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Researchers at Brandeis determine structure of key protein associated with Parkinson's disease

Future looks toward stabilizing protein, treatment

A team of researchers from the Petsko-Ringe and Pochapsky laboratories at Brandeis have produced and determined the structure of alpha-synuclein, a key protein associated with Parkinson's disease.

Their findings, recently published in Proceedings of the National Academy of Sciences (PNAS), provide information that may someday be used to produce a new kind of treatment for the incurable degenerative brain disorder.

While people with Parkinson's diseases exhibit many obvious symptoms such as tremors and weakness of face and throat muscles, definitive diagnosis of Parkinson's comes post mortem, when alpha-synuclein proteins become denatured and form clumps called Lewy bodies in the brain.

"We don't really know whether this is a side effect or whether it's the cause of Parkinson's disease, but we do know that the clumps of proteins are always there," says Thomas C. Pochapsky, professor of chemistry and one of the authors of the paper. Pochapsky's lab was responsible for examining the protein using nuclear magnetic resonance, a sort of MRI for molecules, housed at the Landsman Research Facility.

Alpha-synuclein is found in large quantities in the brain. Its association with Parkinson's disease has stirred curiosity since it was discovered in 1997. "Nobody knows what it does, but there's a lot of it," says Pochapsky. "The question is whether the unfolded or coagulated Lewy body protein just represents the pathological form of something that's normally doing something."

To explore that question, the scientists wanted to find out what the form alpha-synuclein is in before it turns into Lewy body clumps, figuring that if it is possible to stabilize, the progression of Parkinson's disease could be either slowed or reversed. "Even if we don't know what it is, we at least want to know in what form alpha-synuclein protein should be under normal conditions," says Pochapsky.

Gregory Petsko, professor of biochemistry, compares alpha-synuclein to an origami bird that is benign when intact but dangerous if it unfolds. This knowledge could someday lead to the development of therapies that act like glue, helping the protein keep its shape. While some drugs perform in this manner in the treatment of other diseases, the possibility of one for Parkinson's has not been investigated because, until now, scientists thought the Parkinson's protein had no structure. The possibility that the protein actually has a structure and that this form of the protein is benign, means that such an approach can now be considered.

The research has the potential to create a paradigm shift, a dramatic change in how science views a given phenomenon.

More than half a million Americans suffer from Parkinson's disease and, according to the National Institutes of Health, about 50,000 new cases are reported annually. The altering of alpha-synuclein is also believed to be involved in Lewy Body Dementia, a relative of Parkinson's that affects another one million Americans.

Quyen Q. Hoang, who was a post-doctoral researcher in the Petsko-Ringe lab, and is continuing with the research in his own lab at Indiana University School of Medicine, played a key role in developing the methodology for producing this protein.

Jeffrey Agar's lab then used mass spectrometric studies, a method of determining molecule composition. Last, using nuclear magnetic resonance, Pochapsky's lab examined the structure of the tetramer solution.

"We were able to establish that alpha-synuclein is actually a tetramer, meaning that four of these protein molecules stick together while moving around," says Pochapsky. "We've found what we think is the normal form of alpha-synuclein, which no one has seen before it has clumped together in the form of Lewy bodies."

Petsko points out that the ability to make this form of the protein may also shed light on its normal function.

"Synuclein makes up a sizeable percentage of the protein in neurons, but no one really understands what its role in the cell is," Petsko says. "We hope that this form of the protein may be the form that has the benign function, so biochemists and cell biologists may now be able to figure out what it's doing."

Pochapsky explains that while researchers in other institutions have examined alpha-synuclein before, it has not been done with this ultra careful method, which maintains the structure.

Dagmar Ringe, professor of biochemistry, says that monitoring levels of this form of synuclein might be one new approach to early diagnosis of diseases like Parkinson's and Lewy Body Dementia, which could be essential for effective treatment. She adds that the Brandeis reserach results are all the more exciting as a report was published by Dennis Selkoe and Tim Bartels at Harvard Medical School about the same form of synuclein in normal brain and red blood cells.

http://www.eurekalert.org/pub_releases/2011-10/ason-tyb102111.php

Take your blood pressure meds before bed

Taking the drugs at night controls blood pressure better and reduces risk of heart problems

** Patients who take at least one blood pressure-lowering medication at bedtime have better control of their blood pressure and are less likely to experience heart problems than patients who take medications in the morning*

** Sleep-time blood pressure is a better measure of heart health than wake-time blood pressure*

** About one out of three U.S. adults has high blood pressure*

Washington, DC - It's better to take blood pressure-lowering medications before bed rather than first thing in the morning, according to a study appearing in an upcoming issue of the Journal of the American Society Nephrology (JASN). The results indicate that heart conditions such as strokes and heart attacks can be drastically reduced in patients with hypertension with no extra effort or cost.

The time of day when patients take blood pressure-lowering medications can affect their blood pressure patterns, but does it make any difference to their health? Ramón Hermida, PhD (University of Vigo, in Spain) and his colleagues studied this question in a group of 661 patients who had chronic kidney disease and hypertension. Half of the patients took all prescribed blood pressure-lowering medications first thing in the morning and half took at least one of them at bedtime.

After an average follow-up of 5.4 years, patients who took at least one blood pressure-lowering medication at bedtime had better control of their blood pressure and were about one-third as likely to experience a heart-related event such as a heart attack, a stroke, or heart failure compared to patients who took their medications upon awakening. Also, sleep-time blood pressure was a much more accurate measure of heart health than wake-time blood pressure.

"Our results indicate that cardiovascular event rates in patients with hypertension can be reduced by more than 50% with a zero-cost strategy of administering blood pressure-lowering medications at bedtime rather than in the morning," said Dr. Hermida. "This study also documents for the first time that sleep-time blood pressure is the most relevant independent marker of cardiovascular risk," he added.

Study co-authors include Diana Ayala, MD, PhD, Artemio Mojón, PhD, José Fernández, PhD (University of Vigo, in Spain.)
Disclosures: The authors reported no financial disclosures.
The article, entitled "Bedtime Dosing of Antihypertensive Medications Reduces Cardiovascular Risk in CKD," will appear online at http://jasn.asnjournals.org/ on Monday, October 24, 2011, doi:10.1681/ASN.2011040361.

http://www.eurekalert.org/pub_releases/2011-10/rup-ssa101911.php

Study shows Alzheimer's disease-related peptides form toxic calcium channels in the plasma membrane

Increasing suspicion now falls on smaller, soluble A-beta complexes as the toxic form of the protein

Alzheimer's disease is triggered by the inappropriate processing of amyloid precursor protein to generate excess amounts of short peptide fragments called A-beta. For many years, the neurodegeneration associated with Alzheimer's disease was thought to be caused by the buildup of A-beta in insoluble, fibrous plaques. However, increasing suspicion now falls on smaller, soluble A-beta complexes as the toxic form of the protein, partly through their ability to induce excess calcium influx into cells, which disrupts synaptic signaling and stimulates cell death. A new study in The Journal of Cell Biology (www.jcb.org) uses high-resolution imaging to reveal that A-beta oligomers elevate calcium by forming calcium-permeable pores in the plasma membrane.

A-beta oligomers could induce calcium influx by physically disrupting the cell's outer membrane or by activating endogenous calcium channels. But studies have also shown that A-beta peptides can form calcium-permeable pores themselves in both artificial and cell membranes. A limitation of experimental techniques used to date, says Angelo Demuro, from the University of California, Irvine, is that they only monitor the activity of one or two channels at a time. In addition, different groups have obtained disparate results regarding the properties of A-beta channels using this approach.

To overcome these problems, Demuro and colleagues developed an alternative method to measure the activity of calcium channels in living cells. "We can simultaneously record the behavior of thousands of channels using an imaging technique we call optical patch-clamping," Demuro explains. In this approach, frog eggs are filled with a calcium-sensitive dye, and the researchers observe the part of the cell nearest to the cell's outer membrane. When membrane channels open to let calcium into the cell, small fluorescent flashes indicate the duration and extent of calcium influx at each individual pore.

Demuro et al. found that, just twenty minutes after A-beta oligomers were added to the eggs, they displayed flickering spots of fluorescence signifying calcium influx through single membrane channels. This influx was unlikely to be through endogenous channels activated by A-beta because frog eggs barely express calcium channels of their own. Moreover, A-beta aggregates weren't simply disrupting the eggs' membrane, as the influx was inhibited by zinc ions, which block calcium-permeable pores.

A-beta oligomers therefore form calcium-permeable channels of their own in the membrane. Demuro and colleagues characterized the properties of these pores by simultaneously imaging the activity of thousands of channels in a single membrane region. "They are all different," says Demuro. "[The pores] show a wide variety of behaviors." Most pores opened infrequently and only let in small amounts of calcium, but some opened more often and channeled large amounts of calcium into the cell. Though few in number, Demuro et al.'s measurements suggest that this latter type of pore may be largely responsible for the toxic increase in cytoplasmic calcium levels.

Differences in the properties of individual pores may be caused by differences in the number of A-beta peptides assembled into each channel, with higher-order oligomers forming the more active species of pore. "It would be nice to visualize how many A-beta peptides each pore has and whether this is related to the activity of the channel," Demuro says. If pore activity is affected by the oligomerization state of A-beta, it appears that A-beta peptides continue to assemble after their insertion into membranes, as the pores became more active as eggs were exposed to A-beta oligomers for longer periods. This increase in calcium influx over time may be related to the gradual progression of Alzheimer's symptoms.

Beyond Alzheimer's disease, Demuro et al.'s approach may help explain the pathogenesis of other neurodegenerative disorders like Parkinson's and Huntington's disease, in which misfolded and aggregated proteins have also been reported to form calcium-permeable channels.

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Coffee consumption associated with decreased risk for basal cell carcinoma

Caffeine could be related to an inverse association between basal cell carcinoma risk and consumption of coffee, a study found.

BOSTON - The prospective study, presented at the 10th AACR International Conference on Frontiers in Cancer Prevention Research, held Oct. 22-25, 2011, examined the risks of basal cell carcinoma (BCC), squamous cell carcinoma (SCC) and melanoma in connection with coffee consumption and found a decreased risk for BCC only.

“Given the nearly 1 million new cases of BCC diagnosed each year in the United States, daily dietary factors with even small protective effects may have great public health impact,” said researcher Fengju Song, Ph.D., a postdoctoral fellow in the department of dermatology at Brigham and Women’s Hospital and Harvard Medical School. “Our study indicates that coffee consumption may be an important option to help prevent BCC.”

Data were taken from the Nurses’ Health Study (Brigham and Women’s Hospital) and the Health Professionals Follow-Up Study (Harvard School of Public Health). In the Nurses’ Health Study, 72,921 participants were followed from June 1984 to June 2008. In the Health Professionals Follow-Up Study, 39,976 participants were followed from June 1986 to June 2008.

The researchers reported 25,480 incident skin cancer cases. Of those, 22,786 were BCC, 1,953 were SCC, and 741 were melanoma.

Song and colleagues reported that women who consumed more than three cups of coffee per day had a 20 percent reduction in risk for BCC, and men who consumed more than three cups per day had a nine percent risk reduction compared with people who consumed less than one cup per month.

The amount of coffee consumption was inversely associated with BCC risk. Those in the highest quintile had the lowest risk, with an 18 percent reduction for women and a 13 percent reduction for men.

Song and colleagues were surprised by the inverse connection in BCC cases only. Animal studies have suggested an association between coffee intake and skin cancer risk, but epidemiologic studies have not conclusively shown the same results, they said.

“Mouse studies have shown that oral or topical caffeine promotes elimination of UV-damaged keratinocytes via apoptosis (programmed cell death) and markedly reduces subsequent SCC development,” Song said. “However, in our cohort analysis, we did not find any inverse association between coffee consumption and the risk for SCC.”

Song said that additional studies specifically addressing the association between coffee consumption and BCC and the mechanism behind this association are warranted.

http://www.eurekalert.org/pub_releases/2011-10/uom-rwm102411.php

Rural women more likely to be diagnosed with most serious form of breast cancer

Researcher recommends changes to free screening programs

COLUMBIA, Mo.– Women living in rural areas face unique challenges concerning health and wellness issues. Now, an MU researcher has found that rural women are more likely than women living in cities to be diagnosed with late-stage breast cancer, the most severe form of the disease.

"The stage at which the cancer is diagnosed has a tremendous impact on the type of treatment, recovery and survivability," said Faustine Williams, a doctoral student in the Department of Rural Sociology in the College of Agriculture, Food and Natural Resources. "Finding ways to identify and treat breast cancer sooner are keys to increasing survivability."

Williams found that women who travel 50 to 75 miles to a healthcare facility are 10 percent more likely to be diagnosed with late-stage breast cancer. She says women in rural areas are less likely to seek preventative treatment and testing due to the high cost and time necessary. Identifying breast cancer earlier increases survival rates.

Many states offer free breast cancer screening programs; however, programs can be improved to better serve women in rural areas. In Missouri, Williams recommends changes to the Show Me Healthy Women (SMHW) program, a free breast and cervical cancer screening program for Missourians. To receive a free screening, women must meet certain age, income and insurance guidelines. Although there are 180 facilities throughout the state, they are unevenly distributed. Several rural counties do not have a single facility. Williams recommends that programs like SMHW make facilities more accessible to women in rural areas.

"In some cases women in rural areas must spend an entire day seeking routine medical treatment," Williams said. "By strategically placing health screening facilities in poor and rural areas, women would have better access to health care and it would increase the likelihood that rural women would seek medical care and be diagnosed with breast cancer earlier."

Williams analyzed data from the Missouri Information for Community Assessment in her study. She used mapping software to pinpoint the locations of patients diagnosed with each stage of breast cancer, as well as the nearest screening facility. Then, she calculated the distances from patients with each cancer stage to the nearest screening facilities.

In Missouri, eight of the top 10 counties for late-stage breast cancer incidences are considered rural counties by the United States Office of Management and Budget. Of the 55,182 female breast cancer cases reported in Missouri between 1996 and 2007, 17,093, or 31 percent, were diagnosed as late-stage cancer.

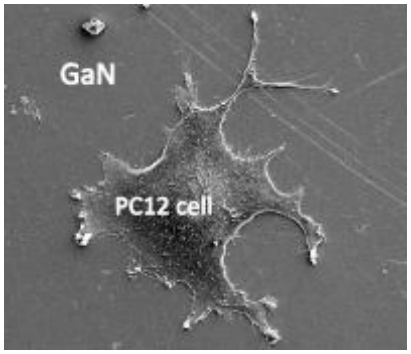
Williams presented her research at the Community Development Society and Rural Sociological Society Joint Annual Meetings in Boise, Idaho.

http://www.eurekalert.org/pub_releases/2011-10/ncsu-rfg102411.php

Research finds gallium nitride is non-toxic, biocompatible - holds promise for implants

Researchers from North Carolina State University and Purdue University have shown that the semiconductor material gallium nitride (GaN) is non-toxic and is compatible with human cells – opening the door to the material's use in a variety of biomedical implant technologies.

GaN is currently used in a host of technologies, from LED lighting to optic sensors, but it is not in widespread use in biomedical implants. However, the new findings from NC State and Purdue mean that GaN holds promise for an array of implantable technologies – from electrodes used in neurostimulation therapies for Alzheimer's to transistors used to monitor blood chemistry.



This is a scanning electron microscope image of cell growth on GaN that has been coated with peptides. Albena Ivanisevic, North Carolina State University

"The first finding is that GaN, unlike other semiconductor materials that have been considered for biomedical implants, is not toxic. That minimizes risk to both the environment and to patients," says Dr. Albena Ivanisevic, who co-authored a paper describing the research. Ivanisevic is an associate professor of materials science and engineering at NC State and associate professor of the joint biomedical engineering program at NC State and the University of North Carolina at Chapel Hill.

Researchers used a mass spectrometry technique to see how much gallium is released from GaN when the material is exposed to various environments that mimic conditions in the human body. This is important

because gallium oxides are toxic. But the researchers found that GaN is very stable in these environments – releasing such a tiny amount of gallium that it is non-toxic.

The researchers also wanted to determine GaN's potential biocompatibility. To do this they bonded peptides – the building blocks that make up proteins – to the GaN material. Researchers then placed peptide-coated GaN and uncoated GaN into cell cultures to see how the material and the cells interacted.

Researchers found that the peptide-coated GaN bonded more effectively with the cells. Specifically, more cells bonded to the material and those cells spread over a larger area.

"This matters because we want materials that give us some control over cell behavior," Ivanisevic says. "For example, being able to make cells adhere to a material or to avoid it.

"One problem facing many biomedical implants, such as sensors, is that they can become coated with biological material in the body. We've shown that we can coat GaN with peptides that attract and bond with cells. That suggests that we may also be able to coat GaN with peptides that would help prevent cell growth – and keep the implant 'clean.' Our next step will be to explore the use of such 'anti-fouling' peptides with GaN."

The paper, "Gallium Nitride is Biocompatible and Non-Toxic Before and After Functionalization with Peptides," is forthcoming from Acta Biomaterialia and was co-authored b

http://www.eurekalert.org/pub_releases/2011-10/mu-hdf102411.php

Harsh discipline fosters dishonesty in young children

Study compares lie-telling behaviour in harshly punitive, mildly punitive environments

Young children exposed to a harshly punitive school environment are more inclined to lie to conceal their misbehaviour than are children from non-punitive schools, a study of three- and four-year-old West African children suggests.

The study, published in the journal Child Development, also indicates that children in a punitive environment are able to tell more convincing lies than those in a non-punitive environment.

The research, by Professor Victoria Talwar of McGill University and Professor Kang Lee of the University of Toronto, examined deceptive behaviours in two groups of children living in the same neighbourhood. One group was enrolled in a private school that used a traditional authoritarian discipline model, in which beating with a stick, slapping of the head, and pinching were administered publicly and routinely for offenses ranging from forgetting a pencil to being disruptive in class. In the other school, also private, children were disciplined with time-outs or scolding and, for more serious offenses, were taken to the principal's office for further reprimand.

