Geologists point to outer space as source of the Earth's mineral riches

TORONTO, ON – According to a new study by geologists at the University of Toronto and the University of Maryland, the wealth of some minerals that lie in the rock beneath the Earth's surface may be extraterrestrial in origin.

"The extreme temperature at which the Earth's core formed more than four billion years ago would have completely stripped any precious metals from the rocky crust and deposited them in the core," says James Brenan of the Department of Geology at the University of Toronto and co-author of the study published in Nature Geoscience on October 18.

"So, the next question is why are there detectable, even mineable, concentrations of precious metals such as platinum and rhodium in the rock portion of the Earth today? Our results indicate that they could not have ended up there by any known internal process, and instead must have been added back, likely by a 'rain' of extraterrestrial debris, such as comets and meteorites."

Geologists have long speculated that four and a half billion years ago, the Earth was a cold mass of rock mixed with iron metal which was melted by the heat generated from the impact of massive planet-sized objects, allowing the iron to separate from the rock and form the Earth's core. Brenan and colleague William McDonough of the University of Maryland recreated the extreme pressure and temperature of this process, subjecting a similar mixture to temperatures above 2,000 degrees Celsius, and measured the composition of the resulting rock and iron.

Because the rock became void of the metal in the process, the scientists speculate that the same would have occurred when the Earth was formed, and that some sort of external source – such as a rain of extraterrestrial material – contributed to the presence of some precious metals in Earth's outer rocky portion today.

"The notion of extraterrestrial rain my also explain another mystery, which is how the rock portion of the Earth came to have hydrogen, carbon and phosphorous - the essential components for life, which were likely lost during Earth's violent beginning."

The research was funded with the support of the Natural Sciences and Engineering Research Council of Canada and a NASA Cosmochemistry grant.

A major step in making better stem cells from adult tissue

Findings by Scripps Research scientists brighten prospects of stem cell therapy for range of diseases

LA JOLLA, CA –A team led by scientists from The Scripps Research Institute has developed a method that dramatically improves the efficiency of creating stem cells from human adult tissue, without the use of embryonic cells. The research makes great strides in addressing a major practical challenge in the development of stem-cell-based medicine.

The findings were published in an advance, online issue of the journal Nature Methods on October 18, 2009.

The new technique, which uses three small drug-like chemicals, is 200 times more efficient and twice as fast as conventional methods for transforming adult human cells into stem cells (in this case called "induced pluripotent stem cells" or "iPS cells").

"Both in terms of speed and efficiency, we achieved major improvements over conventional conditions," said Scripps Research Associate Professor Sheng Ding, Ph.D., who led the study. "This is the first example in human cells of how reprogramming speed can be accelerated. I believe that the field will quickly adopt this method, accelerating iPS cell research significantly."

In addition to its significant practical advantages, the development of the technique deepens the understanding of the biology behind the transformation of adult human cells into stem cells.

Tackling Major Challenges

The hope of most researchers in the field is that one day it will be possible to use stem cells - which possess the ability to develop into many other distinct cell types, such as nerve, heart, or lung cells - to repair damaged tissue from any number of diseases, from Type 1 diabetes to Parkinson's disease, as well as from injuries. The creation of iPS cells from adult cells sidesteps ethical concerns associated with the use of embryonic stem cells, and allows the generation of stem cells matched to a patient's own immune system, avoiding the problem of tissue rejection.

The creation of human iPS cells was first announced in December 2007 by two labs, one in Japan and another in Wisconsin. In both cases, the teams used viruses to insert multiple copies of four genes (eg. c-Myc, Oct4, Sox2, Klf4) into the genome of skin cells. These four genes then produced transcription factors turning on and off other genes, and pushing the cell to "dedifferentiate" into stem cells.

While the work was a major breakthrough, it left two major challenges for the field to solve before iPS cell therapy could be considered of any potential practical use. The first involved safety, since the technique relied

on potentially harmful genetic manipulation, and worse yet, the insertion of two known cancer-causing genes (c-Myc and Oct4). The second problem was the length and inefficiency of the iPS cell process, which had a success rate of roughly one in 10,000 cells and took about four weeks from start to finish.

Ding and colleagues essentially solved the first problem, the reliance on genetic manipulation, earlier this year in a paper published in Cell Stem Cell (Volume 4, Issue 5, May 8, 2009). In the paper, the researchers demonstrated that they could use purified proteins to transform adult cells all the way back to the most primitive embryonic-like cells, avoiding the problems associated with inserting genes.

In the current paper, the team makes major strides in solving the second problem, efficiency.

A Focus on Natural Processes

In developing the improved method, Ding drew on his knowledge of biology. He decided he would focus his efforts on manipulating a naturally occurring process in cells, in particular in a type of adult cell called fibroblasts, which give rise to connective tissue.

This naturally occurring process - called MET (mesenchymal to epithelial cell transition) - pushes fibroblasts closer to a stem-cell-like state. If he could manipulate such a fundamental process to encourage MET and the formation of stem cells, Ding reasoned, such a method would be both safer and more direct than hijacking other aspects of biology, for example those directly involved in cancer.

"People have studied this mechanism for 10 to 20 years," said Ding. "It is a fundamental mechanism."

Ding and colleagues tested a number of drug-like molecules, looking for those that inhibited the TGFb (transforming growth factor beta) and the MEK (mitogen-activated protein kinase) pathways, which are known to be involved in the MET process. The researchers identified the most active compounds, then looked at their effects on stem cell creation when used singly and in combination.

