferating tumors

UC San Diego researchers find surprising role for enzyme in tumor cell division and new drug to combat it

Researchers at the University of California, San Diego School of Medicine and the UC San Diego Moores Cancer Center have identified a new drug discovery approach enabling the destruction of the most highly proliferative tumors. The discovery, published in the Nov. 13 online issue of the journal Nature Medicine, points to an effective, alternative method for killing fast-growing cancer cells without causing some of the negative effects of current therapies.

The scientists, led by David A. Cheresh, PhD, professor of pathology and associate director for translational research at the Moores Cancer Center, used an innovative chemical and biological approach to design a new class of drugs that arrests division in virtually all tumor cells by binding to and altering the structure of an enzyme called RAF.



This is a diagram of "allosteric" approach. **UC San Diego School of Medicine**

RAF has been long-studied, but its role in cell division – critical to cell proliferation and tumor growth – was a surprise. "By designing a new class of drugs that changes the shape of RAF, we were able to reveal this previously undiscovered role for RAF in a wide range of highly proliferative tumors," Cheresh said.

Current cancer drugs that target enzymes like RAF are generally designed to interact with the active site of the enzyme. Unfortunately, these drugs often lack specificity, Cheresh said. "They hit many different targets, meaning they can produce undesired side effects and induce dose-limiting toxicity." More of a concern is that tumor cells often develop resistance to this class of drugs rendering them inactive against the cancer.

Cheresh and colleagues pursued development of a new class of RAF inhibitors that do not bind to the active site of the enzyme and so avoid the limitations of current drugs. Instead, this new class, called allosteric inhibitors, changes the shape of the target enzyme and in doing so, renders it inactive. The specific drug tested, known as KG5, singles out RAF in proliferating cells, but ignores normal or resting cells. In affected tumor cells, RAF is unable to associate with the mitotic apparatus to direct cell division, resulting in cell cycle arrest leading to apoptosis or programmed cell death. KG5 in a similar manner effectively interferes with proliferating blood vessels, a process called angiogenesis.

"It's an unusual discovery, one that really challenges current dogma," said Cheresh. "Before this drug was designed, we had no idea RAF could promote tumor cell cycle progression. This may be only one example of how, by designing drugs that avoid the active site of an enzyme, we can identify new and unexpected ways to disrupt the growth of tumors. In essence, we are attacking an important enzyme in a whole new way and thereby discovering new things this enzyme was intended for."

KG5 produced similar results in tests on cancer cell lines, in animal models and in tissue biopsies from human cancer patients. The research team has since developed variants of KG5 that are 100-fold more powerful than the original drug. They hope one of these more powerful compounds will soon enter clinical trials at Moores Cancer Center.

The new RAF targeted compounds are being developed by Amitech Therapeutic Solutions, Inc a start-up company in San Diego.

Co-authors of the study, all from the departments of Pathology or Radiation Oncology at the UC San Diego Moores Cancer Center, are Ainhoa Mielgo, Laetitia Seguin, Miller Huang, Fernanda Camargo, Sudarshan Anand, Aleksandra Franovic, Sara M. Weis, Sunil Advani and Eric Murphy.

Funding for this research came from the National Institutes of Health.