The study involved an experiment comparing the behaviour of children in the two schools. Children were seen individually and asked to play a guessing game by an experimenter who was born and raised locally. The children were told not to peek at a toy when left alone in a room. Most children in both schools couldn't resist the temptation, and peeked at the toy. When the experimenter asked if they had peeked, nearly all the peekers from the punitive school lied – compared with just over half of those from the non-punitive school. What's more, after the initial lie, lie-tellers from the punitive school were better able to maintain their deception when answering follow-up questions about the identity of the toy – by deliberately giving an incorrect answer, for example, or by feigning ignorance, rather than blurting out the name of the toy.

The findings suggest that "a punitive environment not only fosters increased dishonesty but also children's abilities to lie to conceal their transgressions," Talwar and Lee conclude.

In fact, the three- and four-year-old lie-tellers in the punitive school were as advanced in their ability to tell convincing lies as six- to seven-year-old lie-tellers in existing studies. "This finding is surprising," the authors note, as "existing studies have consistently found that children from punitive environments tend to suffer general delays in cognitive development."

"One possibility is that the harsh punitive environment heightens children's motivation to come up with any strategies that will help them survive in that environment," Prof. Lee says. "Lying seems particularly adaptive for the situation.

"Our study, I think, may serve as a cautionary tale for parents who sometimes would use the harshest means of punishment when they catch their children lying. It is clear that corporal punishment not only does not reduce children's tendency to lie, but actually improves their lying skills."

http://www.eurekalert.org/pub_releases/2011-10/bmj-dhc102111.php

Doctors happily cite alcohol as cause of death, but not smoking, for fear of stigmatization

Does smoking kill? A study of death certification and smoking

UK doctors are willing to cite alcohol as a cause of death on death certificates, but not smoking, for fear of stigmatising the deceased, shows research published online in the Journal of Clinical Pathology.

This has implications for the true extent of the impact of smoking on health, say the researchers, who point out that the current statistical estimates of the death toll from smoking are potentially flawed.

They looked at just over 2,000 death certificates and 236 post mortem reports, issued at a large London teaching hospital between 2003 and 2009, to see what cause of death doctors had cited.

Doctors have been allowed to cite smoking and alcohol as a direct or underlying cause of death without the need to refer the case to a coroner since 1992.

Smoking was identified as the cause of death in only two certificates (0.1% of the total) and included in part II of the death certificate, which outlines other contributory conditions, in only 10 cases (0.5% of the total).

The two cases in which smoking was cited were lung cancer and chronic obstructive pulmonary disease (COPD). Yet 279 deaths included these diagnoses, and in most cases the deceased was a current (over 45%) or former (over 23%) smoker. It is well known that smoking is the primary cause of both lung cancer and COPD.

In all, 407 deaths were caused by conditions in which smoking is thought to have a substantial role. Yet smoking was cited as the cause of death in only two of these certificates and as a contributory factor in six.

The post mortem reports were no better: not a single case cited smoking as causing or contributing to death, which the authors describe as "surprising."

Yet doctors willingly cited alcohol as a direct or contributory cause of death. This was cited in over half (57.4%) of the 54 death certificates, which included diagnoses linked to alcohol use.

"Death certification is an important source of mortality data and directly captures 99.79% of all deaths in the UK," say the authors, who point out that the doctors in this study are not unique in their reluctance to cite smoking as a cause of death.

"There are many reasons why smoking is not cited as a [cause of death] by doctors in the UK," they write. "The first and frequently debated reason relates to doctors' desire not to cause relatives distress by stigmatising the deceased and their smoking habit."

They continue: "While the results of this study would support this assumption, it is interesting that the same clinicians frequently cited alcohol use as an underlying cause of death."

This may be because alcohol use is generally more accepted culturally, suggest the authors, adding that the stigma associated with smoking is well documented, and may be worsening as a result of the recent legislation, banning smoking in public places.

"Given the overwhelming evidence showing a causal link between smoking and certain terminal conditions, more effort should be made to record smoking on the death certificate. It is clear that the current arrangements fail to achieve this," they conclude.

http://www.bbc.co.uk/news/health-15401746

Immune system defect may cause ME

Researchers in Norway believe Chronic Fatigue Syndrome (CFS), also known as ME, may be caused by a wayward immune system attacking the body.

By James Gallagher Health reporter, BBC News

The illness, the cause of which is uncertain and has no known cure, has attracted significant controversy.

A small study, reported in PLoS One, showed a cancer drug, which inhibited the immune system, relieved symptoms in some patients. The ME Association said the findings were "very encouraging news".

Doctors in Norway stumbled across their first clue in 2004 when treating a patient with both Hodgkin's lymphoma, a cancer of the white blood cells, and CFS.

When she received cancer treatment, her fatigue symptoms improved for five months.

'Dramatic'

The latest study, carried out at the Haukeland University Hospital in Bergen, built on the previous discovery by testing 30 patients with CFS.

Half were given two doses of Rituximab, a cancer drug which eliminates a type of white blood cell, while the other half were given a fake treatment.

In those patients receiving the drug, 67% reported an improvement in a score of their fatigue levels. Just 13% showed any improvement in the sham group.

Øystein Fluge, an oncology consultant at the hospital, told the BBC: "There was a varied response: none, moderate, dramatic relief of all symptoms. "Two had no recurrence [of their symptoms], their life was turned completely around very dramatically." Their theory is that a type of white blood cell, B lymphocytes, are producing an antibody which attacks the body.

The drug wipes out the lymphocytes which in some cases may "reset the immune system", however, in other patients the fatigue symptoms would return when more B lymphocytes were made.

Caution

Mr Fluge said: "I think the fact that patients responded to treatment, improved cognitive function, fatigue and pain makes us believe we're touching one of the central mechanisms.

"But we're scratching at the surface, I would not characterise this as a major breakthrough."

The researchers are now investigating the effect of giving more doses over a longer period of time.

If their hunch is right it will throw up more questions, such as what is the immune system actually attacking and whether or not an actual test for CFS/ME be developed.

Dr Charles Shepherd, the UK ME Association's medical adviser, said: "The results of this clinical trial are very encouraging news for people with ME. "Firstly, they help to confirm that there is a significant abnormality in immune system function in this disease. "Secondly, they indicate that altering the immune system response in ME could be an effective form of treatment for at least a subset of patients. "We now need further clinical trials of such anti-cancer agents to see if other research groups can replicate these findings."

http://www.sciencedaily.com/releases/2011/10/111024084630.htm

Heart Transplant Surgery Safe and Effective

Canadian Retrospective Spanning Three Decades Finds Survival Rates Now Close to 90 Per Cent

ScienceDaily - Heart transplantation is a very safe and effective therapy, according to a new long-term study presented at the Canadian Cardiovascular Congress 2011, co-hosted by the Heart and Stroke Foundation and the Canadian Cardiovascular Society.

Researchers at the University of Ottawa Heart Institute heart transplant program revealed results from 25 years of follow-up on a total of 461 transplant patients. Mean age at transplant was 49 ±13 years. Patients were followed and managed according to guidelines in effect at the time. They found that survival rates have improved by more than 20 per cent over the years since modern heart transplantation became available in 1980.

"Heart transplants are amazingly effective therapy," says Dr. Marc Ruel, surgical director of the heart transplant program at the University of Ottawa Heart Institute. "We must remember that half of these patients would otherwise not have lived one year without a transplant."

The Heart Institute found that survival rates have been good over the years, especially from 2003 onward, with more advanced surgical and medical care, where the survival rate at eight years post-surgery is now 89.3 per cent. "Results have significantly improved over the years," says Dr. Ruel.

The study found that overall survival rates for the 25-year period were:

At one year -- 86%
At five years -- 75%
At 10 years -- 62%
At 15 years -- 47%
At 20 years -- 36%

Fifty-five per cent of all patients were status 3 or higher -- meaning they had more complicated and urgent medical needs -- at transplant. Survival was negatively influenced by age at transplant. The younger the patient is at the time of transplant, the more successful the outcome. Each additional 10 years of age decreases the survival rate by 20 per cent, the study found. Survival was not significantly affected by gender or by whether a patient was on a ventricular assist device − a mechanical pump that helps a weakened heart pump blood throughout the body − pre-transplant.

Causes of death beyond the perioperative period were cardiac allograft vasculopathy in 36 per cent (at a mean of eight years post-transplant), rejection in six per cent (at a mean 1.4 years post-transplant), sepsis in 10 percent (at a mean of one year post-transplant), cancer in 17 per cent (at a mean of 7.7 years post-transplant), and other causes in 32 per cent (at a mean of 8.2 years post-transplant). Successful heart transplantation is a team effort that starts with donor identification, consent from families, donor preparation, and collaboration between hospitals. It involves a large team of surgeons, transplant cardiologists, nurses, coordinators, physiotherapists, and social workers.

"Heart transplant is one of the most philosophically, symbolically, surgically and medically beautiful acts," says Dr. Ruel. "Although the number of donors will always be insufficient until we find new therapies such as cardiac regeneration, it is important to recognize the importance of heart transplant programs and of organ donation, in light of the many lives saved and families positively touched by this therapy. We hope that this research conveys the message."

"Heart transplant is a very good choice for some patients," adds Dr. Haissam Haddad, medical director of the University of Ottawa Heart Institute heart transplant program. "It has a strong record of safety and success."

Heart disease is a leading cause of death in Canada. "Heart transplantation is an excellent treatment to the select few who need it," says Heart and Stroke Foundation spokesperson Dr. Beth Abramson. "We can all do our part by signing our donor cards and letting loved ones know our wishes." She also recommends we all lead healthy lives to try to prevent heart disease. "Canadians with heart failure who otherwise might have died have access to a life-saving procedure thanks to generous donors and our incredible multidisciplinary transplant teams," says Dr. Abramson. "This research is a valuable measure of how this life-saving advance is working for our sickest patients - those who need a new heart."

Heart transplant is used to treat severe, end-stage heart failure. This heart failure may be the result of damage to the heart from coronary artery disease, such as a heart attack; severe, untreated hypertension (hypertensive heart disease); heart valve problems; infections such as viruses; alcohol and illicit drug use; inherited heart disease or congenital heart disease. In 2010 there were 167 heart transplants in Canada, performed in five provinces. On December 31, 2010, there were 135 Canadians on the waiting list for a heart transplant.

http://arstechnica.com/science/news/2011/10/climate-skeptics-perform-independent-analysis-finally-convinced-earth-is-getting-warmer.ars

Climate skeptics perform independent analysis, finally convinced Earth is getting warmer

By John Timmer | Published 4 days ago

Last week, a project called Berkeley Earth released drafts of its findings. The project was started by a physicist, Richard Muller, who had previously expressed doubts about the mathematical rigor of climate science; it received funding from a variety of sources, including the Department of Energy and foundations set up by Bill Gates and the Koch brothers. The Berkeley Earth team set out to analyze records of the Earth's surface temperatures to answer questions about the trajectory of the planet's recent warming that had been raised by skeptics and contrarians. To a very large degree, it discovered that climatologists had been doing a pretty good job after all.

Climatologists have generated a number of reconstructions of global temperature trends based on instruments that have been recording temperatures since the 1800s. However, one of those records was produced by members of the Climatic Research Unit at the University of East Anglia. That record became embroiled in controversy: the CRU was the target of e-mail thefts, was unable to release some of its records due to commercial agreements, and had destroyed some paper copies of original data decades earlier. NASA and NOAA, however, performed independent reconstructions based on publicly available data.

Even those, however, had become the targets of criticism. Recording stations were moved, their surroundings urbanized, and researchers performed adjustments or dropped some stations entirely in order to compensate. Various parties hostile to the findings of climate science have raised questions about this process. Have the scientists really compensated for urbanization? Was the trajectory of the modern warming really as extreme as the temperature records were showing?

And those were the moderate voices. At the more extreme end of the spectrum, some accused researchers of selectively dropping only stations that showed cooling trends, and raised questions about whether the planet had warmed at all. These questions weren't very realistic—melting ice, migrating species, and other factors made it pretty clear the planet was warming—but the climate debate has no shortage of unreasonable voices.

Rerunning the numbers

In any case, the Berkeley Earth project set out to answer all of those questions. It would use many more stations, perform an independent reconstruction of global temperatures, and examine the effect of urbanization. And it has now completed that analysis and posted drafts of the four papers it has submitted to peer reviewed journals (they're currently in the review process).

It's not clear that they will all be published, because a few of them largely duplicate information that's already out there, as even the project head admits. "Our biggest surprise was that the new results agreed so closely with the warming values published previously by other teams in the US and the UK," said Richard Muller. "This confirms that these studies were done carefully and the potential biases identified by climate change skeptics did not seriously affect their conclusions."

So, with a different set of temperature stations, Berkeley Earth has succeeded in producing a graph that looks nearly indistinguishable from those of the other research groups. Is it possible to produce a biased record? Absolutely—about a third of the stations in Berkeley Earth's dataset show a cooling trend over the past 70 years. But, given this analysis, there's no reason to give any credibility to accusations that climate scientists were cooking the books on temperatures.

But could the climate record be inadvertently biased? Critics have suggested that urbanization and the changing environment around many temperature stations have created a false warming signal; this is the

premise behind the Surface Stations project, which went out and rated US instruments for likely problems. Both of these issues had been tackled by the scientific community. A paper from NOAA scientists looked at the best-rated US surface stations, and found they produced a temperature plot indistinguishable from that of the network as a whole. Berkeley Earth essentially duplicates this analysis.

Similarly, a group of NASA scientists (including James Hansen—yes, he still does science) used satellite images of nighttime lighting to determine which temperature stations are in urban areas, and found that these have a minimal impact on the temperature record. Berkeley Earth used a different source of urbanization information (daylight imagery that was processed by a machine learning algorithm), but come to the same conclusion: the urban heat island effect isn't skewing the temperature record.

Is there anything new here at all? The primary new contribution seems to be in a paper that focuses on short term variability in the climate. The Berkeley Earth record shows a good correlation between surface temperatures and variability in the North Atlantic. The El Niño-Southern Oscillation, which takes place in the Pacific, is generally regarded as the main driver of short-term variability, so this goes a bit against the grain. It's possible that this is a result of Berkeley Earth's focus on land-based readings, but we'll have to await their next analysis, which will include ocean readings, to see.

A sanity check for skepticism?

With the papers released, however, a publicity war has broken out. Richard Muller, one of the leaders of Berkeley Earth, penned an editorial in which he ignores the previous work by NASA, NOAA, and others, and claims there was good reason to be skeptical of the temperature record. Until now, that is. Berkeley Earth has largely recapitulated that previous work, so now it can all be trusted, and climate skeptics should simply move on to something else. Muller may have been one of the only people to have actually done what anyone skeptical of the climate scientists should do—perform an independent check of their work—but his public spin on his results is completely unrealistic.

Of course, like the NOAA study before it, Berkeley Earth undercuts the whole rationale behind the Surface Station project, and the people behind that are not happy. After posting nearly any trivia that came along on their blog (called Watts Up With That, after its lead, Anthony Watts), they have suddenly gotten very upset that the four papers were released before going through peer review—at which point they think they should be rejected for publication.

Stranger still, Watts and a number of others are now disowning their past, claiming to never have doubted that the Earth had been warming, and complaining that Muller's editorial caricatures their view up as a straw man. That's hard to reconcile with Watts' past statements. In a document he prepared for a think tank, Watts had written, "Instrumental temperature data for the pre-satellite era (1850-1980) have been so widely, systematically, and unidirectionally tampered with that it cannot be credibly asserted there has been any significant 'global warming' in the 20th century." Now, after Berkeley Earth's release, he claims to have never questioned that the Earth had warmed. Other prominent skeptics are saying similar things.

But Watts still doesn't trust Berkeley Earth's results. And, based on the comments on his blog, most of his readers don't either. That suggests that, contrary to Muller's expectations, this won't be the end of the skepticism of the temperature record.

What it may help do is drive those who keep questioning whether the Earth has warmed further to the fringes, where they can join those who question whether the greenhouse effect exists even after a century of work has confirmed that it does. That's a territory that doesn't merit the label skepticism anymore.

Actual skeptics might see this as an opportunity to focus on the scientific community's attribution of the temperature changes Berkeley Earth has confirmed, which is primarily ascribed to anthropogenic influences. There's an entire chapter of the IPCC report devoted to attribution, though, so any scientific skepticism should at least start by addressing the arguments outlined there.

http://www.livescience.com/16658-alien-planets-comets-oceans-water.html

Comet-Seeded Alien Oceans Could Be Common

A still-forming alien solar system has enough water in its outer reaches to fill Earth's oceans several thousand times over, a new study finds.

Mike Wall, SPACE.com Senior Writer

The discovery marks the first time astronomers have detected water in a dusty planet-forming disk so far from its central star, in the frigid region where comets are born. Scientists think comet impacts delivered most of Earth's water, and the new study hints that alien planets may commonly acquire oceans in the same way.

"We now know that large amounts of water ice are available in planet-forming disks, ready to be incorporated in comets," said Michiel Hogerheijde, of Leiden Observatory in the Netherlands, the study's lead

author. "Ultimately, some of this water may end up on Earth-like planets that form completely dry but this way may end up with life-supporting oceans."

A nearby star

Hogerheijde and his team made the find using the European Space Agency's Herschel Space Observatory. They trained Herschel on the appropriately named young star TW Hydrae, which is located about 175 light-years away in the constellation Hydra (the Sea Serpent). TW Hydrae is an orange dwarf star, slightly smaller and dimmer than our sun. It's only about 10 million years old, and is still surrounded by a disk of dust and gas that should one day coalesce to form planets, researchers said.