The researchers found two chemicals - ALK5 inhibitor SB43142 and MEK inhibitor PD0325901 - used in combination were highly effective in promoting the transformation of fibroblasts into stem cells.

"This method is the first in human cells that is mechanism-specific for the reprogramming process," said Ding.

And the two-chemical technique bested the efficiency of the classic genetic method by 100 times.

Efficient, Fast, Safe

But the researchers thought they might be able to do even better.

Attempting to increase the efficiency of the process even further, the team decided to enlist another natural pathway, the cell survival pathway. After screening a library of compounds targeting this pathway, the team focused on a novel compound called Thiazovivin.

The researchers found that a technique using Thiazovivin in combination with the two previously selected chemicals, SB43142 and PD0325901, beat the efficiency of the classic method by 200 times.

In addition, while the classic method required four weeks to complete, the new method took two weeks.

In addition to its virtues of speed and efficiency, Ding emphasizes that the safety profile of the new method is highly promising. Not only is the method based on natural biological processes, he said, but also the type of molecules used have all been tested in humans.

In addition to Ding, the article, "A Chemical Platform for Improved Induction of Human iPS Cells," was authored by Tongxiang Lin (first author), Rajesh Ambasudhan, Xu Yuan1, Wenlin Li, Simon Hilcove, Ramzey Abujarour, Xiangyi Lin, and Heung Sik Hahm of Scripps Research, and Ergeng Hao and Alberto Hayek of The Whittier Institute for Diabetes, University of California San Diego. The research was supported by the National Institutes of Health and Fate Therapeutics.

Norwegian Wood For The Ages: 'Mummified' Pine Trees Found

ScienceDaily - Norwegian scientists have found “mummified” pine trees, dead for nearly 500 years yet without decomposition. Norway’s wet climate seems perfect for encouraging organic matter to rot – particularly in Sogndal, located on Norway’s southwestern coastline, in one of the most humid, mild areas of the country. In fact, with an average of 1541 millimetres of rain yearly and relatively mild winters, Sogndal should be an environment where decomposition happens fast. Not so.

This three grew from 1334-1513. **(Credit: Terje Thun, NTNU)**

“We were gathering samples of dead trees to reconstruct summer temperatures in western Norway, when our dendrochronological dating showed the wood to be much older than expected”, says Terje Thun, an associate professor at the Norwegian University of Science and Technology’s (NTNU) Museum of Natural History and Archaeology. Thun conducted the work with his colleague Helene Løvstrand Svarva.

From a time before the Black Death

"We were astounded to find fresh wood in trees that started to grow in the late 1200s and had died almost 500 years ago, which is much older than we originally expected. Somehow they have kept from decomposing for several centuries in this humid climate", Thun says. "This is quite extraordinary - I would go as far as to call it sensational."

Thun says that when a pine tree dies, it secretes a great deal of resin, which deters the microorganisms needed for decomposition. "Nevertheless, preventing the natural breakdown of the wood for centuries is quite a feat", he says. Thun is one on Norway's leading dendrochronology experts. Dendrochronology is the dating of trees.

Used in mummification

Resin was one of the ingredients used in Ancient Egypt for mummification, so its conservation abilities have been known for millennia. However, that trees could "self-mummify" in such a humid climate for centuries was new to the NTNU scientists.

"Many of the trunks we dated turned out to have seeded in the early 1200s, and had lived for more than 100 years at the time of the Black Death around 1350", Thun says. "That means that the dead wood has 'survived' in nature for more 800 years without breaking down."

It seems there truly is something good about Norwegian wood.

Protein may predict heart attack and early death, not stroke

ST. PAUL, Minn. – People with high levels of a protein called C-reactive protein (CRP), a marker for inflammation in the blood, may be at higher risk for heart attack and death but not stroke, according to a study published in the October 20, 2009, print issue of Neurology®, the medical journal of the American Academy of Neurology.

The study involved 2,240 people from the Northern Manhattan Study who were 40 years old or older and stroke-free. Of the group, 63 percent were Hispanic, 20 percent non-Hispanic black and 15 percent non-Hispanic white residents.

All participants had their blood tested for CRP levels and were evaluated for stroke and heart attack risk factors. They were followed for an average of eight years. In that time, there were 198 strokes, 156 heart-related events and 586 deaths.

The researchers found that people with CRP levels greater than three milligrams per liter were 70 percent more likely to suffer a heart attack and 55 percent more likely to die early compared to people who had levels of one milligram per liter or less of the protein in their blood. The protein was not associated with an increased risk of stroke once other risk factors were taken into account.

"The role of this protein in predicting risk of stroke has been controversial although prior studies have found it to be a marker for predicting risk of heart disease," said study author Mitchell Elkind, MD, MS, of Columbia University Medical Center in New York and a Fellow with the American Academy of Neurology. "However, in our large, multiethnic population, CRP levels did not play a role in predicting stroke, though they may still help determine whether someone is at risk of heart attack or early death."

CRP protein levels are associated with such medical and lifestyle risk factors as diabetes, smoking, alcohol consumption and physical activity. "It appears that by living a healthy lifestyle, one may be able to lower these protein levels, thus lowering the risk of cardiac events and possibly early death," said Elkind. "It may be that the failure of CRP to predict stroke in our study, unlike in some other populations, reflects the fact that our population is older and has more of these risk factors. While CRP may be predictive in generally young healthy people, it may be less useful among older, sicker people. More research needs to be done on why the protein wasn't able to predict stroke in the same manner as heart disease."

The study was supported by the National Institutes of Health.