Herschel detected huge amounts of water — thousands of times more water than is found on Earth — in the freezing-cold outer reaches of this disk, far from TW Hydrae itself. The water out there is likely ice coating the innumerable tiny dust grains that swirl around in the disk, researchers said. Ultraviolet radiation from TW Hydrae knocks some water molecules free from these icy grains, allowing Herschel to spot the light signature from the resulting vapor. Astronomers have found water vapor in the warmer, interior regions of other planet-forming disks before. So Hogerheijde's team wasn't shocked to find evidence of water farther out.

"We had actually always suspected that this much water was hiding out in the cold reaches of disks like these," Hogerheijde told SPACE.com in an email. Thanks to Herschel, he added, "we can now for the first time detect the water vapor, and infer the presence and size of the hidden ice reservoir." [Gallery: Views from the Herschel Space Observatory] The team reports its results in the Oct. 21 issue of the journal Science.

Alien comets, alien oceans?

The TW Hydrae find suggests that ice-bearing comets may form commonly around other stars. The icy wanderers might thus have seeded oceans on many alien planets throughout the cosmos over the years, researchers said.

"It does seem likely that life-supporting environments can form easily around other stars, now that we have found sufficient water ice to seed Earth-like planets with oceans," Hogerheijde said. The discovery could also help astronomers better understand solar system evolution and planet formation in a general sense, he added.

For example, large quantities of ice in a protoplanetary disk could serve as a sort of glue, Hogerheijde said, helping dust grains stick together and grow into planetesimals, the building blocks of planets.

Also, analysis of TW Hydrae's far-flung ice shows that it's significantly different than that found on comets in our solar system. This suggests that comets' ice comes from several different regions in the dusty disk, not just the freezer on its outer edge.

"We actually think that comets in our own solar system contain mixtures of ices from across the solar nebula, hinting at the presence of long-range transportation of material through planet-forming disks," Hogerheijde said. "This is a much more 'dynamic' picture of planet formation than previously imagined."

http://well.blogs.nytimes.com/2011/10/24/really-the-claim-holidays-can-affect-when-expectant-mothers-deliver/?partner=rss&emc=rss

Really? The Claim: Holidays Can Affect When Expectant Mothers Deliver

Researchers at the Yale School of Public Health reviewed millions of birth certificates and found a 5.3 percent dip in spontaneous births on Halloween

By ANAHAD O'CONNOR

THE FACTS Researchers have long suspected that holidays and culturally meaningful events can play a role in medical outcomes. Some believe that terminally ill patients, for example, can hang on to life for religious events, birthdays and symbolically important occasions, though decades of study of the question have yielded mixed results.

It has been unclear whether a similar holiday-postponement effect could be seen in pregnant women. In a study published this month, however, researchers at the Yale School of Public Health reviewed millions of birth certificates and found a 5.3 percent dip in spontaneous births on Halloween, suggesting that a mother's mental state may play a role in when she goes into labor. The researchers also noted a 16.9 percent drop in Caesarean births on Halloween, perhaps indicating that many women avoid scheduling the procedure then.

The scientists looked at all births in the United States over an 11-year period that occurred within one week on either side of Halloween, adjusting for variables like day of the week. The 1.8 million births revealed a clear reluctance to start labor around the festival of the dead.

But would a more symbolically positive holiday have the reverse effect?

To find out, the researchers studied 1.7 million births that occurred within a week of Valentine's Day over the same 11 years. They found a 3.6 percent spike in spontaneous births on Valentine's and a 12.1 percent rise in Caesareans.

THE BOTTOM LINE New research suggests that women may be able to control the timing of spontaneous births around certain holidays.

http://medicalxpress.com/news/2011-10-links-disinfection-byproducts-adverse-health.html

Research links water disinfection byproducts to adverse health effects

the first identification of a cellular mechanism linked to the toxicity of a major class of drinking water disinfection byproducts

Michael Plewa, lead scientist and professor of genetics in the U of I Department of Crop Sciences, reports the first identification of a cellular mechanism linked to the toxicity of a major class of drinking water disinfection byproducts. This study, published in Environmental Science & Technology, suggests a possible connection to adverse health effects, including neurological diseases such as Alzheimer's. Credit: David Riecks, University of Illinois ITCS

University of Illinois scientists report the first identification of a cellular mechanism linked to the toxicity of a major class of drinking water disinfection byproducts. This study, published in Environmental Science & Technology, suggests a possible connection to adverse health effects, including neurological diseases such as Alzheimer's.

"I'm not implying that drinking disinfected water will give you Alzheimer's," said Michael Plewa, lead scientist and professor of genetics in the U of I Department of Crop Sciences. "Certainly, the disinfection of drinking water was one of the most significant public health achievements of the 20th century. But the adverse effects of disinfection byproducts (DBPs) that are unintentionally formed during this process are causing concerns as researchers unveil their toxicity."

More than 600 DBPs have been discovered. Although researchers know some DBPs are toxic, little biological information is available on the majority of these water contaminants. The Environmental Protection Agency regulates only 11 of these DBPs, he said.

Plewa's laboratory investigated the biological mechanism, or the cellular target that leads to toxicity, in the second-most prevalent DBP class generated in disinfected water – haloacetic acids (HAAs).

"The EPA has regulated HAAs for nearly 15 years. However, we did not know how they caused toxicity before this study," he said. "Now that we've uncovered the mechanism for HAAs, we can make sense of past data that can lead to new studies relating to adverse pregnancy outcomes, different types of cancer, and neurological dysfunction."

Plewa believes this will assist the EPA in establishing regulations based on science. Their research will also help the water treatment community develop new methods to prevent the generation of the most toxic DBPs.

"It's fairly simple," Plewa said. "To increase the health benefits of disinfected water, we must reduce the most toxic DBPs. If we understand their biological mechanisms, we can come up with more rational ways to disinfect drinking water without generating toxic DBPs."

In this study, researchers focused on three HAAs – iodoacetic acid, bromoacetic acid and chloroacetic acid. After they rejected their first hypothesis that the HAAs directly damaged DNA, they looked at research in a different area – neuroscience. Plewa's graduate student, Justin Pals, discovered an amazing connection, Plewa said.

In neurotoxicology, iodoacetic acid reduces the availability of nutrients or oxygen in neurons by inhibiting glyceraldehyde-3-phosphate dehydrogenase (GAPDH).

"Researchers are interested in understanding how to prevent damage after a stroke or other neurological damage," Plewa said. "Iodoacetic acid kills these cells. One of the targets they found was that iodoacetic acid inhibited GAPDH."

Plewa's lab conducted quantitative GAPDH enzyme kinetics and discovered that the data were highly correlated with a diversity of adverse health markers.

"All the pieces of the puzzle fell into place in an instant," Plewa said. "We had discovered our cellular target – GAPDH. Never before had this type of research been done with this level of precision and associated with a large body of adverse biological impacts."

They discovered that the HAA disinfection byproducts were toxic because the cells cannot make ATP, and this causes oxidative stress.

"Cells treated with HAAs experience DNA damage," Plewa said. "So they start expressing DNA repair systems. HAAs are not directly damaging DNA, rather they are inhibiting GAPDH, which is involved in increasing the oxidative stress that we are observing."

A growing body of information has shown that GAPDH is associated with the onset of neurological diseases.

"If you carry a natural mutation for GAPDH and are exposed to high levels of these disinfection byproducts, you could be more susceptible to adverse health effects such as Alzheimer's," he said.

More research is needed to study iodinated disinfection byproducts because they are the most reactive in inhibiting GAPDH function and are currently not regulated by the EPA, Plewa said.

"We replaced the standard working model of direct DNA damage with a new working model based on a cellular target molecule," he said. "This discovery is a fundamental contribution to the field of drinking water science."

More information: This research, "Biological Mechanism for the Toxicity of Haloacetic Acid Drinking Water Disinfection Byproducts," was published in Environmental Science & Technology.

Provided by University of Illinois at Urbana-Champaign

http://www.bbc.co.uk/news/health-15428202

NHS must prepare for the genetic revolution, report says

The NHS needs to "urgently" develop the tools and expertise needed to take advantage of a revolution in genetic testing

By James Gallagher Health reporter, BBC News

The NHS needs to "urgently" develop the tools and expertise needed to take advantage of a revolution in genetic testing, a report says.

The Foundation for Genomics and Population Health argues that new technologies could soon change care for cancer patients and people with rare conditions.

Treatments could one day be tailored to an individual patient's needs.

The government says it is evaluating the benefits.

Everyone's genetic code is made up of a string of letters. It contains a host of information that defines much of who we are, from eye colour to susceptibility to some diseases.

Revolution

The cost of sequencing the code, effectively writing out the string of letters, has fallen dramatically and this could be important for medicine.

Being able to read the code could help diagnose patients. Around 3% of people have genetic defects which cause rare forms of illnesses such as diabetes or cardiovascular disease.

Cancer can also be described as a genetic disease and some genes are known to increase the risk of cancer.

Genetics could also help predict which cancer drugs are more likely to work or those with the least side effects. Tumours which express the KRAS gene are, for example, known to be more susceptible to the drug cetuximab.

The government's chief genetics advisor, Sir John Bell, says: "[Genetics] will touch every single area of medicine for sure. For some it will have a very major effect, others it will be less dominant, but the contribution of genetics to all human disease is clear."

The report's lead author, Dr Caroline Wright, told the BBC: "I think it will come fairly quickly, probably for the rare disorders to start with, particularly kids with developmental disorders, any kind of undiagnosed rare condition where you suspect it to be genetic, but you don't know where to look."

Challenge

She argues that the NHS needs to come up with a way of dealing with the information from sequencing a patient's genetic code.

"The biggest challenge in a way is interpretation. Next generation sequencing techniques, that have improved and become much cheaper, are the beginning of the problem," she said.

"Once you've got your three or six billion letters of code, finding the answer in that is going to be very difficult.

"I think at the moment the NHS really needs desperately to build up the infomatics [IT] support."

Sir John says a set of specialist hubs need to be set up to handle the information, but that there also needed to be a "restructuring of the whole operation" to bring genetics to specialists in cancer, heart disease, diabetes and public health.

A Department of Health spokesperson said: "Understanding and harnessing genetic information offers potential to develop new treatments and cures.

"We continue to work closely with the research community and the research arm of NHS to look at the feasibility of specific programmes and new developments.

"We have asked the Human Genomic Strategy group to look at advances in this area and to evaluate their benefit to the NHS. Their report is due in January 2012."

http://www.nytimes.com/2011/10/25/health/research/25regimens.html?_r=1&partner=rss&emc=rss

Regimens: Better Blocker of Breast Cancer Recurrence

Letrozole reduces the chances that a woman's cancer will return and improves her odds of survival to a greater degree than tamoxifen

By ANAHAD O'CONNOR

The breast cancer drug letrozole reduces the chances that a woman's cancer will return and improves her odds of survival to a greater degree than tamoxifen, a widely used estrogen blocker, according to a new analysis.

The study is the latest installment in a long-running trial comparing treatment after surgery in postmenopausal women who have breast cancers that are estrogen-receptor positive, or sensitive to estrogen. Those cases account for about 60 percent of all breast cancers. The study involved 8,010 women and looked at two treatments: letrozole (brand name Femara) or tamoxifen taken alone for five years or both drugs taken in sequence, one for two years followed by the other for three years. The women were followed for more than eight years on average.

Women given letrozole for five years after surgery had a 20 percent lower risk of breast cancer recurrence and were 21 percent less likely to die during the study, compared with those who were given only tamoxifen, long the gold standard. Neither combination of drugs significantly lowered the likelihood of recurrence or death compared with taking letrozole alone, researchers found.

The study was published online this month in The Lancet Oncology and was financed in part by the National Cancer Institute and Novartis, the maker of letrozole.

http://www.bbc.co.uk/news/magazine-15402968

Viewpoint: Carers should fall silent after a patient's death

Surgeon and columnist Pauline Chen suggests doctors and nurses should be obliged to pause for silent reflection when someone they are treating dies. It would be good for them, she says, and may make them better carers.

On hospital wards, in the operating room, in clinics and in the intensive care unit, there should be a mandatory five-minute silence when a patient dies. The doctors, nurses and all who had been caring for the patient at the end would gather around the bedside for those five minutes and reflect in silence on that patient's life and death.

In my experience, there's a moment right after the patient dies when most caregivers, particularly doctors, will scatter - if not in presence then in mind. We immediately think about going to see the next patient, cleaning the room, getting the body ready to go to the mortuary. Anything to avoid confronting the reality before us because, for those of us who practise in wealthier countries, a patient who dies represents our professional failure.

Several years ago, I took care of a young woman who had had a transplant a decade earlier but who was now hospitalised because of a series of infections. She was slender and blonde, and I can recall how she loved talking about the novels she had read and the way she raised her right hand to her forehead, palm facing outward, to pat her hair.

But on the night she bled to death from an infection that had eroded into a major artery, none of us stopped to remember the lively conversations about literature. Instead, as soon as she was pronounced dead, we became preoccupied with seeing the next patient, removing the stains from blood that had gushed up to the ceiling and disposing of the used needles and syringes strewn on her bed. We did not talk about her, the woman who had just died in the room.

Weighed down

I have often thought back to the fact that I did not stop to remember her or acknowledge her impact on me. There was no closure to our relationship, no acknowledgment of her life or my grief. Had I lived those moments around her death differently, perhaps the details of her death would not be frozen in my mind as they are now, a few minutes replaying over and over again. Perhaps by acknowledging her passing I would not be as weighed down by what was lost, even as I continued to care for other patients.

I believe that instituting the five-minute pause for silence after a patient dies will change the way doctors, nurses and other caregivers approach death.

First, it will give closure, as well as respect, to the relationship between that patient and his or her caregivers.

Second, the conscious pause, the act of taking time out, will establish a ritual. And rituals, consistently practised, offer great comfort at difficult moments.

Finally, the five-minute silence will allow caregivers to acknowledge their own feelings.

I am convinced that one of the reasons doctors and other healthcare providers don't do a better job caring for the dying is that we hardly ever take the time to acknowledge our own responses to those who have died. We deny those feelings only to end up constrained by them.

A five-minute pause for silence would allow us to attend to our own grief about a patient who has died and free us to commit ourselves fully to those who will follow.

Pauline Chen is a liver surgeon and author of Final Exam: A Surgeon's Reflection on Mortality. She also writes the Doctor and Patient column for the New York Times.

http://www.physorg.com/news/2011-10-uranium-radionuclide-adsorption-hanford-site.html

The preferences of uranium: Radionuclide's adsorption in Hanford Site sediments varies based on grain size

Uranium prefers petite particles. The radionuclide attaches quickly and abundantly to smaller subsurface grains, according to scientists at Pacific Northwest National Laboratory.

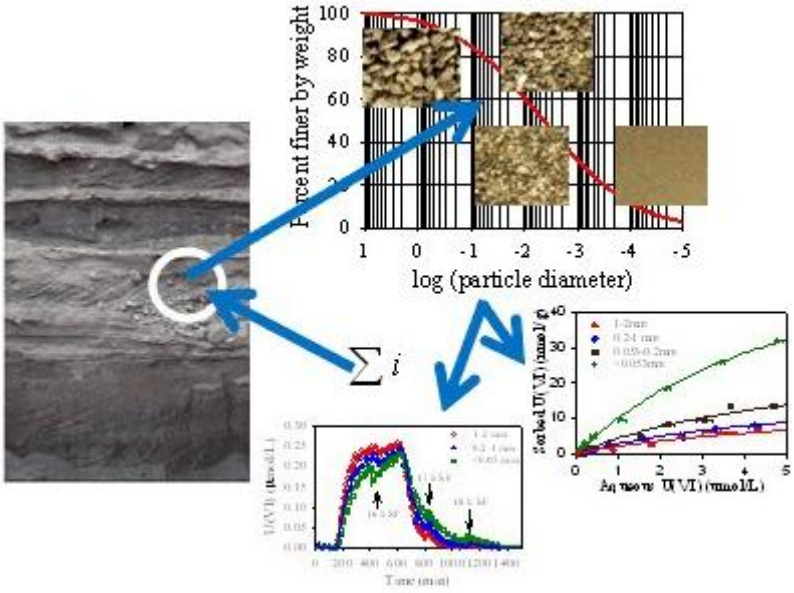
PhysOrg.com - The team found that gravel and other large bits adsorbed less uranium(IV) than smaller grains. The larger particles also adsorbed uranium more slowly than the smaller ones. Using this information, the team wrote a series of mathematical formulas to predict uranium adsorption and desorption affinity and kinetics in sediments containing different grain sizes. The predictions were successfully tested using sediment from the Hanford Site.

Uranium movement at the Hanford Site is an ongoing concern. Uranium and other radioactive holdovers from weapons production reside under the Site, in southeastern Washington State. These radionuclides are spreading out from their sources and migrating toward the Columbia River, a major waterway. To keep the uranium from the river, scientists need to know how uranium moves, or doesn't, through the complex subsurface. This study demonstrates a way for getting such information for wide areas. With these and other results, PNNL scientists are shaping how uranium's behavior is considered by scientists, cleanup experts, and regulators.

Calculating exactly how much uranium is present and how fast uranium migrates requires scientists to scale measurements from the lab to the field. Essentially, they must take samples measured across millimeters to centimeters and extrapolate them to systems that extend for meters or kilometers.

"Upscaling is always a challenge," said Dr. Chongxuan Liu, a PNNL geochemist who worked on the study.

The scientists on this study began by conducting wet chemistry experiments to determine adsorption characteristics of four grain sizes. The grains were coarse sand (1-2 mm), medium sand (0.2-1 mm), fine sand (0.053-0.2 mm), and clay/silt fraction (<0.053 mm). The scientists used surface area and microporosity instruments, stirred flow cells, and other resources at EMSL. Based on the experimental results, they performed computer simulations to quantify the kinetics and equilibrium thermodynamics in individual size fractions.



Scientists demonstrated a new concept that allows them to accurately calculate the uranium adsorption in a heterogeneous subsurface sample.

Then, the team worked out mathematical formulas to sum up the uranium adsorptions in the sediments consisting of different grain sizes. The team tested their approach using contaminated Hanford Site sediment. Their calculations agreed well with the laboratory measurements.