Clots traveling from lower veins may not be the cause of pulmonary embolism in trauma patients

Mass. General study questions current dogma, further study needed

A report from a team of Massachusetts General Hospital (MGH) physicians calls into question the longstanding belief that pulmonary embolism (PE) - the life-threatening blockage of a major blood vessel in the lungs - is caused in trauma patients by a blood clot traveling from vessels deep within the legs or lower torso. In their study utilizing advanced imaging technologies, which appears in the October Archives of Surgery, the MGH investigators found no evidence of deep venous thrombosis (DVT) in most trauma patients with pulmonary embolism.

"A consistent finding of previous studies – which was often overlooked – was that no lower-extremity vein clots were found in patients suffering pulmonary embolism," says George Velmahos, MD, PhD, chief of the MGH Division of Trauma, Emergency Surgery, and Surgical Critical Care, who led the study. "But our surgical

minds were so stuck in the dogma that PE originates from lower-extremity DVT that even though the data was there, we didn't pay attention to it."

Traditional thinking has been that pulmonary embolism results when a deep venous thrombosis in the legs or pelvis breaks off and travels through the bloodstream into the lungs. If that were true, the authors note, pulmonary embolism patients should still have evidence of the DVT, since part of the original clot would remain attached to the location where it formed. The earlier studies that did not find DVTs in trauma patients with PE had utilized ultrasound imaging, which is limited in its ability to locate deep venous thrombosis, possibly missing any remaining clots.

The current investigation analyzed the results of computed-tomography-based tests – CT pulmonary angiograms for the lungs and for the lower extremities CT venography, which is highly accurate in diagnosing clots in major blood vessels. The researchers reviewed the records of 247 trauma patients who had received both CT pulmonary angiograms and CT venograms at MGH from 2004 through 2006. While 46 patients developed pulmonary embolism and 18 had deep venous thrombosis, only 7 of the 46 PE patients also had evidence of DVT. The known accuracy of CT venograms make it highly unlikely, the authors note, that many patients had undetected DVTs.

This report – believed to be the first to express doubts about the accepted origin of pulmonary embolism – needs to be confirmed by other investigators and also cannot be extrapolated to the rare instances when PE develops in otherwise healthy individuals. The authors' hypothesis – yet to be tested – is that clots may form independently in the lungs, and if the study's results hold up, they would imply that current measures to prevent PE – including blood-thinning drugs, mechanical compression of the legs and the insertion of filters into the major vein that carries blood from the lower extremities – are not effective.

"If it turns out that clots are forming primarily in the lungs, it would revolutionize the way we think about PE and they way we prevent and treat it," says Velmahos, who is the John Francis Burke Professor of Surgery at Harvard Medical School.

Additional authors of the Archives of Surgery report are Konstantinos Spaniolas, MD, Malek Tabbara, MD, Marc de Moya, MD, Alice Gervasini, RN, PhD, and Hasan Alam, MD; MGH Trauma, Emergency Surgery, and Surgical Critical Care; and Hani Abujudeh, MD, MGH Radiology.

Study: Added oxygen during stroke reduces brain tissue damage

COLUMBUS, Ohio – Scientists have countered findings of previous clinical trials by showing that giving supplemental oxygen to animals during a stroke can reduce damage to brain tissue surrounding the clot.

The timing of the delivery of 100 percent oxygen – either by mask or in a hyperbaric chamber – is critical to achieving the benefit, however.

"The use of supplemental oxygen after blood flow is restored in the brain appears to actually cause harm by unleashing free radicals," said Savita Khanna, assistant professor of surgery at Ohio State University and principal investigator of the research. "The resulting tissue damage was worse than stroke-affected tissue that received no treatment at all."

Previous clinical trials in humans have suggested that administering oxygen under pressure could harm stroke patients. But the studies did not take into account the status of blood flow in the brain at the time the oxygen was delivered, Khanna noted.

The types of stroke under study are ischemic, meaning a clot is blocking blood flow in the brain, rather than hemorrhagic, strokes that occur when blood vessels rupture in the brain.

The new Ohio State study showed that the use of pure oxygen that was delivered by mask during stroke was also effective, making for easier clinical application of such a therapy when the time for that is right.

However, technology doesn't yet allow for quick and continuous real-time measurement of blood flow in the brain in a hospital. This means clinicians treating stroke patients cannot risk administering hyperbaric oxygen that could do more harm than good if it is not timed properly.

"Hyperbaric oxygen during stroke shows the promise of being an effective tool, but there are things that need to occur before this can be applied in a clinical setting," said Cameron Rink, assistant professor of surgery at Ohio State and a co-investigator on the research. "We need to find better ways to monitor blood flow in humans in real time." Rink presented the research Monday (10/19) during a poster session at the Society for Neuroscience annual meeting in Chicago.

Stroke is the third-leading cause of death in the United States, and an effective treatment remains elusive. So-called "clot-busting" drugs dissolve the clots, but typically must be administered within three hours of the stroke's onset. The average time between the start of a stroke and a patient's arrival at a hospital is about four hours - which adds to the treatment challenge, according to the researchers.

Khanna, Rink and colleagues tested the effects of supplemental oxygen therapy on five groups of rats in which the scientists induced a 90-minute ischemic stroke and then restored blood flow in the animals' brains.

Two groups of animals received either normal oxygen or pressurized oxygen while blood flow was blocked in the brain. Two other sets of rats received normal or pressurized oxygen after blood flow was restored. A control group received no supplemental oxygen, breathing room air instead.

Two days later, the researchers examined the rats' brains using powerful 4.7-Tesla magnetic resonance imaging to calculate the volume of damaged tissue. The images showed the size of the infarct, or the area of tissue susceptible to stroke damage as a result of poor oxygenation.

The images showed that the animals that received supplemental oxygen treatment while blood flow was blocked had a significantly smaller amount of tissue damage compared to the rats that received oxygen after blood flow was restored, Khanna said.

By further examining images of the rats' brains, the scientists determined that the supplemental oxygen during the active period of a stroke specifically reduced the death of neurons and prevented the damage that free radicals can cause to lipids that help protect those brain cells. By comparison, more dead neurons and oxidative stress were found in the brains of rats receiving oxygen only after blood flow was restored.

"Ultimately, the supplemental oxygen after blood flow is restored is more than the tissue can handle, and is more than it needs. Why add oxygen on top of tissue that's already oxygenated?" Rink said. "Supplemental oxygen during the blockage, on the other hand, is highly protective."

The researchers are using other technologies to determine how the loss of oxygen affects the functions of genes in the brain. Of the approximately 30,000 genes investigated to date, at least 6,000 are either inactivated or highly activated when a stroke reduces the oxygen in the brain. Their future work will explore the ramifications of those changed gene functions.

Khanna and Rink conducted this research with Sashwati Roy, Pavan Ananth and Chandan Sen of Ohio State's Department of Surgery, and Mahmood Khan and Periannan Kuppusamy of the Department of Internal Medicine.

Meet future woman: shorter, plumper, more fertile

* 20:00 19 October 2009 **by Bob Holmes**

Women of the future are likely to be slightly shorter and plumper, have healthier hearts and longer reproductive windows. These changes are predicted by the strongest proof to date that humans are still evolving.

Medical advances mean that many people who once would have died young now live to a ripe old age. This has led to a belief that natural selection no longer affects humans and, therefore, that we have stopped evolving.

"That's just plain false," says Stephen Stearns, an evolutionary biologist at Yale University. He says although differences in survival may no longer select "fitter" humans and their genes, differences in reproduction still can. The question is whether women who have more children have distinguishing traits which they pass on to their offspring.

To find out, Stearns and his colleagues turned to data from the Framingham Heart Study, which has tracked the medical histories of more than 14,000 residents of the town of Framingham, Massachusetts, since 1948 – spanning three generations in some families.

Pass it on

The team studied 2238 women who had passed menopause and so completed their reproductive lives. For this group, Stearns's team tested whether a woman's height, weight, blood pressure, cholesterol or other traits correlated with the number of children she had borne. They controlled for changes due to social and cultural factors to calculate how strongly natural selection is shaping these traits.

Quite a lot, it turns out. Shorter, heavier women tended to have more children, on average, than taller, lighter ones. Women with lower blood pressure and lower cholesterol levels likewise reared more children, and – not surprisingly – so did women who had their first child at a younger age or who entered menopause later. Strikingly, these traits were passed on to their daughters, who in turn also had more children.

If these trends continue for 10 generations, Stearns calculates, the average woman in 2409 will be 2 centimetres shorter and 1 kilogram heavier than she is today. She will bear her first child about 5 months earlier and enter menopause 10 months later *(Proceedings of the National Academy of Sciences, DOI: 10.1073/pnas.0906199106).*

Decoding culture

It's hard to say what is selecting for these traits, and to discern whether they are being passed down through the women's genes, but because Stearns controlled for many social and cultural factors, it is likely that his results document genetic, rather than cultural evolution at work.

It is not the first study to conclude that natural selection is operating on humans today; the difference is that much of the earlier work has drawn that conclusion from geographic differences in gene frequencies, rather than from direct measurements of reproductive success. That leaves Stearns's study as perhaps the most detailed

measure of evolution in humans today. "It's interesting that the underlying biological framework is still detectable beneath the culture," he says. Analyses of other long-term medical data sets could shed more light on the interplay between genetics and culture.

Clemson researchers say algae key to mass extinctions

CLEMSON - Algae, not asteroids, were the key to the end of the dinosaurs, say two Clemson University researchers. Geologist James W. Castle and ecotoxicologist John H. Rodgers have published findings that toxin producing algae were a deadly factor in mass extinctions millions of years ago. The research not only provides new insights into the past but also offers a caution about the future. The scientists say that current environmental conditions show significant similarity to times when previous mass extinctions occurred.

Castle is presenting the research results at the Geological Society of America meeting in Portland, Oregon. He and Rodgers have spent two years analyzing data from ancient algal deposits - stromatolite structures - finding evidence that blue-green algae, which produce poisons and deplete oxygen, were present in sufficient quantities to kill off untold numbers of plants and animals living on land or in the sea.

The scientists introduced their theory in "Hypothesis for the role of toxin-producing algae in Phanerozoic mass extinctions based on evidence from the geologic record and modern environments." The paper was published in the March 2009 issue of the peer-reviewed journal Environmental Geosciences. A copy of the paper is available on the Clemson News Services Web site: www.clemson.edu/media-relations/.

Castle and Rodgers research confronts current theories that caused five major extinctions and a number of minor die-offs during the 545-plus million years during which life with "hard parts" - skeletons and shells - has flourished and left fossils. Phanerozoic is Greek for "visible life" and is the present eon in the Earth's 4.5 billion year existence. Two eons are generally considered to make up all of geological time since the formation of the Earth. The Cryptozoic - hidden life - is the larger of the two eons, but life forms lacked body parts that could become mineralized.