The team is continuing to examine this approach, drawing upon PNNL's nearly 50 years of geochemistry and biogeochemistry experience. Next, the team will determine if their approach is robust under variable geochemical and hydrological conditions at Hanford Site.

More information: J Shang, et al. 2011. "Effect of Grain Size on Uranium(VI) Surface Complexation Kinetics and Adsorption Additivity." Environmental Science & Technology 45(14):6025-6031. DOI:10.1021/es200920k

Provided by Pacific Northwest National Laboratory

http://www.eurekalert.org/pub_releases/2011-10/aof-rhf102511.php

Researchers have found evidence for the existence of a hypnotic state

The key was in the glazed staring eyes

Researchers have found evidence for the existence of a hypnotic state -- the key was in the glazed staring eyes

A multidisciplinary group of researchers from Finland (University of Turku and Aalto University) and Sweden (University of Skövde) has found that strange stare may be a key that can eventually lead to a solution to this long debate about the existence of a hypnotic state.

One of the most widely known features of a hypnotized person in the popular culture is a glazed, wide-open look in the eyes. Paradoxically, this sign has not been considered to have any major importance among researchers and has never been studied in any detail, probably due to the fact that it can be seen in only some hypnotized people.

This study was done with a very highly hypnotizable participant who can be hypnotized and dehypnotized by just using a one-word cue. The change between hypnotic state and normal state can thus be varied in seconds.

The researchers used high-resolution eye-tracking methodology and presented a set of well-established oculomotor tasks that trigger automatic eye behavior. They found the glazed stare was accompanied by objectively measurable changes in automatic, reflexive eye behavior that could not be imitated by non-hypnotized participants.

In the field of hypnosis research this result means that hypnosis can no longer be regarded as mental imagery that takes place during a totally normal waking state of consciousness. On the other hand, the result may have wider consequences for psychology and cognitive neuroscience, since it provides the first evidence of the existence of a conscious state in humans that has previously not been scientifically confirmed.

Hypnosis has had a long and controversial history in psychology, psychiatry and neurology. For over 100 years researchers have debated if a special hypnotic state exists or whether it is just about using cognitive strategies and mental imagery in a normal waking state. So far, a hypnotic state has never been convincingly demonstrated, and therefore, many researchers regard the hypnotic state to be just a popular myth in psychology.

The results were published in the journal ***PLoS ONE 24.10.2011.***

http://www.eurekalert.org/pub_releases/2011-10/bu-lae102111.php

Land animals, ecosystems walloped after Permian dieoff

Scientists conclude from the fossil record that terrestrial ecosystems took up to 8 million years to rebound fully from the mass extinction

Lystrosaurus, a relative to mammals, was one of a handful of "disaster taxa" to escape from the rubble of the Permian Period, along with the meter-high spore-tree Pleuromeia. Low diversity of animals delayed the full recovery of land ecosystems by millions of years. **Victor Leshyk**

PROVIDENCE, R.I. [Brown University] - The cataclysmic events that marked the end of the Permian Period some 252 million years ago were a watershed moment in the history of life on Earth. As much as 90 percent of ocean organisms were extinguished, ushering in a new order of marine species, some of which we still see today. But while land dwellers certainly sustained major losses, the extent of extinction and the reshuffling afterward were less clear.

In a paper published in the journal Proceedings of the Royal Society B, researchers at Brown University and the University of Utah undertook an exhaustive specimen-by-specimen analysis to confirm that land-based vertebrates suffered catastrophic losses as the Permian drew to a close. From the ashes, the survivors, a handful of genera labeled "disaster taxa," were free to roam more or less unimpeded, with few competitors in their respective ecological niches. This lack of competition, the researchers write, caused vicious boom-and-bust cycles in the ecosystems, as external forces wreaked magnified havoc on the tenuous links in the food web. As a result, the scientists conclude from the fossil record that terrestrial ecosystems took up to 8 million years to rebound fully from the mass extinction through incremental evolution and speciation.

"It means the (terrestrial ecosystems) were more subject to greater risk of collapse because there were fewer links" in the food web, said Jessica Whiteside, assistant professor of geological sciences at Brown and co-author on the paper.

The boom-and-bust cycles that marked land-based ecosystems' erratic rebound were like "mini-extinction events and recoveries," said Randall Irmis, a co-author on the paper, who is a curator of paleontology at the Natural History Museum of Utah and an assistant professor of geology and geophysics at Utah.

The hypothesis, in essence, places ecosystems' recovery post-Permian squarely on the repopulation and diversification of species, rather than on an outside event, such as a smoothing out of climate. The analysis mirrors the conclusions reached by Whiteside in a paper published last year in Geology, in which she and a colleague argued that it took up to 10 million years after the end-Permian mass extinction for enough species to repopulate the ocean — restoring the food web — for the marine ecosystem to stabilize.

"It really is the same pattern" with land-based ecosystems as marine environments, Whiteside said. The same seems to hold true for plants, she added.

Some studies have argued that continued volcanism following the end-Permian extinction kept ecosystems' recovery at bay, but Whiteside and Irmis say there's no physical evidence of such activity.

The researchers examined nearly 8,600 specimens, from near the end of the Permian to the middle Triassic, roughly 260 million to 242 million years ago. The fossils came from sites in the southern Ural Mountains of Russia and from the Karoo Basin in South Africa. The specimen count and analysis indicated that approximately 78 percent of land-based vertebrate genera perished in the end-Permian mass extinction. Out of the rubble emerged just a few species, the disaster taxa. One of these was Lystrosaurus, a dicynodont synapsid (related to mammals) about the size of a German shepherd. This creature barely registered during the Permian but dominated the ecosystem following the end-Permian extinction, the fossil record showed. Why Lystrosaurus survived the cataclysm when most others did not is a mystery, perhaps a combination of luck and not being picky about what it ate or where it lived. Similarly, a reptilian taxon, procolophonids, were mostly absent leading to the end-Permian extinction, yet exploded onto the scene afterward.

"Comparison with previous food-web modeling studies suggests this low diversity and prevalence of just a few taxa meant that links in the food web were few, causing instability in the ecosystem and making it susceptible to boom-bust cycles and further extinction," Whiteside said.

The ecosystems that emerged from the extinction had such low animal diversity that it was especially vulnerable to crashes spawned by environmental and other changes, the authors write. Only after species richness and evenness had been re-established, restoring enough population numbers and redundancy to the food web, did the terrestrial ecosystem fully recover. At that point, the carbon cycle, a broad indicator of life and death as well as the effect of outside influences, stabilized, the researchers note, using data from previous studies of carbon isotopes spanning the Permian and Triassic periods.

"These results are consistent with the idea that the fluctuating carbon cycle reflects the unstable ecosystems in the aftermath of the extinction event," Whiteside said.

The National Science Foundation and the University of Utah funded the work. Reporters and the general public have free access to the manuscript through an award from the University of Utah J. Willard Marriott Library Open Access Publishing Fund.

http://www.eurekalert.org/pub_releases/2011-10/ccon-emo102511.php

Extreme melting on Greenland ice sheet, reports CCNY team

Glacial melt cycle could become self-amplifying, making it difficult to halt

The Greenland ice sheet can experience extreme melting even when temperatures don't hit record highs, according to a new analysis by Dr. Marco Tedesco, assistant professor in the Department of Earth and Atmospheric Sciences at The City College of New York. His findings suggest that glaciers could undergo a self-amplifying cycle of melting and warming that would be difficult to halt.

"We are finding that even if you don't have record-breaking highs, as long as warm temperatures persist you can get record-breaking melting because of positive feedback mechanisms," said Professor Tedesco, who directs CCNY's Cryospheric Processes Laboratory and also serves on CUNY Graduate Center doctoral faculty.

Professor Tedesco and his team collected data for the analysis this past summer during a four-week expedition to the Jakobshavn Isbræ glacier in western Greenland. Their arrival preceded the onset of the melt season.

Combining data gathered on the ground with microwave satellite recordings and the output from a model of the ice sheet, he and graduate student Patrick Alexander found a near-record loss of snow and ice this year. The extensive melting continued even without last year's record highs.

The team recorded data on air temperatures, wind speed, exposed ice and its movement, the emergence of streams and lakes of melt water on the surface, and the water's eventual draining away beneath the glacier. This lost melt water can accelerate the ice sheet's slide toward the sea where it calves new icebergs. Eventually, melt water reaches the ocean, contributing to the rising sea levels associated with long-term climate change.

The model showed that melting between June and August was well above the average for 1979 to 2010. In fact, melting in 2011 was the third most extensive since 1979, lagging behind only 2010 and 2007. The "mass balance", or amount of snow gained minus the snow and ice that melted away, ended up tying last year's record values.

Temperatures and an albedo feedback mechanism accounted for the record losses, Professor Tedesco explained. "Albedo" describes the amount of solar energy absorbed by the surface (e.g. snow, slush, or patches of exposed ice). A white blanket of snow reflects much of the sun's energy and thus has a high albedo. Bare ice – being darker and absorbing more light and energy – has a lower albedo.

But absorbing more energy from the sun also means that darker patches warm up faster, just like the blacktop of a road in the summer. The more they warm, the faster they melt.

And a year that follows one with record high temperatures can have more dark ice just below the surface, ready to warm and melt as soon as temperatures begin to rise. This also explains why more ice sheet melting can occur even though temperatures did not break records.

Professor Tedesco likens the melting process to a speeding steam locomotive. Higher temperatures act like coal shoveled into the boiler, increasing the pace of melting. In this scenario, "lower albedo is a downhill slope," he says. The darker surfaces collect more heat. In this situation, even without more coal shoveled into the boiler, as a train heads downhill, it gains speed. In other words, melting accelerates.

Only new falling snow puts the brakes on the process, covering the darker ice in a reflective blanket, Professor Tedesco says. The model showed that this year's snowfall couldn't compensate for melting in previous years. "The process never slowed down as much as it had in the past," he explained. "The brakes engaged only every now and again."

The team's observations indicate that the process was not limited to the glacier they visited; it is a large-scale effect. "It's a sign that not only do albedo and other variables play a role in acceleration of melting, but that this acceleration is happening in many places all over Greenland," he cautioned. "We are currently trying to understand if this is a trend or will become one. This will help us to improve models projecting future melting scenarios and predict how they might evolve."

Additional expedition team members included Christine Foreman of Montana State University, and Ian Willis and Alison Banwell of the Scott Polar Research Institute, Cambridge, UK.

Professor Tedesco and his team provide their preliminary results on the Cryospheric Processes Laboratory webpage. They will will be presenting further results at the American Geophysical Union Society (AGU) meeting in San Francisco on December 5 at 9 a.m. and December 6 at 11:35 a.m.

The research was supported by the National Science Foundation and the NASA Cryosphere Program. The World Wildlife Fund is acknowledged for supporting fieldwork activities.

Online:** 2011 Melting in Greenland **report http://greenland2011.cryocity.org

http://www.eurekalert.org/pub_releases/2011-10/jhu-scy102511.php

Students coax yeast cells to add vitamins to bread

Any way you slice it, bread that contains critical nutrients could help combat severe malnutrition in impoverished regions.

That is the goal of a group of Johns Hopkins University undergraduate students who are using synthetic biology to enhance common yeast so that it yields beta carotene, the orange substance that gives carrots their color. When it's eaten, beta-carotene turns into vitamin A.

The students' project is the university's entry in iGEM, the International Genetically Engineered Machine competition. After a regional judging earlier this month, the undergraduates' project, called VitaYeast, has advanced to the iGEM finals, scheduled for Nov. 5-7 at the Massachusetts Institute of Technology. In the annual iGEM contest, students from around the world present projects based on synthetic biology, a burgeoning field in which researchers manipulate small bits of DNA and other biological material to make cells carry out new tasks.

The Johns Hopkins participants say that no matter what happens at the iGEM finals, they will continue to tout their enhanced bread as a relatively simple way to help hundreds of thousands of people who are suffering from malnutrition.

Team member Arjun Khakhar, a junior biomedical engineering major, grew up in Bombay, India, where he saw widespread poverty and malnutrition. "The major problem in developing countries right now is not that people are hungry and starving because they don't have enough food," he said. "What people don't have now is the [right type of] food that they need to survive. Vital nutrients like vitamins are just missing from their diets, because they can't afford fruits and vegetables. That's what we wanted to provide through VitaYeast."

Producing a new food to save malnourished people around the globe may sound like an audacious goal for a group of 15 to 20 students who haven't yet picked up their college diplomas. But Arjun doesn't think so. "How do I get the idea in my mind that I want to change the world?" he said. "I would ask, How can you not have the idea that you want to change the world?"

To curb global malnutrition, Arjun and his teammates envisioned an enhanced starter dough that could be shared easily and cheaply among large groups of impoverished people. The bread baked from this dough could avert health problems that occur when vitamins and other nutrients are missing from their diets. Such health problems can be serious. The World Health Organization has described vitamin A deficiency as the leading cause of preventable blindness in children.

Yeast, which helps make bread rise, does not normally produce vitamins. To make this happen, the students, representing a variety of science majors, had to genetically tweak the single-cell microbes. The team members figured out how to add to yeast cells certain DNA sequences that triggered a series of biochemical reactions that produced beta carotene. They presented that development at the iGEM regional contest and are continuing to work on yeast that also produces Vitamin C, another crucial nutrient needed in impoverished areas.

As they worked on the VitaYeast project, the students were advised by Johns Hopkins faculty members, including Jef Boeke, a leading yeast expert who is a professor of molecular biology and genetics at the School of Medicine. "One of the great things about iGEM teams, which are mostly made up of undergraduates, is that those students, frankly, will not believe that something is impossible," Boeke said. "If you tell them that something is impossible, they will go off and do it. I find that to be very exciting."

Working in lab space provided by Boeke and other faculty members, the iGEM students solved the science challenges and produced samples of their enhanced dough. But would VitaYeast yield bread that looks and smells good enough to eat? As all good cooks know, the proof is in the pudding -- or, in this case, the bread basket. To find out, the students purchased a bread-making machine, found a simple recipe online and turned their lab into a makeshift kitchen. "We wanted to simulate the process that a regular person might go through to bake bread," said team member Steffi Liu, a junior biomedical engineering major from Edison, N.J. "The only thing that's different in the recipe is that we substituted our vitamin A yeast for the normal dry packaged yeast."

The resulting bread, she said, "looks exactly the same as normal bread. Definitely the same smell! The lab smelled amazing after we baked the bread. Everybody wanted a bite of it. But obviously we can't do that."

Because the lab bread contains a genetically engineered ingredient that has not undergone safety testing or received approval from government regulators, the students are not permitted to eat it. But they are encouraged by the tempting aroma and traditional breadlike texture and appearance.

In recent years, some genetically engineered foods have been rejected by malnourished people merely because they did not look, smell or taste like the familiar food staples. The Johns Hopkins students are banking on greater success, partly because they are thinking small. "VitaYeast is a tiny component – it gets killed in the bread," said Noah Young, a senior biomedical engineering major from Irvine, Calif. "We're not genetically modifying the wheat. We're not genetically modifying the flour or the water. We're genetically modifying something like 1 percent of the bread recipe. When you bake VitaYeast bread and you look at it, it looks like normal bread."

As part of the project, team member Ashan Veerakumar, a senior neuroscience major from Toronto, will survey Baltimore area residents about whether they would eat genetically modified food, particularly if it could improve their health. "The thing we're trying to find out here," Ashan said, "is whether our project is something the public will accept."

He and some of the other team members are also looking for outside funding to continue pushing the VitaYeast project forward. Yet before VitaYeast bread can make its way to malnourished people, it must overcome many hurdles, including animal testing and rigorous regulatory reviews.

Still, faculty adviser Boeke is not betting against his student scientists. "Could this notion of releasing a genetically modified organism in a Third World country ever happen?" he asked. "Personally, I think the answer is yes." Some of the iGEM students, Boeke said, "were ready to rush off and do it right away, and we had to restrain their enthusiasm." Another faculty member, who is a bioethicist, was called in to urge the students to be more patient in pressing toward their goal. "She's helped the students understand what the steps are needed to get to that point," Boeke said. "That will certainly be a multiyear process, at best. But I think it could happen."

Video interviews and color digital images of the student inventors are available; contact Phil Sneiderman.
Related link: VitaYeast Web site: http://2011.igem.org/Team:Johns_Hopkins

http://www.eurekalert.org/pub_releases/2011-10/f-sf-spt102511.php

Strawberries protect the stomach from alcohol

In an experiment on rats, European researchers have proved that eating strawberries reduces the harm that alcohol can cause to the stomach mucous membrane.

Published in the open access journal Plos One, the study may contribute to improving the treatment of stomach ulcers. A team of Italian, Serbian and Spanish researchers has confirmed the protecting effect that strawberries have in a mammal stomach that has been damaged by alcohol. Scientists gave ethanol (ethyl alcohol) to laboratory rats and, according to the study published in the journal Plos One, have thus proved that the stomach mucous membrane of those that had previously eaten strawberry extract suffered less damage.

Sara Tulipani, researcher at the University of Barcelona (UB) and co-author of the study explains that "the positive effects of strawberries are not only linked to their antioxidant capacity and high content of phenolic compounds (anthocyans) but also to the fact that they activate the antioxidant defences and enzymes of the body."

The conclusions of the study state that a diet rich in strawberries can have a beneficial effect when it comes to preventing gastric illnesses that are related to the generation of free radicals or other reactive oxygen species. This fruit could slow down the formation of stomach ulcers in humans.

Gastritis or inflammation of the stomach mucous membrane is related to alcohol consumption but can also be caused by viral infections or by nonsteroidal anti-inflammatory medication (such as aspirin) or medication used to treat against the Helicobacter pylori bacteria.