Other researchers have theorized that climate changes, sea level, volcanic activity, even asteroids were primary causes for deaths of more than 50 percent of life on Earth. Castle and Rodgers claim that these causes are contributors, but algae were the mass killer. They point out that asteroid-caused extinction, a popular theory for the end of dinosaurs, does not fit the evidence. "The fossil record indicates that mass extinctions ... occurred in response to environmental changes at the end of the Cretaceous; however, these extinctions occurred more gradually than expected if caused solely by a catastrophic event."

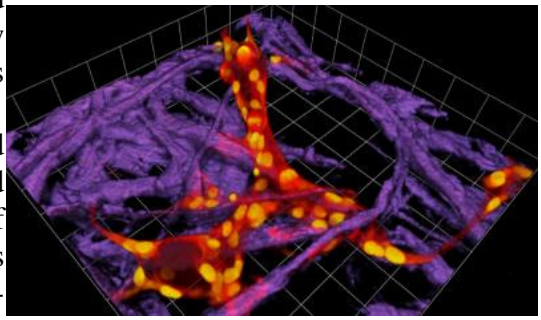
Perhaps most provocative is the conclusion of Castle and Rodgers that "this hypothesis gives us cause for concern and underscores the importance of careful and strategic monitoring as we move into an era of global climate change." The scientists state that the level of "modern toxin-producing algae is presently increasing, and their geographic distribution is expanding...."

Rodgers has been surprised by the response to the publication of the paper. "Scientists from around the world have been sending us data that support our hypothesis and our concern about the future," said Rodgers. "I look forward to the debate this work will generate. I hope it helps focus attention on climate change and the consequences we may face."

The book of life can now literally be written on paper

Stacks of filter paper provide a realistic, easy-to-use medium for growing cells

An insight from the labs of Harvard chemist George Whitesides and cell biologist Don Ingber is likely to make a fundamental shift in how biologists grow and study cells - and it's as cheap and simple as reaching for a paper towel.



Ratmir Derda, a postdoctoral student co-mentored by Whitesides and Ingber at Harvard's new Wyss Institute for Biologically Inspired Engineering, has realized that by growing cells on several sheets of uncoated paper, he can solve a problem that has bedeviled biologists for years: how to easily grow and study cells that mimic the three-dimensionality of real tissue.

Endothelial cells grown in small stacks of paper, forming vessel-like structures that crawl among the cellulose fibers (cellulose fibers are purple, nucleus is yellow and the cytoskeleton is red). Harvard researchers have found that paper is an excellent medium for culturing cells with the accuracy of a 3-D medium and the simplicity of a 2-D one. Credit: Ratmir Derda

This work will simplify creation of realistic, three-dimensional models of normal or cancerous tissue - potentially making it faster and easier to find drugs that fight cancer and other diseases.

"This research has the potential to become a standard laboratory tool, alongside the Petri dish, in laboratories that work with cells," said George M. Whitesides, the Woodford L. and Ann A. Flowers University Professor at Harvard University and a founding faculty member of the Wyss Institute. "Filter paper and other kinds of paper are readily available, and the technique is both very flexible in what it can do, and very convenient to use."

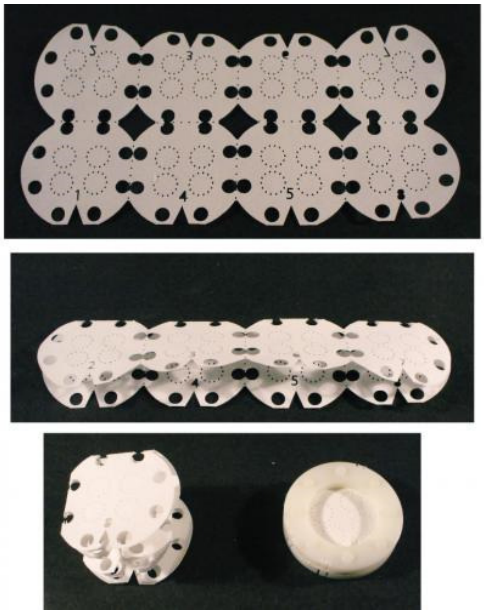
The study, "Paper-Supported Three-Dimensional Cell Culture for Tissue-Based Bioassays," appears in the October 19, 2009, issue of the Proceedings of the National Academy of Sciences.

Now, researchers grow cells in a Petri dish, creating a thin, two-dimensional layer of cells. If they want to do a better job of mimicking real tissue, they culture the cells in a gel. But because cells in different locations get vastly different amounts of oxygen and food, these cultures fail to mimic real tissues. And studying the cells from different parts of these gels without destroying the 3D culture is tricky.

By growing the cells in a thin layer of gel supported by paper, and then stacking those pieces of paper, the scientists showed they could recreate the benefits of two-dimensional research – where cells receive a uniform amount of oxygen and food -- while also closely mimicking real tissue. In this case, they engineered a 3D tumor on paper that exhibited behaviors similar to a cancer in the body.

Stacking multiple cell-containing sheets also allows researchers to examine the interior of a large cell cluster, either cultured on a dish or grown in vivo, simply by peeling the layers apart, without disturbing the properties of the cells. Isolating cells grown with other 3D culture techniques requires either performing complex laser-assisted surgery on the tumor sections or destroying the architecture of the tissue and then sorting the cells.

Derda said he had the initial insight that led to this study when he heard a colleague complain that he couldn't use paper to filter blood, because the erythrocytes, which give blood their red color, are sometimes trapped in the paper and sometimes go through it. Derda, who developed and used peptide arrays for stem cell research in his Ph.D. work, thought he might be able to use this trapping property for high-throughput screening. When he discussed that insight with Whitesides, the older chemist suggested Derda try stacking the pages instead.