Maurizio Battino, coordinator of the research group at the Marche Polytechnic University (UNIVPM, Italy) suggests that "in these cases, the consumption of strawberries during or after pathology could lessen stomach mucous membrane damage." The team found less ulcerations in the stomachs of those rats which had eaten strawberry extract (40 milligrams/day per kilo of weight) for 10 days before being given alcohol.

Battino emphasises that "this study was not conceived as a way of mitigating the effects of getting drunk but rather as a way of discovering molecules in the stomach membrane that protect against the damaging effects of differing agents."

Treatments for ulcers and other gastric pathologies are currently in need of new protective medicines with antioxidant properties. The compounds found within strawberries could be the answer.

Furthermore, as well as scientists at the UNIVPM and the UB, others from the universities of Salamanca and Granada in Spain and of Belgrade in Serbia have participated in this research study.

***References**: José M. Alvarez-Suarez, Dragana Dekanski, Slavica Ristić, Nevena V. Radonjić, Nataša D. Petronijević, Francesca Giampieri, Paola Astolfi, Ana M. González-Paramás, Celestino Santos-Buelga, Sara Tulipani, José L. Quiles, Bruno Mezzetti, Maurizio Battino. "Strawberry Polyphenols Attenuate Ethanol-Induced Gastric Lesions in Rats by Activation of Antioxidant Enzymes and Attenuation of MDA Increase". Plos One 6 (10): e25878, October 2011. (http://dx.plos.org/10.1371/journal.pone.0025878).*

http://www.sciencedaily.com/releases/2011/10/111025090349.htm

New Weapon Against Cancer: Microwaves Can Be Used to Create Medical Images

A research team from Chalmers University of Technology has developed new techniques of cancer diagnosis and treatment with the aid of microwaves, which could play a pioneering role in the battle against cancer.

ScienceDaily - These techniques could save many lives and are more effective, less invasive and simpler than currently available alternatives. Clinical studies are now being planned.

The Chalmers team expects to be able to test two different techniques on patients within the next six months. One method is an alternative to mammography, i.e. using X-rays to detect breast cancer. The other aims to treat tumours in the head and neck by heating the cancer cells.

Microwaves can be used to create medical images - a new technique known as microwave tomography. Andreas Fhager, Associate Professor of Biomedical Electromagnetics, has developed a system to detect breast cancer with the new technique. He points out that the method has several advantages over mammography.

"We obtain three-dimensional images showing significantly better contrast between healthy and malignant tissue compared to X-rays. That makes it easier to detect even really small tumours that may currently be obscured by healthy tissue, thus creating the preconditions for much more reliable diagnosis."

"Unlike X-rays, the technique also emits negligible doses of non-ionising radiation - less than a hundredth of the radiation to which you are exposed when talking on a mobile phone."

The idea is to use the technique in conjunction with a treatment couch, equipped with holes for the breasts, to which the thirty or so antennas required by the examination are connected. It should be considerably more

comfortable for patients than mammography. The method is also much less expensive, not only because microwave equipment is not so costly, but also because the clearer images make interpretation easier for the doctors.

In the second Chalmers project, the microwaves are actually used to destroy the tumours by heating them, a process known as hyperthermia. Clinical studies have shown that treatment with conventional radiotherapy and chemotherapy in combination with hyperthermia may double the long-term ability to cure certain forms of cancer, such as cervical cancer and soft-tissue sarcoma.

"We are now developing a new hyperthermia system that can reach deep-seated tumours in the head and neck with high accuracy," says Hana Dobšíček Trefná, a PhD in Biomedical Engineering. "In this way, higher temperatures can be reached in the tumour without affecting the surrounding tissue."

With time, the Chalmers team hope to be able to combine both methods. As soon as a tumour is detected, the already connected antennas could be used to start treating the tumour directly while at the same time monitoring that the right tissue is heated up. The method should also be applicable for other parts of the body than breasts, head and neck.

Theranostics -- the treatment and diagnosis of diseases in a single system -- is a growing area of research, and the Chalmers team believe that microwaves have great potential in the field. The underlying microwave technology is already being used in the "Strokefinder," a helmet that can distinguish between blood clots and bleeding in the brain. The Strokefinder is currently undergoing clinical trials at Sahlgrenska Hospital.

http://www.sciencedaily.com/releases/2011/10/111025091533.htm

A Rest, a Meal, Then Death for 5,000-Year-Old Glacier Mummy

Scientists Consolidate Results of Research Into Ötzi's State of Health and His Death

ScienceDaily - There is now broad agreement on the circumstances of Ötzi's death. Around 100 experts on mummies from nearly every single continent gathered for the "2nd Bolzano Mummy Congress" held at the European Academy of Bolzano from the 20th to the 22nd October 2011, with the aim of discussing any diseases he might have been suffering from and the events surrounding his death. From the moment of his discovery 20 years ago, Ötzi -- the 5,000-year-old glacier mummy -- has been puzzling the scientific research community, though little by little he is also revealing many of his secrets.

There was broad agreement at the Bolzano Congress about the last hour of his life. Albert Zink, Head of the Institute for Mummy Research at EURAC, reports as follows about the circumstances of the Iceman's death: "He felt safe enough to take a break, and settled down to a copious meal. While thus resting, he was attacked, shot with an arrow and left for dead." There was no evidence pointing to a possible burial as some scientists have suggested in the past. "The position of the mummified body with his arm pointing obliquely upwards, the lack of any piles of stones or other features which often accompany burial sites, runs counter to the burial theory," he continues.

But there is still the problem of what was Ötzi doing up there, at a height of 3,200 metres? At the Bolzano Congress, the Innsbruck based scientists Andreas Putzer, Daniela Festi and Klaus Oeggl refuted the theory, first put forward in 1996, according to which Ötzi was a shepherd who had taken his herd to pastures high up in the mountains to graze during the summer months. According to the latest archaeological and botanical findings, there was no seasonal migration of cattle during the Chalcolithic period, the Copper Stone Age. The so called transhumance did not start until around 1500 BC.

Ötzi was not on the run. On the contrary, between 30 and 120 minutes before his death he had settled down to a hearty meal, as evidenced by stomach samples investigated by Albert Zink and his team this past summer. Goat meat, grains of corn, pieces of leaves, apples and flies' wings were clearly discernible under the microscope.

Innsbruck Botanist Klaus Oeggl was able to detect pollen from the Hop-hornbeam in Ötzi's stomach. Oeggl had, some time ago, discovered a high concentration of such pollen in Ötzi's bowels and had concluded that Ötzi had actually died in the spring and not, as had been assumed for some time, in the autumn. Since food remains fresher in the stomach where it only stays two to four hours, the discovery of pollen in this part of the body gives further weight to this theory.

Nanotechnology used on a brain sample at the Ludwig Maximilian University in Munich was able to confirm a further assumption: Ötzi did in fact suffer trauma to his skull and brain. This alone would have been sufficient to cause death, but was no doubt at least a contributory factor along with his arrow wound. What is still unclear is whether he incurred the trauma through a fall or a blow to the head.

The majority of the findings are based on the examination of tissue samples from the stomach and the brain taken endoscopically by a team of scientists from Magdeburg, Bolzano and Munich in November last year.

Since then, scientists from almost all disciplines have been investigating these samples from their own specific scientific angles using subject-specific methods: medics, nanotechnologists, anthropologists, biochemists, archaeologists and physicists. There are now over 100 "Ötzi researchers," and the Bolzano Mummy Congress represents a so far unique opportunity for them to discuss the present state of research face-to-face at a gathering which was specifically dedicated to the famous iceman.

http://www.bbc.co.uk/news/world-asia-pacific-15452071

Ship from failed Mongol invasion found off Japan

The wreck of a ship thought to have taken part in a failed Mongol invasion of Japan has been found off the Japanese coast.

A team of researchers uncovered a 12-metre (36ft) section of keel buried in deep sand off Nagasaki prefecture. They said it was the first time such a large piece of hull had been recovered from the Mongol invasion fleets. The 13th Century attacks on Japan were a rare setback for the Mongols at the height of their powers.

Experts expressed surprise that the wreck was so well preserved after so many centuries on the seabed.

The researchers from the Okinawa-based University of the Ryukyus used ultrasonic equipment to detect the remains of the ship. The wood on the hull was painted whitish grey and held together by nails. Bricks, weapons and other instruments were found on board. The discovery is expected to shed light on the shipbuilding skills of the time and give clues about the nature of the Mongol defeat.

'Divine wind'

The Japanese have always attributed their victory to storms that wrecked the Mongol fleets during both attempted invasions in 1274 and 1281. They concluded that Japan was protected from invasion by a divine wind, or Kamikaze, which was invoked in World War II to inspire pilots to launch suicide attacks on allied ships.

As Central Asian nomads, the Mongols had little experience of the sea and used subjugated Chinese and Koreans to build their fleets. The structure of the ship is said to resemble Chinese ships of the era.

The Mongols that did manage to land are reputed to have had some success against the Japanese, who struggled to match their skilled use of mounted archers. But on both occasions, the Mongols and the Chinese and Korean troops under their command, headed back out to sea to try to ride out approaching typhoons - and that proved to be their downfall.

http://medicalxpress.com/news/2011-10-alzheimer-patients-drugs-opposing-effects.html

Many Alzheimer's patients get drugs with opposing effects

You wouldn't brake your car while stepping on the gas - or wash down a sleeping pill with espresso.

Yet many people taking common Alzheimer's disease medications - cholinesterase inhibitors - are given medications with anticholinergic properties, which oppose their effects. Group Health Research Institute scientists investigated how often that happens and reported on the consequences in an "Early View" study e-published in the Journal of the American Geriatrics Society.

"Cholinesterase inhibitors are today's primary therapy for slowing Alzheimer's disease," said study leader Denise Boudreau, PhD, RPh, an associate scientific investigator at Group Health Research Institute. "Anticholinergic properties are often found in drugs commonly used to treat gastrointestinal disorders, allergies, urinary incontinence, depression, and Parkinson's disease, and they can have negative effects on cognition and function in the elderly. There's concern that if someone is taking both types of drugs - cholinesterase inhibitors and anticholinergic medications - they will antagonize each other, and neither will work."

In clinical trials, cholinesterase inhibitors show modest effects against the functional and cognitive decline of people with Alzheimer's disease. These medications, such as donepezil (Aricept) work by inhibiting the breakdown of acetylcholine, which sends signals in the nervous system. By contrast, anticholinergics - such as diphenhydramine (Benadryl) and oxybutynin (Ditopan) - block the action of acetylcholine. Since the two types of drugs have opposite effects, it makes sense not to give both kinds of drugs to an individual person. But until Dr. Boudreau's study, few researchers had explored how often patients are prescribed both types of medications and which harms this might cause.

Dr. Boudreau and colleagues conducted a retrospective cohort study of 5,625 people aged 50 or older who received a new prescription for cholinesterase inhibitors between 2000 and 2007. The researchers used electronic pharmacy records of Group Health Cooperative and Kaiser Permanente Colorado, nonprofit health care systems that together provide care to more than a million people. The research team found patients who also had a prescription for anticholinergics from the year before their cholinesterase prescription until the analysis ended on December 31, 2008, or the patient left the health care system or died. The study was the first

to use state death records and insurance claims for nursing home care to look for effects of taking both drug types.

The researchers found:

Of the cholinesterase inhibitor users, 37 percent were also taking at least one anticholinergic drug, and more than 11 percent took two or more. This was similar to other studies of Medicare beneficiaries.

* For those using both medication types, dual use generally lasted three to four months, but 25 percent used both classes of drugs for more than a year.
* Anticholinergics were already being used in 23 percent of people receiving a new cholinesterase inhibitor prescription, and 77 percent continued, even after starting the cholinesterase inhibitor.
* Subjects using both medication types were not more likely to enter a nursing home or to die than those taking only cholinesterase inhibitors.

"**It's** reassuring that we did not observe an association between simultaneous use of the two types of drugs and increased risk of death or nursing home placement," said Dr. Boudreau. "But concomitant use of these drugs is, at the very least, not optimal clinical practice." Preventing concurrent use of opposing drugs could also be a chance to reduce waste in health care spending, since a month of donepezil treatment costs approximately $180.

One reason that health care providers might prescribe conflicting medications is that dementia patients often have multiple medical conditions. Also, anticholinergics are often given to counteract the side effects of cholinesterase inhibitors, which are one of the few available treatments for people with Alzheimer's. Dr. Boudreau hopes the study raises awareness about the potential inappropriateness of prescribing both types of drugs—and stimulate discussions about the best way to make therapeutic decisions for people with Alzheimer's.

"Providers, families, and patients should carefully consider the extent to which demonstrated benefits or harms in an individual patient justify long-term use of these drugs," said Dr. Boudreau. "A good first step is to have clearly agreed-upon goals for therapy and a plan to monitor for effects and side effects." Now Group Health Research Institute scientists have started to work with Group Health Cooperative on steps like these to improve the quality of care. *Provided by Group Health Research Institute*

http://www.eurekalert.org/pub_releases/2011-10/tuoh-adc102511.php

Astronomers discover complex organic matter in the universe

An organic substance commonly found throughout the Universe contains a mixture of aromatic and aliphatic components

In today's issue of the journal Nature, astronomers report that organic compounds of unexpected complexity exist throughout the Universe. The results suggest that complex organic compounds are not the sole domain of life but can be made naturally by stars.

Prof. Sun Kwok and Dr. Yong Zhang of the University of Hong Kong show that an organic substance commonly found throughout the Universe contains a mixture of aromatic (ring-like) and aliphatic (chain-like) components. The compounds are so complex that their chemical structures resemble those of coal and petroleum. Since coal and oil are remnants of ancient life, this type of organic matter was thought to arise only from living organisms. The team's discovery suggests that complex organic compounds can be synthesized in space even when no life forms are present.

The researchers investigated an unsolved phenomenon: a set of infrared emissions detected in stars, interstellar space, and galaxies. These spectral signatures are known as "Unidentified Infrared Emission features". For over two decades, the most commonly accepted theory on the origin of these signatures has been that they come from simple organic molecules made of carbon and hydrogen atoms, called polycyclic aromatic hydrocarbon (PAH) molecules. From observations taken by the Infrared Space Observatory and the Spitzer Space Telescope, Kwok and Zhang showed that the astronomical spectra have features that cannot be explained by PAH molecules. Instead, the team proposes that the substances generating these infrared emissions have chemical structures that are much more complex. By analyzing spectra of star dust formed in exploding stars called novae, they show that stars are making these complex organic compounds on extremely short time scales of weeks.

Not only are stars producing this complex organic matter, they are also ejecting it into the general interstellar space, the region between stars. The work supports an earlier idea proposed by Kwok that old stars are molecular factories capable of manufacturing organic compounds. "Our work has shown that stars have no problem making complex organic compounds under near-vacuum conditions," says Kwok. "Theoretically, this is impossible, but observationally we can see it happening."

Most interestingly, this organic star dust is similar in structure to complex organic compounds found in meteorites. Since meteorites are remnants of the early Solar System, the findings raise the possibility that stars

enriched the early Solar System with organic compounds. The early Earth was subjected to severe bombardments by comets and asteroids, which potentially could have carried organic star dust. Whether these delivered organic compounds played any role in the development of life on Earth remains an open question.

Prof. Sun Kwok is the Dean of Science and Chair Professor of Physics of the University of Hong Kong. He serves as Vice President of Division VI (interstellar matter) of the International Astronomical Union, and is the incoming Vice President of Commission 51 (bioastronomy) of the International Astronomical Union. He has published many books, including the recent book "Organic Matter in the Universe" (Wiley, 2011).

Dr. Yong Zhang is a Research Assistant Professor at the University of Hong Kong.

This work was supported by the Research Grants Council of Hong Kong.

http://www.eurekalert.org/pub_releases/2011-10/acs-ata102611.php

Advance toward a breath test to diagnose multiple sclerosis

Scientists are reporting the development and successful tests in humans of a sensor array that can diagnose multiple sclerosis from exhaled breath

Scientists are reporting the development and successful tests in humans of a sensor array that can diagnose multiple sclerosis (MS) from exhaled breath, an advance that they describe as a landmark in the long search for a fast, inexpensive and non-invasive test for MS -- the most common neurological disease in young adults. Their report appears in the journal ACS Chemical Neuroscience.

Hossam Haick and colleagues report that doctors now diagnose MS based on its characteristic symptoms, which include muscle spasms, numbness, coordination problems and slurred speech. One common tool for confirming the diagnosis and making informed decisions on treatment is magnetic resonance imaging (MRI) of the brain. Another tool is a lumbar puncture or "spinal tap" to analyze the fluid that bathes the brain and spinal cord. But MRI scans are costly, and lumbar punctures are invasive.

To overcome these obstacles, the researchers have identified volatile organic compounds that can be associated with MS from exhaled breath. Based on these findings, the researchers developed a new sensor array that can diagnose MS by analyzing the determined chemical compounds that appear in the breath of MS patients. Using the developed sensors, the researchers carried out a proof-of-concept clinical study on 34 MS patients and 17 healthy volunteers and found that the developed sensors are just as accurate as a spinal tap but without the pain or the risk of side effects. "The results presented here open new frontiers in the development of fast, noninvasive and inexpensive medical diagnosis tools for detection of chronic neurological diseases," the scientists stated. "The results could serve as a launching pad for the discrimination between different subphases of stages of multiple sclerosis as well as for the identification of multiple sclerosis patients who would respond well to immunotherapy." A large clinical study with the reported sensors is underway and will be reported in the future.

http://www.physorg.com/news/2011-10-uk-scientists-super-broccoli.html

UK scientists grow super broccoli

Popeye might want to consider switching to broccoli. British scientists recently unveiled a new breed of the vegetable that experts say packs a big nutritional punch.

The new broccoli was specially grown to contain two to three times the normal amount of glucoraphanin, a nutrient believed to help ward off heart disease.

"Vegetables are a medicine cabinet already," said Richard Mithen, who led the team of scientists at the Institute for Food Research in Norwich, England, that developed the new broccoli. "When you eat this broccoli ... you get a reduction in cholesterol in your blood stream," he told Associated Press Television.

Glucoraphanin works by breaking fat down in the body, preventing it from clogging the arteries. It is only found in broccoli in significant amounts.

To create the vegetable, sold as "super broccoli," Mithen and colleagues cross-bred a traditional British broccoli with a wild, bitter Sicilian variety that has no flowery head, and a big dose of glucoraphanin. After 14 years, the enhanced hybrid was produced, which has been granted a patent by European authorities. No genetic modification was used.

It's been on sale as Beneforte in select stores in California and Texas for the last year, and hit British shelves this month. Later this fall, the broccoli will be rolled out across the U.S.

The super vegetable is part of an increasing tendency among producers to inject extra nutrients into foods, ranging from calcium-enriched orange juice to fortified sugary cereals and milk with added omega 3 fatty acids. In Britain, the new broccoli is sold as part of a line of vegetables that includes mushrooms with extra vitamin D, and tomatoes and potatoes with added selenium.

Not enough data exists to know if anyone could overdose on glucoraphanin, but vitamin D and selenium in very high quantities can be toxic.

Mithen and colleagues are conducting human trials comparing the heart health of people eating the super broccoli to those who eat regular broccoli or no broccoli. They plan to submit the data to the European Food Safety Agency next year so they can claim in advertisements the broccoli has proven health benefits.

"There's a lot of circumstantial evidence that points to (glucoraphanin and related compounds) as the most important preventive agents for (heart attacks) and certain cancers, so it's a reasonable thing to do," said Lars Ove Dragsted, a professor in the department of human nutrition at the University of Copenhagen. He previously sat on panels at the International Agency for Research on Cancer examining the link between vegetables and cancer.

Dragsted said glucoraphanin is a mildly toxic compound used by plants to fight insects. In humans, the compound may stimulate the immune system to attack cancer, he suggested.

Other experts said eating foods packed with extra nutrients would probably only have a minimal impact compared with other lifestyle choices, like not smoking and exercising.

"Eating this new broccoli is not going to counteract your bad habits," said Glenys Jones, a nutritionist at Britain's Medical Research Council. She doubted whether adding the nutrients in broccoli to more popular foods would work to improve people's overall health.

"If you added this to a burger, people might think it's then a healthy food and eat more burgers, whereas this is not something they should be eating more of," Jones said. She also thought the super broccoli's U.K. price - it costs about a third more than regular broccoli - might discourage penny-pinching customers.

But that wasn't enough to deter Suzanne Johnson, a 43-year-old mother of two young children in London.

"I'm very concerned about the food they eat and would happily pay a bit more to buy something that has an added benefit," Johnson said.

But for her children, taste is ultimately more important than any nutritional value. "Broccoli is one of the vegetables they actually like, so I'm glad it's the one (scientists) have been working on," she said. This wouldn't work if it had been mushrooms or asparagus."

http://www.sciencedaily.com/releases/2011/10/111026122440.htm

Infection Is an Important Post-Stroke Problem

After a stroke the brain tries to protect itself by blocking all inflammation. However, this also makes the patient highly susceptible to infection which can lead to death.

ScienceDaily - Researchers have now discovered the mechanism behind this response and how to possibly treat it. The research is published this month in the journal Science.

Using a mouse model, scientists at the University of Calgary's Faculty of Medicine have discovered Natural Killer T-cells (NKT) are the immune cells that get activated in the patient after a stroke. The cells suppress the immune system as the body tries to prevent inflammation to protect the brain. The researchers have also found a new drug that can stop the NKT cells from suppressing the immune system, stopping the infections.

"When we discovered that these novel NKT cells are important in fighting infection in stroke, we were able to specifically target them. This means that infections can be controlled without having to administer high levels of antibiotics," says Paul Kubes, PhD, senior author of the study and director of the Snyder Institute at the University of Calgary. "This in its own right is important to avoid over-usage of antibiotics leading to development of anti-biotic resistant strains of bacteria."

Early indications are that NKT cells in humans behave very similarly to NKT cells in mice making this highly relevant to human stroke.

"The research does not cure the stroke itself," says Connie Wong, PhD , also a co-author of the study and member of the Snyder Institute at the University of Calgary , "But by providing novel therapies it holds the promise to significantly decrease death rates associated with stroke."

This research publication has recently been recognized by Faculty of 1000, a website for researchers that identifies and evaluates the most significant articles from biomedical research publications.

The research was supported by the Canadian Institutes for Health Research (CIHR). Paul Kubes' research is also funded by Alberta Innovates -- Health Solutions.

http://www.newscientist.com/article/dn21097-dinosaur-teeth-hold-first-clues-to-migration.html

Dinosaur teeth hold first clues to migration

Impressed by the spectacle of wildebeest swarming across the Serengeti? Now imagine vast herds of sauropods seasonally moving out of the dry floodplains of the western US into the highlands.

by Michael Marshall

The first persuasive evidence that this happened comes from a study of dinosaur teeth from Camarasaurus, one of the most common species of sauropod. It grew to 15 metres long and lived in Wyoming and Utah in the late Jurassic. Its fossils have been found on what was once a low-lying floodplain, which would have periodically dried out. Henry Fricke of Colorado College in Colorado Springs wondered if they migrated to nearby hills to find food and water during the dry season.

To find out, he looked at the oxygen isotopes in 32 fossil teeth. The ratio of isotopes is determined by the water the dinosaurs drank. He found the ratio in teeth was different to that in carbonate rock from the floodplain – which carries the signature of the water it formed in. This suggests that Camarasaurus sometimes left the area.

By drilling through the layers in a tooth, Fricke could track the different sources its owner drank from.

One tooth revealed that the oxygen isotopes gradually changed over five months, strengthening the idea that the migration was seasonal. The most likely interpretation, says Fricke, is that the dinosaurs moved to greener pastures at higher altitudes.

Palaeontologists have long suspected that some dinosaurs migrated, but this is the first solid evidence of it, says Paul Barrett of the Natural History Museum in London. Camarasaurus must have put a lot of pressure on food resources, so it makes sense that they moved around. Barrett suspects rarer sauropods such as Haplocanthosaurus didn't need to migrate.

It's likely Camarasaurus had company on the long treks. When modern herbivores migrate, they are followed by predators, so the same may have happened in the Jurassic. The most common local predator was Allosaurus, a distant cousin of T. Rex. Fricke is trying to find out if they tracked Camarasaurus. It would make sense if they did: "A mass migration," says Barrett, "is basically a huge walking supermarket."

Journal reference: Nature, DOI: 10.1038/nature10570

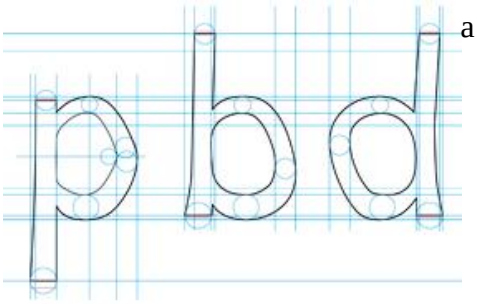
http://www.scientificamerican.com/article.cfm?id=new-font-helps-dyslexics-read

Bold Stroke: New Font Helps Dyslexics Read [Slide Show]

Dutch researcher designs distinct characters into "Dyslexie" to make it more difficult for dyslexics to rotate, swap and mirror letters and numbers

By Jennifer Nalewicki

After years of fumbling while reading the written word, Christian Boer, a graphic designer from the Netherlands, has developed a way to help tackle his dyslexia. The 30-year-old created a font called Dyslexie that has proved to decrease the number of errors made by dyslexics while reading. The font works by tweaking the appearance of certain letters of the alphabet that dyslexics commonly misconstrue, such as "d" and "b," to make them more recognizable. This month Boer released the font in English for U.S. users to purchase online.



The Dyslexie font works by tweaking the appearance of certain letters of the alphabet that dyslexics commonly misconstrue, such as "p", "b" and "d," to make them more recognizable. Image: Courtesy of Christian Boer

Boer began designing the font in 2008 while studying at the University of Twente in the Netherlands. It eventually became his graduate school project. In December 2010 a fellow student conducted an independent study on the font as part of a master's thesis and discovered a significant reduction in reading errors by dyslexics when reading Dutch text typed in Dyslexie as opposed to the Arial font.

View this article in the Dyslexie font. (pdf)

Boer's research could likewise have a big impact on English speakers, given the prevalence of dyslexia when reading that language, as compared with Italian, whose words are pronounced more closely to how they are spelled. In the U.S. one out of every five persons is dyslexic, according to the National Institutes of Health.

Unlike other readers, dyslexics have a tendency to rotate, swap and mirror letters, making it difficult for them to comprehend what they're reading. For years it was thought that dyslexia was a vision problem, but scientists now know that the condition stems from the brain. Scans of dyslexic brains show that there are structural differences—including in the thalamus, which serves an information way station—when compared with other brains. Some dyslexics even see letters as suspended 3-D animations that twist before their eyes. "I

perceived letters floating like balloons in my head," Boer says. As a means to finally "tie down" these balloons, Boer dedicated his time and graphic design skills to come up with Dyslexie.

Whereas the majority of typography designers want their fonts to be aesthetically pleasing (think of the flowing serifs of Lucida Calligraphy or the chiseled lines of Arial), Boer was more concerned with reading comprehension. He estimates that the time he spent designing his font added up to 15 hours per letter. He even recruited dyslexic college pals for feedback.

One of the first things he did was increase the boldness of letters at their bases, to make them appear weighted, causing readers' brains to know not to flip them upside down, as can occur with "p" and "d." Boer also enlarged the openings of various letters, such as "a" and "c," to make them more distinguishable from one another, and increased the length of "the tail" of other letters, like the "g" and y." He also put certain letters at a slant so that they would appear to be in italics, like the "j," a tactic to increase the brain's ability to distinguish it from the letter "i." Finally, he boldfaced capital letters and punctuation, and provided ample space between letters and words, to allow the brain more time to compute the letters and begin forming them into words and sentences.

Although Dyslexie is not the first font out there to help aid dyslexics, it has received much fanfare from sufferers thus far, including participants from the aforementioned University of Twente study, who commented that the font allowed them to read with improved accuracy, and for a longer time before tiring

Boer does not tout his font as a cure for dyslexia—there is none known—but he says, "it's like a wheelchair" that can help them. Given the different levels of the disability, it is difficult for one font to aid all dyslexics. He remains hopeful, however, that Dyslexie is a step in the right direction to help others who have suffered as he has all these years. In the meantime Boer has released Dyslexie for purchase in both English and Dutch on his Web site.

http://medicalxpress.com/news/2011-10-doctors-overrate-language.html

Doctors often overrate how well they speak a second language

Communicating with patients who do not speak English is a challenge facing all health care providers. New research shows that even those physicians who say they are fluent in a second language may be overestimating their actual skills.

In an effort to ensure equal care, the U.S. Department of Health and Human Services calls for health organizations to provide patients who have limited English proficiency (LEP) access to an interpreter or a bilingual staff person. But just how well does the health provider speak the second language?

"Part of the problem is that there are no standards for how bilingual staff are assessed, so it's left to organizations to decide for themselves," said lead author Lisa Diamond, MD, of the Immigrant Health and Cancer Disparities Service at Memorial Sloan-Kettering Cancer Center in New York.

The study, appearing in Health Services Research, takes a look at how physicians at the Palo Alto Medical Foundation (PAMF) in the San Francisco Bay area describe their language skills.

Patients can search for a physician on the PAMF website by languages spoken, such as Spanish and Chinese. The old site categorized a doctor's non-English proficiency as "basic," "medical/conversational" or "fluent."

However, in 2009, PAMF instituted a new, adapted version of a scale known as the Interagency Language Roundtable (ILR), which has a long history of use by the U.S. government, private and academic organizations. The ILR rates proficiency in five levels with explanations of each: poor, fair, good, very good and excellent.

After the new scale was introduced, 258 (75 percent) of the physicians changed their rating on the website—31 who had considered themselves "fluent" downgraded to "good" or "fair" on the ILR scale. And just 11 percent considered their proficiency as "excellent." Seventeen percent used "very good" and 38 percent said they were "fair." Being "fair" was defined as "…can get the gist of most everyday conversations but has difficulty communicating about health care concepts."

"This is a very tricky area as this demonstrates how many providers overestimate their proficiency in another language," said Joseph Betancourt, MD, director of the Disparities Solutions Center at Massachusetts General Hospital in Boston. "This can lead to miscommunication and even medical errors."

Betancourt added that while he wasn't familiar with the ILR scale, it "seems like a promising and necessary tool to objectively measure provider fluency in other languages."

Diamond added, "At this point, we don't know for sure which method of assessing non-English language proficiency is the most accurate and, thus, can't set standards yet. Identifying such a tool is part of the focus of my current research."

More information: Diamond LS, Luft HS, et al. "Does this Doctor Speak My Language?" Improving the characterization of physician non-English language skills. Health Services Res online, 2011. http://onlinelibra … 0.1111/(ISSN)1475-6773/
Provided by Health Behavior News Service

http://www.physorg.com/news/2011-10-fukushima-nuke-pollution-sea-world.html

Fukushima nuke pollution in sea 'was world's worst'

France's nuclear monitor said Thursday the amount of caesium 137 that leaked into the Pacific from the Fukushima disaster was the greatest single nuclear contamination of the sea ever seen.

France's nuclear monitor said on Thursday that the amount of caesium 137 that leaked into the Pacific from the Fukushima disaster was the greatest single nuclear contamination of the sea ever seen. But, confirming previous assessments, it said caesium levels had been hugely diluted by ocean currents and, except for near-shore species, posed no discernible threat. From March 21 to mid-July, 27.1 peta becquerels of caesium 137 entered the sea, the Institute for Radiological Protection and Nuclear Safety (IRSN) said.

One peta becquerel is a million billion becquerels, or 10 to the power of 15. Of the total, 82 percent entered the sea before April 8, through water that was pumped into the Fukushima's damaged reactor units in a bid to cool them down, it said. "This is the biggest single outflow of man-made radionuclides to the marine environment ever observed," the agency said in a press release.

Caesium is a slow-decaying element, taking 30 years to lose half of its radioactivity.

The IRSN said large quantities of iodine 131 also entered the sea as a result of the disaster, caused by the March 11 9.0-magnitude quake that occurred off northeastern Japan. But iodine 131 decays quickly, having a half-life of eight days, and the contamination "swiftly diminished," the report said.

The IRSN said that, for the Pacific generally, caesium levels would ultimately stabilise at 0.004 becquerels per litre thanks to the diluting effect of powerful ocean currents. This is twice the concentration that prevailed during atmospheric nuclear testing in the 1960s. "These levels should not have an impact in terms of radiological safety," the IRSN said. However, "significant pollution of seawater on the coast near the damaged plant could persist," because of continuing runoff of contaminated rainwater from the land, it said. "Maintaining monitoring of marine species taken in Fukushima's coastal waters is justified," it said.

The IRSN cited deep-water fish, fish at the top of the marine food chain and molluscs and other filtrating organisms as "the species that are the most sensitive" to caesium pollution.

http://www.eurekalert.org/pub_releases/2011-10/uok-wra102711.php

Watermelon reduces atherosclerosis in University of Kentucky study

In a recent study by University of Kentucky researchers, watermelon was shown to reduce atherosclerosis in animals.

LEXINGTON, Ky. - The animal model used for the study involved mice with diet-induced high cholesterol. A control group was given water to drink, while the experimental group was given watermelon juice. By week eight of the study, the animals given watermelon juice had lower body weight than the control group, due to decrease of fat mass. They experienced no decrease in lean mass. Plasma cholesterol concentrations were significantly lower in the experimental group, with modestly reduced intermediate and low-density lipoprotein cholesterol concentrations as compared to the control group.

A measurement of atherosclerotic lesion areas revealed that the watermelon juice group also experienced statistically significant reductions in atherosclerotic lesions, as compared to the control group.

"Melons have many health benefits," said lead investigator Dr. Sibu Saha. "This pilot study has found three interesting health benefits in mouse model of atherosclerosis. Our ultimate goal is to identify bioactive compounds that would improve human health."

The study was conducted by Sibu Saha, UK Department of Surgery; Aruna Poduri, UK Saha Cardiovascular Research Center (UK Saha CRVC); Debra L. Rateri, UK Saha CVRC; Shubin Saha of Purdue Univ.; and Alan Daugherty, director, UK Saha CVRC.

http://www.eurekalert.org/pub_releases/2011-10/uot-ias102711.php

Insects are scared to death of fish

University of Toronto biologists find higher mortality among dragonflies exposed to undue stress

TORONTO, ON - The mere presence of a predator causes enough stress to kill a dragonfly, even when the predator cannot actually get at its prey to eat it, say biologists at the University of Toronto.

"How prey respond to the fear of being eaten is an important topic in ecology, and we've learned a great deal about how these responses affect predator and prey interactions," says Professor Locke Rowe, chair of the Department of Ecology and Evolutionary Biology (EEB) and co-principal investigator of a study conducted at U of T's Koffler Scientific Reserve.

"As we learn more about how animals respond to stressful conditions – whether it's the presence of predators or stresses from other natural or human-caused disruptions – we increasingly find that stress brings a greater risk of death, presumably from things such as infections that normally wouldn't kill them," says Rowe.

Shannon McCauley, a post-doctoral fellow, and EEB professors Marie-Josée Fortin and Rowe raised juvenile dragonfly larvae (Leucorrhinia intacta) in aquariums or tanks along with their predators. The two groups were separated so that while the dragonflies could see and smell their predators, the predators could not actually eat them. “What we found was unexpected - more of the dragonflies died when predators shared their habitat," says Rowe. Larvae exposed to predatory fish or aquatic insects had survival rates 2.5 to 4.3 times less than those not exposed.