Fellow postdoctoral student Anna Laromaine helped Derda figure out how to clip multiple layers of paper together while submerged in the gel, allowing the first multi-layer cell culture to grow. When he gingerly pulled the sheets of paper apart and analyzed the distribution of cells in different layers, he realized the versatility of paper as a growing medium and its potential to mimic any three-dimensional tissue.

"The best thing about this approach is that it can be used by everyone," Derda said. "Paper is nearly free, it's all over the place and you don't have to know anything other than how to dip."

Paper makes a great medium for culturing cells with the ease of a Petri dish and the accuracy of a 3-D gel, according to researchers in Harvard's Department of Chemistry, Wyss Institute for Biologically Inspired Engineering and Harvard Medical School. This image illustrates the steps needed to make multi-layer cultures out of uncoated paper.

Credit: Ratmir Derda

The work was supported by funds from the Wyss Institute, National Institutes of Health, Vertex Inc., DoD Breast Cancer Innovator Award, the Fulbright-Generalitat de Catalunya, and the American Heart Association.

In addition to Derda, Whitesides and Ingber, the founding director of the Wyss Institute, a faculty member at Harvard's Medical School and its School of Engineering and Applied Sciences, and a researcher at Children's Hospital Boston, the paper's other authors are: Akiko Mammoto and Tadanori Mammoto of Ingber's lab, and Laromaine and Sindy K. Y. Tang of Whitesides' lab.

The Wyss Institute for Biologically Inspired Engineering at Harvard was created at the start of 2009 with a $125 million gift from entrepreneur Hansjorg Wyss. Developed as an alliance between Harvard and other premier academic and clinical partners, the Institute's faculty and staff collaborate in high-risk, fundamental science-driven technology development that strives to exploit the way Nature builds.

Shifting the world to 100 percent clean, renewable energy as early as 2030 -- here are the numbers

Most of the technology needed to shift the world from fossil fuel to clean, renewable energy already exists. Implementing that technology requires overcoming obstacles in planning and politics, but doing so could result in a 30 percent decrease in global power demand, say Stanford civil and environmental engineering Professor Mark Z. Jacobson and University of California-Davis researcher Mark Delucchi.

To make clear the extent of those hurdles – and how they could be overcome – they have written an article that is the cover story in the November issue of Scientific American. In it, they present new research mapping

out and evaluating a quantitative plan for powering the entire world on wind, water and solar energy, including an assessment of the materials needed and costs. And it will ultimately be cheaper than sticking with fossil fuel or going nuclear, they say. The key is turning to wind, water and solar energy to generate electrical power – making a massive commitment to them – and eliminating combustion as a way to generate power for vehicles as well as for normal electricity use.

The problem lies in the use of fossil fuels and biomass combustion, which are notoriously inefficient at producing usable energy. For example, when gasoline is used to power a vehicle, at least 80 percent of the energy produced is wasted as heat. With vehicles that run on electricity, it's the opposite. Roughly 80 percent of the energy supplied to the vehicle is converted into motion, with only 20 percent lost as heat. Other combustion devices can similarly be replaced with electricity or with hydrogen produced by electricity.

Jacobson and Delucchi used data from the U.S. Energy Information Administration to project that if the world's current mix of energy sources is maintained, global energy demand at any given moment in 2030 would be 16.9 terawatts, or 16.9 million megawatts.

They then calculated that if no combustion of fossil fuel or biomass were used to generate energy, and virtually everything was powered by electricity - either for direct use or hydrogen production - the demand would be only 11.5 terawatts. That's only two-thirds of the energy that would be needed if fossil fuels were still in the mix.

In order to convert to wind, water and solar, the world would have to build wind turbines; solar photovoltaic and concentrated solar arrays; and geothermal, tidal, wave and hydroelectric power sources to generate the electricity, as well as transmission lines to carry it to the users, but the long-run net savings would more than equal the costs, according to Jacobson and Delucchi's analysis.

"If you make this transition to renewables and electricity, then you eliminate the need for 13,000 new or existing coal plants," Jacobson said. "Just by changing our infrastructure we have less power demand."

Jacobson and Delucchi chose to use wind, water and solar energy options based on a quantitative evaluation Jacobson did last year of about a dozen of the different alternative energy options that were getting the most attention in public and political discussions and in the media. He compared their potential for producing energy, how secure an energy source each was, and their impacts on human health and the environment.

He determined that the best overall energy sources were wind, water and solar options. His results were published in Energy and Environmental Science. The Scientific American article provides a quantification of global solar and wind resources based on new research by Jacobson and Delucchi.

Analyzing only on-land locations with a high potential for producing power, they found that even if wind were the only method used to generate power, the potential for wind energy production is 5 to 15 times greater than what is needed to power the entire world. For solar energy, the comparable calculation found that solar could produce about 30 times the amount needed.

If the world built just enough wind and solar installations to meet the projected demand for the scenario outlined in the article, an area smaller than the borough of Manhattan would be sufficient for the wind turbines themselves. Allowing for the required amount of space between the turbines boosts the needed acreage up to 1 percent of Earth's land area, but the spaces between could be used for crops or grazing. The various non-rooftop solar power installations would need about a third of 1 percent of the world's land, so altogether about 1.3 percent of the land surface would suffice.

The study further provides examples of how a combination of renewable energy sources could be used to meet hour-by-hour power demand, addressing the commonly asked question, given the inherent variability of wind speed and sunshine, can these sources consistently produce enough power? The answer is yes.