In a second experiment, 11 per cent of larvae exposed to fish died as they attempted to metamorphose into their adult stage, compared to only two per cent of those growing in a fish-free environment. "We allowed the juvenile dragonflies to go through metamorphosis to become adult dragonflies, and found those that had grown up around predators were more likely to fail to complete metamorphosis successfully, more often dying in the process," says Rowe.

The scientists suggest that their findings could apply to all organisms facing any amount of stress, and that the experiment could be used as a model for future studies on the lethal effects of stress.

The research is described in a paper titled "The deadly effects of 'nonlethal' predators", published in Ecology and highlighted in Nature this week. It was supported by grants to Fortin and Rowe from the Canada Research Chairs program and the Natural Sciences and Engineering Research Council of Canada, and a post-doctoral fellowship awarded to McCauley.

http://www.scientificamerican.com/article.cfm?id=big-pharma-giving-away-drug-patents-2011-10

Big Pharma Giving Away Drug Patents To Help Cure Tropical Disease

By offering up their drugs for free to developing countries, drug companies hope to make inroads into new markets, and prevent a few diseases along the way.

By Ariel Schwartz

By offering up their drugs for free to developing countries, drug companies hope to make inroads into new markets, and prevent a few diseases along the way. Intellectual property is crucial for pharmaceutical companies to survive; without it, their pricey blockbuster drugs can be replaced with cheap generics. And yet, big companies like AstraZeneca, Novartis, GlaxoSmithKline, Pfizer, Sanofi, and Merck are willingly putting some of their intellectual property information in a public database. The pharmaceutical industry hasn't gone crazy--it's just participating in an initiative that aims to treat neglected tropical diseases.

WIPO Re:Search, a collaboration between The World Intellectual Property Organization, BIO Ventures For Global Health, pharmaceutical giants, nonprofits, and universities, is offering up a searchable database of intellectual property from drug companies that can aid in the treatment of diseases like tuberculosis, malaria, Chagas disease, and dengue fever. The initiative will also facilitate partnerships between participating organizations to speed up research and development.

"What the researchers want and what the companies are willing to provide is expertise and know-how between the lines of a patent," says Don Joseph, COO of BIO Ventures for Global Health." They can say, here's work we've done before that worked, here's work that we've done before that didn't work. Don't reinvent the wheel."

It's not that there's a lot of money in developing these drugs. According to Joseph, pharmaceutical companies don't make much from malaria drugs currently on the market. But there's another benefit for pharmaceutical companies participating in WIPO Re:Search: The opportunity to create new relationships in countries around the world where they may not presently have any.

No matter the motivation for big pharma, WIPO Re:Search has the potential to speed up the lengthy, risky process of drug and vaccine development for some of the world's poorest citizens. "The goal is to come out of this initiative with as many new products for neglected diseases as possible," says Joseph.

http://www.sciencedaily.com/releases/2011/10/111027112506.htm

Hospital Team Significantly Reduced Risk of Further Vascular Events After 'Mini Strokes'

Patients who had a transient ischaemic attack, sometimes referred to as a "mini stroke," were much less likely to experience further vascular events in the first year if their care was co-ordinated by a special hospital team

ScienceDaily - Patients who had a transient ischaemic attack (TIA), sometimes referred to as a "mini stroke," were much less likely to experience further vascular events in the first year if their care was co-ordinated by a special hospital team. That is the key finding from a study published in the November issue of the European Journal of Neurology.

Researchers from the Department of Neurology at Aarhus University Hospital in Denmark studied 306 patients admitted to the hospital with a TIA. They found that when the patients were treated by an acute TIA team their cumulated risk of having a stroke in the first seven days was 65% lower than expected. The cumulated risk in the first 90 days fell by 74%.

"The aim of our study was to see if patients had better clinical outcomes if they were under the care of a special team, which integrated outpatient care and stroke unit facilities and provided on-going nurse-led counselling" says lead author Dr Paul von Weitzel-Mudersbach.

"TIA, which is caused by a temporary lack of blood to part of the brain, is a serious condition associated with a high short-term risk of ischaemic stroke. Previous research has shown that the cumulated stroke risk in the first three months after a TIA is ten to 12% in unselected patients and more than 30% in patients with carotid stenosis, a dangerous narrowing of the largest blood vessels that deliver blood to the brain.

"Although urgent intervention has been shown to reduce the risk of stroke, a number of previous studies have shown poor long-term drug compliance in many patients."

The patients were referred directly to the acute TIA team by their family doctor or ambulance, bypassing the emergency department. Patients who had suffered a TIA in the last 48 hours, and those with multiple TIA, faced a high risk of stroke and were admitted to the stroke unit. This offered the option for immediate preventative action, including thrombolysis drugs, to break up blood clots in the case of recurrent stroke. The other patients were seen in the outpatients department within three days of referral.

All the patients seen by the team received acute treatment with antithrombotic and cholesterol lowering drugs and were offered fast-track surgery if they had carotid stenosis. Follow-up included nurse-conducted health counselling after seven, 90 and 365 days. Each contact included the importance of secondary prevention, such as drug compliance and stopping smoking.

Key findings of the study included:

* Just under two-thirds of the patients were admitted immediately after their TIA (65%) with the rest being seen as outpatients. Inpatient stays averaged one day.
* Over half (58%) were seen within 24 hours of their TIA and 70% within 24 hours of the call for attention. The figures at one week were 76% and 89% respectively.
* Just over 5% had a stroke, non-fatal heart attack or died from a vascular event within a year of their TIA.
* The cumulated stroke risk was calculated and compared with the ABCD2 score, an established method of identifying individuals with a high early risk of stroke after a TIA. The actual scores in the Aarhus study were 1.6% and 2% after seven and 90 days, significantly lower than the ABCD2 predicted stroke scores of 4.5% and 7.5%.
* Early surgery to remove the build up of plaque in the carotid blood vessels was performed in 8.5% of patients. However, the authors believe this only played a minor role in the reduced risk.
* The majority of the patients (95%) fulfilled at least one secondary prevention measure: reduced blood pressure, reduced cholesterol, no smoking and self-reported adherence to antithrombotic treatment. 48% achieved three out of the four targets.
* Most of the patients (93%) adhered to their antithrombotic treatment.
* More than 60% of the patients who smoked at the time of their TIA changed their smoking habits -- 31% quit and 29.5% reduced their smoking by at least 50%. Most of the changes happened in the first seven days.

"Our study shows that urgent treatment of patients with TIA is feasible and associated with a substantial reduction in stroke risk during the first three months, which is consistent with previous studies from the UK and France" says Dr von Weitzel-Mudersbach.

"We believe that early and aggressive antithrombotic treatment may play a major role in the reduction of short-term stroke risk in most patients. Meanwhile, the combination of secondary prevention efforts with a relatively high compliance rate - including the essential telephone follow-up provided by a specially trained nurse in the first three months - was probably responsible for the low long-term risk of adverse clinical outcome.

"Treating TIA by deploying a specialist team that can admit patients when the risk of recurrent symptoms is highest and prompt thrombolysis can be used, combined with nurse-conducted health counselling, seems to be effective."

http://www.scientificamerican.com/article.cfm?id=asteroid-21-lutetia

Hard Rock: Asteroid Lutetia May Be an Intact Leftover from Planetary Formation

A 2010 flyby by the Rosetta spacecraft showed Lutetia to be dense and dusty, a probable member of the planetesimal population that coalesced to form Earth and other planets

By John Matson | Friday, October 28, 2011 | 4

A brief encounter between a European spacecraft and a large asteroid has revealed that the space rock is likely a mostly intact leftover from the planetary formation process. But the flyby raised more questions than it answered, providing tantalizing but somewhat puzzling hints about the asteroid's makeup and internal structure.

The spacecraft, a European Space Agency probe called Rosetta, flew by Asteroid Lutetia in July 2010. The spacecraft is on its way to a planned encounter with Comet Churyumov–Gerasimenko in 2014; Rosetta shut down most of its systems and entered communication hibernation this past June to conserve power during its a 2.5-year cruise toward that rendezvous. Rosetta scientists have now analyzed the imagery and other data from the asteroid flyby; the results appear in a trio of studies in the October 28 issue of Science.

The researchers' main conclusion is that Lutetia looks to be an ancient planetesimal of the type that merged to form the planets in the first millions of years of solar system history. That contrasts with some smaller bodies visited by spacecraft, such as the asteroids Itokawa and Mathilde, which look not to be single, solid leftovers but rather looser, more porous assemblages of planetary odds and ends.

Lutetia, however, is too dense to have much porosity. Rosetta scientists derived a density estimate for the asteroid from visual assessments of Lutetia's irregular physical dimensions (121 by 101 by 75 kilometers), as well as from a mass measurement produced by tracking Rosetta's radio signals back to Earth. Even at a flyby distance of 3,170 kilometers, the asteroid's gravitational tug on the passing spacecraft was enough to deflect Rosetta's trajectory and Doppler-shift the spacecraft's radio transmissions. The magnitude of that Doppler shift reflected the strength of Lutetia's gravitational pull and therefore its mass.

At 3.4 grams per cubic centimeter, Lutetia rivals the larger Vesta for the densest known asteroid. "It's something like 20 percent denser than granite, so it's really dense material there," says Holger Sierks, a planetary researcher at the Max Planck Institute for Solar System Research in Katlenburg–Lindau, Germany, lead author of one of the new studies. The implication is that Lutetia must be solid, or very nearly so, with a composition that should have survived from the dawn of the solar system to today. "It has significant strength, so you'd need a lot of energy to hammer it to pieces," he says.

Planetesimals such as Lutetia hold important clues to the planetary formation process. "It's really huge, so it's very interesting to see a very large remnant that really survived from the early days," Sierks says.

That is not to say that Lutetia has had it easy; the asteroid's ancient surface bears the scars of billions of years of impacts from smaller objects. Its surface is pocked with more than 350 craters sized at least 600 meters in diameter, including a whopper of a crater, called Massilia, some 55 kilometers across. "Certainly a lot of material was shaved off to what we see today," Sierks says. "But it didn't see an impact that shattered it to pieces."

The cratering record and photographic evidence of landslides reveal that a deep layer of dusty, lunarlike soil, or regolith, coats the asteroid. "We know that we are looking at several hundreds of meters, if not a kilometer-thick, layer of regolith with very low density," Sierks says.

That low-density exterior material, which resembles that of primitive meteorites known as chondrites, is tough to reconcile with the asteroid's high overall density, which exceeds that of most chondrites. "It's a head-scratcher," says Erik Asphaug, a planetary scientist at the University of California, Santa Cruz, who did not contribute to the new studies. In the absence of a mass measurement, one might naively assume a porosity of about 20 percent for a similar-looking asteroid, Asphaug says. "Suddenly you have this asteroid, Lutetia, where one has to assume that you have a porosity of essentially zero, which doesn't fit at all with this dusty surface, heavily cratered, that's been bashed around for a long time," he says. "Trying to figure out what it's all about is really baffling."

One possibility is that Lutetia is partially differentiated, meaning that it has a metallic core, like a half-baked mini planet. A differentiated structure would help explain Lutetia's overall high density, especially if impacts carved away some of the less dense material after heavier metals had coagulated in the core. "I see a body which has a really beat up mantle, and probably deep beneath that mantle an iron core," Asphaug says. "Unfortunately, we'll probably never know." At least, Rosetta never will return there so it could deliver the data to clear up the mystery.

That is the fundamental problem with flybys, which are essentially add-ons to a spacecraft's primary mission and rarely deliver as much science as the main event. A fleeting rendezvous, lasting just hours in the case of Rosetta's 55,000-kilometer-per-hour pass at Lutetia, gives some clues to the target object but no opportunity for detailed follow-up investigation.

"It's a pity that we didn't stay for long enough," Sierks says. "If we had stayed for awhile, we would have been able to tell more about the interior of the body, and of course about the surface." As Rosetta zooms farther and farther beyond the Asteroid Belt to get a close look at Comet Churyumov–Gerasimenko, Sierks hopes that an asteroid-lander mission will not be far behind. "It's a good argument for the next generation of missions going out into the Asteroid Belt," he says, "because they really have to land there and...not just scratch the surface, but really get into the pristine material and find out what's there."

http://medicalxpress.com/news/2011-10-scientists-regular-aspirin-intake-halves.html

Scientists prove regular aspirin intake halves cancer risk

Scientists including those from Queen's University have discovered that taking regular aspirin halves the risk of developing hereditary cancers.

Hereditary cancers are those which develop as a result of a gene fault inherited from a parent. Bowel and womb cancers are the most common forms of hereditary cancers. Fifty thousand people in the UK are diagnosed with bowel and womb cancers every year; 10 per cent of these cancers are thought to be hereditary.

The decade-long study, which involved scientists and clinicians from 43 centres in 16 countries and was funded by Cancer Research UK, followed nearly 1,000 patients, in some cases for over 10 years. The study found that those who had been taking a regular dose of aspirin had 50 per cent fewer incidences of hereditary cancer compared with those who were not taking aspirin.

The research focused on people with Lynch syndrome which is an inherited genetic disorder that causes cancer by affecting genes responsible for detecting and repairing damage in the DNA. Around 50 per cent of those with Lynch syndrome develop cancer, mainly in the bowel and womb. The study looked at all cancers related to the syndrome, and found that almost 30 per cent of the patients not taking aspirin had developed a cancer compared to around 15 per cent of those taking the aspirin.

Those who had taken aspirin still developed the same number of polyps, which are thought to be precursors of cancer, as those who did not take aspirin but they did not go on to develop cancer. It suggests that aspirin could possibly be causing these cells to destruct before they turn cancerous.

Over 1,000 people were diagnosed with bowel cancer in Northern Ireland last year; 400 of these died from the disease. Ten per cent of bowel cancer cases are hereditary and by taking aspirin regularly the number of those dying from the hereditary form of the disease could be halved.

Professor Patrick Morrison from Queen's University in Belfast, who led the Northern Ireland part of the study, said: "The results of this study, which has been ongoing for over a decade, proves that the regular intake of aspirin over a prolonged period halves the risk of developing hereditary cancers. The effects of aspirin in the first five years of the study were not clear but in those who took aspirin for between five and ten years the results were very clear."

"This is a huge breakthrough in terms of cancer prevention. For those who have a history of hereditary cancers in their family, like bowel and womb cancers, this will be welcome news. Not only does it show we can reduce cancer rates and ultimately deaths, it opens up other avenues for further cancer prevention research. We aim now to go forward with another trial to assess the most effective dosage of aspirin for hereditary cancer prevention and to look at the use of aspirin in the general population as a way of reducing the risk of bowel cancer.

"For anyone considering taking aspirin I would recommend discussing this with your GP first as aspirin is known to bring with it a risk of stomach complaints, including ulcers." The research is due to be published in the Lancet Online on Oct. 28 2011. ***More information: http://www.capp3.org/***

http://www.physorg.com/news/2011-10-highly-efficient-oxygen-catalyst.html

Highly efficient oxygen catalyst found

This new catalyst liberates oxygen at more than 10 times the rate of the best previously known catalyst of its type

This work identifies that the electronic configuration of metal ions can control the activity of metal oxides for oxygen evolution by at least 10,000 times, which serves as a "design principle" (a volcano plot) to screen metal oxide candidates and accelerate the development of water electrolyzer, metal-air batteries and other energy storage technologies. Image: Eva Mutoro, Jin Suntivich, Yang Shao-Horn

A team of researchers at MIT has found one of the most effective catalysts ever discovered for splitting oxygen atoms from water molecules - a key reaction for advanced energy-storage systems, including electrolyzers, to produce hydrogen fuel and rechargeable batteries. This new catalyst liberates oxygen at more than 10 times the rate of the best previously known catalyst of its type.

The new compound, composed of cobalt, iron and oxygen with other metals, splits oxygen from water (called the Oxygen Evolution Reaction, or OER) at a rate at least an order of magnitude higher than the compound currently considered the gold standard for such reactions, the team says. The compound's high level of activity was predicted from a systematic experimental study that looked at the catalytic activity of 10 known compounds. The team, which includes materials science and engineering graduate student Jin Suntivich, mechanical engineering graduate student Kevin J. May and professor Yang Shao-Horn, published their results in Science on Oct. 28.

The scientists found that reactivity depended on a specific characteristic: the configuration of the outermost electron of transition metal ions. They were able to use this information to predict the high reactivity of the new compound — which they then confirmed in lab tests.

"We not only identified a fundamental principle" that governs the OER activity of different compounds, "but also we actually found this new compound" based on that principle, says Shao-Horn, the Gail E. Kendall (1978) Associate Professor of Mechanical Engineering and Materials Science and Engineering.

Many other groups have been searching for more efficient catalysts to speed the splitting of water into hydrogen and oxygen. This reaction is key to the production of hydrogen as a fuel to be used in cars; the operation of some rechargeable batteries, including zinc-air batteries; and to generate electricity in devices called fuel cells. Two catalysts are needed for such a reaction — one that liberates the hydrogen atoms, and another for the oxygen atoms — but the oxygen reaction has been the limiting factor in such systems.

Other groups, including one led by MIT's Daniel Nocera, have focused on similar catalysts that can operate — in a so-called "artificial leaf" — at low cost in ordinary water. But such reactions can occur with higher efficiency in alkaline solutions, which are required for the best previously known catalyst, iridium oxide, as well as for this new compound.

Shao-Horn and her collaborators are now working with Nocera, integrating their catalyst with his artificial leaf to produce a self-contained system to generate hydrogen and oxygen when placed in an alkaline solution. They will also be exploring different configurations of the catalyst material to better understand the mechanisms involved. Their initial tests used a powder form of the catalyst; now they plan to try thin films to better understand the reactions. In addition, even though they have already found the highest rate of activity yet seen, they plan to continue searching for even more efficient catalyst materials. "It's our belief that there may be others with even higher activity," Shao-Horn says.

Jens Norskov, a professor of chemical engineering at Stanford University and director of the Suncat Center for Interface Science and Catalysis there, who was not involved in this work, says, "I find this an extremely interesting 'rational design' approach to finding new catalysts for a very important and demanding problem."