Expanding the transmission grid would be critical for the shift to the sustainable energy sources that Jacobson and Delucchi propose. New transmission lines would have to be laid to carry power from new wind farms and solar power plants to users, and more transmission lines will be needed to handle the overall increase in the quantity of electric power being generated.

The researchers also determined that the availability of certain materials that are needed for some of the current technologies, such as lithium for lithium-ion batteries, or platinum for fuel cells, are not currently barriers to building a large-scale renewable infrastructure. But efforts will be needed to ensure that such materials are recycled and potential alternative materials are explored.

Finally, they conclude that perhaps the most significant barrier to the implementation of their plan is the competing energy industries that currently dominate political lobbying for available financial resources. But the technologies being promoted by the dominant energy industries are not renewable and even the cleanest of them emit significantly more carbon and air pollution than wind, water and sun resources, say Jacobson and Delucchi.

If the world allows carbon- and air pollution-emitting energy sources to play a substantial role in the future energy mix, Jacobson said, global temperatures and health problems will only continue to increase.

Herbal tonic for radiotherapy

Radioprotection and extracts of Ginko biloba

Antioxidant extracts of the leaves of the Gingko biloba tree may protect cells from radiation damage, according to a study published in the International Journal of Low Radiation. The discovery may one day be used to help reduce side effects in cancer patients undergoing radiotherapy.

Chang-Mo Kang of the Korea Institute of Radiological and Medical Sciences in Taegu and colleagues are interested in the protective effects of well-known herbal remedies of which Gingko biloba is one. G. biloba is a unique tree species with no close living relatives and extracts of its leaves contain antioxidant compounds including glycosides and terpenoids known as ginkgolides and bilobalides.

These compounds are thought to protect cells from damage by free radicals and other reactive oxidizing species found in the body. These are generated continuously by the body's normal metabolism, and in excess in some diseases or after exposure to pollution or radiation. They damage proteins, DNA and other biomolecules and left unchecked can kill cells.

As such, extracts of certain plants that contain antioxidants, including G. biloba, have attracted interest for their pharmacological activity. G. biloba is currently sold as a herbal supplement and there are numerous claims for health benefits, including the possibility of preventing the onset of dementia or Alzheimer's disease.

Kang and colleagues have now collected human white blood cells, lymphocytes, from healthy donors aged 18 to 50 years. They treated half of these cells with commercially available G. biloba extract in the laboratory and doused the other half with salt solution as an experimental control. They then compared the effects of gamma radiation from radioactive cesium on the white blood cells compared to the untreated control samples.

The team uses a light microscope to look for lymphocytes undergoing programmed cell death, or apoptosis, as a result of radiation exposure. They found that there was a significant increase in apoptosis in the untreated cells compared with those treated with G. biloba extract. Almost a third of the untreated cells underwent apoptosis compared with approximately one in twenty of the treated cells. Parallel studies with laboratory mice also demonstrated a similar protective effect against radiation poisoning.

The results suggest that the extracts can neutralize the free-radicals and oxidizing agents produced in the cells by the radiation and so prevent them from undergoing apoptosis.

"Protective effect of Gingko biloba against radiation-induced cellular damage in human peripheral lymphocytes and murine spleen cells" in Int. J. Low Radiation, 2009, 6, 209-218

32 new exoplanets found

"HARPS is a unique, extremely high precision instrument that is ideal for discovering alien worlds," says Stéphane Udry, who made the announcement. "We have now completed our initial five-year programme, which has succeeded well beyond our expectations."

The latest batch of exoplanets announced today comprises no less than 32 new discoveries. Including these new results, data from HARPS have led to the discovery of more than 75 exoplanets in 30 different planetary systems. In particular, thanks to its amazing precision, the search for small planets, those with a mass of a few times that of the Earth - known as super-Earths and Neptune-like planets - has been given a dramatic boost. HARPS has facilitated the discovery of 24 of the 28 planets known with masses below 20 Earth masses. As with the previously detected super-Earths, most of the new low-mass candidates reside in multi-planet systems, with up to five planets per system.

In 1999, ESO launched a call for opportunities to build a high resolution, extremely precise spectrograph for the ESO 3.6-metre telescope at La Silla, Chile. Michel Mayor, from the Geneva Observatory, led a consortium to build HARPS, which was installed in 2003 and was soon able to measure the back-and-forward motions of stars by detecting small changes in a star's radial velocity - as small as 3.5 km/hour, a steady walking pace. Such a precision is crucial for the discovery of exoplanets and the radial velocity method, which detects small changes in the radial velocity of a star as it wobbles slightly under the gentle gravitational pull from an (unseen) exoplanet, has been most prolific method in the search for exoplanets.

In return for building the instrument, the HARPS consortium was granted 100 observing nights per year during a five-year period to carry out one of the most ambitious systematic searches for exoplanets so far implemented worldwide by repeatedly measuring the radial velocities of hundreds of stars that may harbour planetary systems.

The programme soon proved very successful. Using HARPS, Mayor's team discovered - among others - in 2004, the first super-Earth (around μ Ara; ESO 22/04); in 2006, the trio of Neptunes around HD 69830 (ESO 18/06); in 2007, Gliese 581d, the first super Earth in the habitable zone of a small star (ESO 22/07); and in

2009, the lightest exoplanet so far detected around a normal star, Gliese 581e (ESO 15/09). More recently, they found a potentially lava-covered world, with density similar to that of the Earth's (ESO 33/09).

"These observations have given astronomers a great insight into the diversity of planetary systems and help us understand how they can form," says team member Nuno Santos.