The research, which was done in collaboration with visiting professor Hubert A. Gasteiger (currently a professor at the Technische Universität München in Germany) and professor John B. Goodenough from the University of Texas at Austin, was supported by the U.S. Department of Energy's Hydrogen Initiative, the National Science Foundation, the Toyota Motor Corporation and the Chesonis Foundation.

http://www.sciencedaily.com/releases/2011/10/111028103215.htm

Meningitis May Be Eradicated. New Vaccine Brings Hope

Outbreaks of meningitis can quickly reach epidemic proportions across a number of African countries, afflicting tens of thousands of people. Now a new vaccine appears capable of completely eradicating the disease.

ScienceDaily - "The vaccine results are exceeding all our expectations," says Dominique Caugant, Chief Scientist at the Norwegian Institute of Public Health. Dominique headed the Norwegian segment of the international Meningitis Vaccine Project, a partnership between the World Health Organization (WHO) and the international non-profit organisation PATH. The project's objective was to eliminate the meningitis epidemics caused by serogroup-A meningococci bacteria in the high-risk meningitis belt: the African countries south of the Sahara Desert, from Senegal in the west to Ethiopia in the east. The result is a new and improved vaccine, MenAfriVac, which costs no more than USD 0.50 per dose.

One in ten lives lost

PATH's Marc LaForce, Director of the vaccine project, presented its preliminary results together with Professor Caugant at the conference Contributions to Global Health Research, Capacity Building and Governance, held in Oslo in September. "The official launch of the vaccine in December 2010 was a great day for all of us on the team," recalls Dr LaForce. "Most people who work in public health never get to experience taking part in the development phase and then actually seeing a product introduced on a nationwide scale." Globally, the WHO calculates that roughly half a million cases of meningococcal disease occur annually. Roughly one in ten infected persons die from the disease; those who survive it are often left debilitated. "Existing vaccines have not been good enough to prevent the occurrence of large-scale epidemics in Africa," explains Professor Caugant. "There are improved vaccines available but they are far too expensive for African countries."

Virtually no incidents

Burkina Faso was the first country to receive the new vaccine. In the course of a few weeks, everyone from the age of one to 29 was vaccinated - nearly 12 million people. The number of people who contract the serogroup-A meningococcal disease varies from year to year, but according to Professor Caugant, 1 000 cases

in the course of a week is not unusual for Burkina Faso, and up to 8 000 cases have been reported in a single week. "Six months after the successful introduction of the vaccine," she says, "only four cases of the serogroup-A meningococcal disease had been reported -- all of them unvaccinated individuals."

The primary funder of the vaccine project was the Bill & Melinda Gates Foundation. The Research Council of Norway's Programme for Global Health and Vaccination Research (GLOBVAC) provided funding for the project's Norwegian component. The Norwegian Institute of Public Health contributed expertise in microbiology and serology in connection with the vaccine, and it is now hosting one of the studies evaluating the efficacy of the vaccine distributed in Burkina Faso. The vaccine is also being used in mass vaccinations in Mali and Niger.

Transmitted by healthy carriers

The Norwegian Institute of Public Health is also carrying out a transmission study in Burkina Faso to determine whether mass vaccination with MenAfriVac also reduces the number of healthy carriers of serogroup-A meningococci bacteria. At any given time, many people have meningococci in their throat without becoming ill; these healthy carriers are the main source of the spread of the bacteria.

A local team of roughly 50 workers has collected more than 40 000 throat swab samples in Burkina Faso. The first samples were taken before the mass vaccination, and the last ones will be collected in October/November 2011. Samples are being taken from three different parts of the country and at various seasons of the year to account for natural variations.

Community immunity

"Positive samples are sent to the NIPH for further analysis," says Professor Caugant. "Preliminary results suggest that there have been substantially fewer serogroup-A carriers after the vaccination campaign, meaning the vaccine provides what is called herd immunity." The concept of herd immunity is that the unvaccinated parts of a population are indirectly protected, since fewer carriers means reduced pressure of infection.

"This is extremely important information for other countries considering introducing the vaccine," adds Professor Caugant. She is a proponent of establishing a child vaccination programme to ensure that the region's future young children also have immunity.

http://bit.ly/reNYHy

Doctors didn't disclose spine product cancer risk in journal

Spine-product paper omitted key data

By John Fauber of the Journal Sentinel

Doctors paid millions of dollars by Medtronic failed to identify a significant cancer risk with the company's spine surgery product in a 2009 paper about results of a large clinical trial. The surgeons left out important data and claimed there was no significant link between the product and cancer.

The company and doctors had become aware of information on an additional cancer case, which pushed the concern to a critical level, at least two months before the paper was published, a Journal Sentinel/MedPage Today investigation found. Independent researchers say they had an ethical duty to report the cancer risk.

The breach is the latest conflict-of-interest controversy facing Medtronic, which is under investigation by a U.S. Senate committee and the U.S. Justice Department for its marketing of the spine surgery product known as bone morphogenetic protein-2, or BMP-2. The product is the bone growth stimulating biological agent used in the company's Infuse, which has been approved by the U.S. Food and Drug Administration, and Amplify, the unapproved product that was the subject of the 2009 paper.

In June, independent researchers found a systematic failure to report serious complications with BMP-2 in 13 papers published over nearly a decade. The papers were written by doctors who received millions of dollars from Medtronic. The unprecedented rebuke, which was published in the Spine Journal, was prompted in part by stories in the Journal Sentinel.

Medtronic and the lead author of the Amplify paper say there was no "statistically significant" cancer connection to the product at the time the paper was accepted for publication in the Journal of Bone & Joint Surgery . Medtronic also said results from the Amplify clinical trial can't be applied to BMP-2 in general.

The researchers had information showing that at two and three years after being implanted with the genetically engineered protein, significantly higher numbers of Amplify patients were being diagnosed with cancer, but they did not report it on their paper. The authors mentioned the cancer link only in a table accompanying the paper. The text itself never addressed the concern of whether BMP-2 might fuel cancer.

"As a physician, you go by what your colleagues publish," said Charles Rosen, an orthopedic surgeon and president of the Association for Medical Ethics. "It's an abuse of trust."

The Journal Sentinel found a full airing of the cancer question in more than 1,000 pages of U.S. Food and Drug Administration records. That information included FDA reports and information filed with the agency by Medtronic as part of its application to win approval for Amplify. At a 2010 Amplify hearing, for example, an FDA staffer said "the primary statistical concern is an apparent association with malignancy."

Several independent spine surgery experts were asked by the Journal Sentinel to look at the FDA data and compare it with what was written in the June 2009 paper that was published in the journal. The experts found several problems with the way the numbers were used.

First, the paper said there were eight patients who were diagnosed with cancer 24 months after being treated with Amplify, compared with two patients who got the standard treatment - a graft of their own hip bone. That resulted in the probability of a real cancer risk that fell a little short of what is considered statistically significant.

However, the actual cancer numbers were nine for those receiving Amplify and two for those who received bone grafts, according to the FDA records. At nine patients the cancer risk becomes significant, based on the way it is measured. The ninth case involved a woman in the trial who underwent surgery with Amplify in 2003 and was diagnosed with stomach cancer in 2005. The patient did not report the cancer to researchers until her five-year follow-up in 2009.

In addition, cancer cases occurring three years after Amplify was implanted showed a clear statistical significance, said Brook Martin, a researcher with Dartmouth Medical School who analyzed the data for the Journal Sentinel. That data indicates that 12 patients had been diagnosed with cancer in the Amplify group, compared with three who got their own hip bone. Martin said the authors had an ethical obligation to report all the cancer information. "It absolutely should be presented, in my view," he said.

A three-year analysis was not done because that time point was not pre-specified, Marybeth Thorsgaard, a Medtronic spokeswoman, said in an email. Thorsgaard and the paper's lead author said the ninth cancer patient wasn't discovered until after the paper had been accepted for publication in the journal, but they refused to provide the date. Thorsgaard said that when the company became aware of the case, it reported to the FDA in an April 2009 update. That was at least two months before the paper actually was published. Neither Medtronic nor the authors could point to any evidence they moved to update the paper to reflect the accurate and more alarming cancer report.

Michelle Hache, spokeswoman for the Journal of Bone & Joint Surgery, declined to comment, but noted that authors have an obligation to report the complete facts of any research.

A popular product

Since coming on the market in 2002, BMP-2 has become popular in spinal surgery. By stimulating bone growth, it can eliminate the need to harvest a small amount of a patient's own bone for use in a spinal fusion surgery. The product was approved for a narrow use after an earlier clinical trial showed it worked about as well as a standard hip bone graft in a specific kind of spinal fusion surgery. But doctors quickly began using it in other, unapproved ways, known as "off-label" use. That helped fuel annual sales of $700 million.

With the Amplify trial, Medtronic was seeking additional FDA approval for a different BMP-2 spinal fusion product. The FDA has refused to grant approval, a decision Medtronic is appealing.

The clinical trial that was the subject of the paper involved 463 spinal fusion surgery patients, including 239 who got the higher-dose BMP-2 preparation used in Amplify.

The 2009 paper on the trial was written by six physician authors. The first three authors of the paper - or entities they are associated with - received about $10 million from Medtronic, mostly in royalties, in 2010 alone. The royalties were for other products, not for BMP-2. Two of the other authors received no compensation from Medtronic in 2010. Another author received between $5,000 and $9,999 for advisory services to the company.

In its own documents, the FDA's reviewers expressed serious concerns about the cancer risk.

At the 2010 advisory panel hearing, an FDA doctor noted that cancer deaths among those in the Amplify clinical trial who got BMP-2 were caused by malignancies that tended to be "highly morbid" and occurred in patients who died relatively soon after being implanted with the product.

"This suggests the possibility of a synergistic effect of the device that could potentially accelerate pre-existing cancer growth," an FDA medical officer said, according to a transcript of the hearing.

A separate FDA document concluded that the cancer incidence was an important concern because of elevated cancer rates in the Amplify clinical trial and trends toward higher cancer rates found in a separate analysis combining the results of Medtronic's other clinical trials of BMP-2.

In a statement last week, the FDA said it could not disclose whether it is investigating whether BMP-2 causes cancer. The agency noted it is examining available information about whether BMP-2 promotes the growth of existing cancers rather than initiating cancer.

Different pictures

In the 2009 paper, authors concluded there was no significant difference in serious complications between those patients who got BMP-2 and those who did not.

How can two such starkly different pictures of a medical product be presented - one in the published medical literature that doctors read, the other in FDA records that many doctors never see?

Papers about company-funded research are more likely to present positive results and gloss over a potential complication, said George Lundberg, the former editor-in-chief of JAMA, the Journal of the American Medical Association. "The authors by virtue of how little attention they paid to it, . . . they didn't want it to be there," he said. "And the company especially didn't want it to be there - out where everybody would see it. They also knew that nobody much reads the FDA reports."

Lundberg also serves as an editor-at-large at MedPage Today and as a consulting professor of pathology and health research at Stanford University. He was not involved in the editing of this report, part of a long-running investigation by the Journal Sentinel in partnership with MedPage Today.

The three co-authors who received substantial royalty payments from Medtronic were contacted for this story, but none agreed to be interviewed.

In an email, lead author John Dimar II, an orthopedic surgeon with the Norton Leatherman Spine Center in Louisville, Ky., noted the paper only included an analysis of 24 months after the surgeries were performed, whereas the FDA data included information going out five years.

Although the clinical trial was set up to test the effectiveness of Amplify at 24 months, independent doctors say the authors were obligated to include information they possessed about serious safety issues such as cancer that occurred beyond two years if those findings contradicted their original conclusions. In addition, the clinical trial was designed to continue to evaluate patients up to five years after their surgery.

Dimar said the lack of statistical significance - based on the eight cases, not the actual nine - plus the fact that there were a variety of different cancers, indicated to the authors that Amplify did not cause the cancers.

He did not respond to questions about why the paper was not updated with the more worrisome cancer numbers before being published or changed after publication.

In 2010, Medtronic paid more than $9 million in royalties to Concept Properties LLC, a Louisville entity associated with Dimar and co-author Steven Glassman, also an orthopedic surgeon at the Norton Leatherman Spine Center. None of the royalties were for BMP-2.

Co-author Kenneth Burkus, an orthopedic surgeon in Columbus, Ga., and his RBCK Research & Consulting received more than $800,000 in royalty and other payments from Medtronic in 2010, none for BMP-2. He did not respond for this story.

Diversity of cancers

Medtronic spokeswoman Thorsgaard said the cancer cases in the Amplify clinical trial can't be generalized to BMP-2. She also said Amplify is a different product than BMP-2 with a different dose and a different piece of equipment. As such, it is not available to surgeons. However, doses of BMP-2 similar to what was used in the Amplify trial are commercially available.

"Aside from the lack of statistical significance, the diversity of cancers did not suggest any indication of a relationship between Amplify and cancer," Thorsgaard said in her email.

However, the diversity of cancers raises even more concern about whether they were caused by BMP-2, said Eugene Carragee, a professor of orthopedic surgery at Stanford University. He spearheaded the rebuke of BMP-2 in June in the Spine Journal, where he is editor-in-chief. Normally, if the cancers were occurring randomly, as they do in the general public, you would expect to see more of the most common cancers, such as breast cancer in the women and prostate cancer cases in men, Carragee said.

But the Amplify patients were diagnosed with cancers of the pancreas, ovaries, vocal cord and stomach.

The possibility that BMP-2 might promote cancer has been a concern ever since it was brought to market because it is a growth factor that causes cells to proliferate, he said. It continues to be a risk that needs to be taken seriously, including for patients who are predisposed to cancer or who may be receiving anything but a very small dose of BMP-2, Carragee said.

"There is no question that BMP has biological effects that we don't fully understand," said Raj Rao, a professor of orthopedic surgery at the Medical College of Wisconsin and a member of the 2010 FDA advisory panel on Amplify. Cancer is one of them, said Rao, who voted against granting approval for Amplify. The Amplify clinical trial may have been too small to fully explore the cancer association, he said .

A separate analysis of all of Medtronic's clinical trials using BMP-2 showed a trend toward high cancer rates, according to FDA records. That analysis involved 18 clinical trials. It found that 2.4% of BMP-2 patients got

cancer, compared with 1.4% who did not get BMP-2. In four high-dose clinical trials of BMP-2, 3.6% patients developed cancer.

John Fauber reported this story in a joint project of the Journal Sentinel and MedPage Today. MedPage Today provides a clinical perspective for physicians on breaking medical news at medpagetoday.com.

http://www.eurekalert.org/pub_releases/2011-10/uocm-fci102611.php

Fat cells in abdomen fuel spread of ovarian cancer

Similar process may boost growth of other cancers

A large pad of fat cells that extends from the stomach and covers the intestines provides nutrients that promote the spread and growth of ovarian cancer, reports a research team based at the University of Chicago in the journal Nature Medicine, published online October 30th, 2011.

Ovarian cancer, the fifth leading cause of cancer deaths in women, tends to spread within the abdominal cavity as opposed to distant organs. In 80 percent of women, by the time ovarian cancer is diagnosed, it has spread to the pad of fat cells, called the omentum. Often, cancer growth in the omentum exceeds the growth of the original ovarian cancer.

"This fatty tissue, which is extraordinarily rich in energy-dense lipids, acts as a launching pad and energy source for the likely lethal spread of ovarian cancer," said study author Ernst Lengyel, MD, PhD, professor of obstetrics and gynecology at the University of Chicago. "The cells that make up the omentum contain the biological equivalent of jet fuel. They feed the cancer cells, enabling them to multiply rapidly. Gaining a better understanding of this process could help us learn how to disrupt it."

The researchers performed a series of experiments to identify the role of these fat cells as major mediators of ovarian cancer metastasis. The first step was to understand the biological signals that attract ovarian cancer cells to the omentum and use it for rapid growth.

The spread of ovarian cancer cells to the omentum can happen quickly. Ovarian cancer cells injected into the abdomen of healthy mice find their way to the omentum within 20 minutes. The researchers found that protein signals emitted by the omentum can attract the tumor cells. Inhibitors which disturbed these signals reduced this attraction by at least 50 percent.

Once ovarian cancer cells reach the omentum, they quickly develop the tools to devour the sustenance provided by this fatty tissue, reprogramming their metabolism to thrive on lipids acquired from fat cells. Ovarian cancer can rapidly convert the entire omentum, a soft fat pad, into a solid mass of cancer cells.

"This mechanism may not be limited to ovarian cancer cells," the authors note. Fat metabolism may also contribute to cancer development in other environments where fat cells are abundant, such as breast cancer.

A protein known as fatty acid binding protein (FABP4), a fat carrier, may be crucial to this process and could be a target for treatment.

When the researchers compared primary ovarian cancer tissue with ovarian cancer tissue which had spread to the omentum, they found that tumor cells next to omental fat cells produced high levels of FABP4. Cancer cells distant from the fat cells did not produce FABP4.

When they inhibited FABP4, the transfer of nutrients from fat cells to cancer cells was drastically reduced. Inhibition of FABP4 also reduced tumor growth and the ability of tumors to generate new blood vessels.

"Therefore," the authors wrote, "FABP4 emerges as an excellent target in the treatment of intra-abdominally disseminating tumors, which preferentially metastasize to adipose tissue such as ovarian, gastric, and colon cancers."

The research was supported by the National Institutes of Health, the Burroughs Wellcome Fund, the Committee on Cancer Biology at the University of Chicago and Bears Care, the charitable beneficiary of the Chicago Bears Football Club. Additional authors include Kristin Nieman, Hilary Kenny, Carla Penicka, Andras Ladanyi, Marion Zillhardt, Iris Romero, Diane Yamada, Rebecca Buell-Gutbrod and Katja Gwin of the University of Chicago; Mark Carey and Gordon Mills of M.D. Anderson Cancer Center; Gökhan Hotamisligil of the Harvard School of Public Health, and Marcus Peter of Northwestern University.