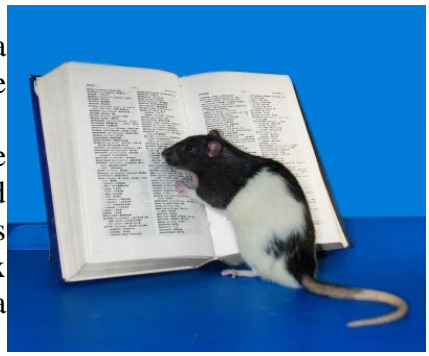
The HARPS consortium was very careful in their selection of targets, with several sub-programmes aimed at looking for planets around solar-like stars, low-mass dwarf stars, or stars with a lower metal content than the Sun. The number of exoplanets known around low-mass stars - so-called M dwarfs - has also dramatically increased, including a handful of super Earths and a few giant planets challenging planetary formation theory.

"By targeting M dwarfs and harnessing the precision of HARPS we have been able to search for exoplanets in the mass and temperature regime of super-Earths, some even close to or inside the habitable zone around the star," says co-author Xavier Bonfils.

The team found three candidate exoplanets around stars that are metal-deficient. Such stars are thought to be less favourable for the formation of planets, which form in the metal-rich disc around the young star. However, planets up to several Jupiter masses have been found orbiting metal-deficient stars, setting an important constraint for planet formation models.

Although the first phase of the observing programme is now officially concluded, the team will pursue their effort with two ESO Large Programmes looking for super-Earths around solar-type stars and M dwarfs and some new announcements are already foreseen in the coming months, based on the last five years of measurements. There is no doubt that HARPS will continue to lead the field of exoplanet discoveries, especially pushing towards the detection of Earth-type planets.

Smart rat 'Hobbie-J' produced by over-expressing a gene that helps brain cells communicate



AUGUSTA, Ga. – Over-expressing a gene that lets brain cells communicate just a fraction of a second longer makes a smarter rat, report researchers from the Medical College of Georgia and East China Normal University.

Dubbed Hobbie-J after a smart rat that stars in a Chinese cartoon book, the transgenic rat was able to remember novel objects, such as a toy she played with, three times longer than the average Long Evans female rat, which is considered the smartest rat strain. Hobbie-J was much better at more complex tasks as well, such as remembering which path she last traveled to find a chocolate treat.

Smart rat Hobbie-J was named after a character in a Chinese cartoon book. **Credit: Medical College of Georgia**

The report comes about a decade after the scientists first reported in the journal Nature that they had developed "Doogie," a smart mouse that over-expresses the NR2B gene in the hippocampus, a learning and memory center affected in diseases such as Alzheimer's. Memory improvements they found in the new genetically modified Long Evans rat were very similar to Doogie's. Subsequent testing has shown that Doogie maintained superior memory as he aged.

"This adds to the notion that NR2B is a universal switch for memory formation," says Dr. Joe Z. Tsien, co-director of the MCG Brain & Behavior Discovery Institute and co-corresponding author on the paper published Oct. 19 in PLoS ONE (see http://dx.plos.org/10.1371/journal.pone.0007486). Dr. Xiaohua Cao at East China Normal University also is a co-corresponding author.

The finding also further validates NR2B as a drug target for improving memory in healthy individuals as well as those struggling with Alzheimer's or mild dementia, the scientists says.

NR2B is a subunit of NMBA receptors, which are like small pores on brain cells that let in electrically-charged ions that increase the activity and communication of neurons. Dr. Tsien refers to NR2B as the "juvenile" form of the receptor because its levels decline after puberty and the adult counterpart, NR2A, becomes more prevalent.

While the juvenile form keeps communication between brain cells open maybe just a hundred milliseconds longer, that's enough to significantly enhance learning and memory and why young people tend to do both better, says Dr. Tsien, the Georgia Research Alliance Eminent Scholar in Cognitive and Systems Neurobiology. This trap door configuration that determines not just how much but how fast information flows is unique to NMBA receptors.

Scientists found that Hobbie-J consistently outperformed the normal Long Evans rat even in more complex situations that require association, such as working their way through a water maze after most of the designated directional cues and the landing point were removed. "It's like taking Michael Jordan and making him a super

Michael Jordan," Deheng Wang, MCG graduate student and the paper's first author, says of the large black and white rats already recognized for their superior intellect.

But even a super rat has its limits. For example with one test, the rats had to learn to alternate between right and left paths to get a chocolate reward. Both did well when they only had to wait a minute to repeat the task, after three minutes only Hobbie-J could remember and after five minutes, they both forgot. "We can never turn it into a mathematician. They are rats, after all," Dr. Tsien says, noting that when it comes to truly complex thinking and memory, the size of the brain really does matter.

That's one of the reasons scientists pursue this type of research: to see if increased production of NR2B in more complex creatures, such as dogs and perhaps eventually humans, gets the same results. He also is beginning studies to explore whether magnesium – a mineral found in nuts, legumes and green vegetables such as spinach – can more naturally replicate the results researchers have obtained through genetic manipulation. Magnesium ion blocks entry to the NMDA receptor so more magnesium forces the brain cell to increase expression levels of the more efficient NR2B to compensate. This is similar to how statin drugs help reduce cholesterol levels in the blood by inhibiting its synthesis in the liver.

Scientists created Hobbie-J and Doogie by making them over-express CaMKII, an abundant protein that works as a promoter and signaling molecule for the NMDA receptor, something that likely could not be replicated in humans. In October 2008, they reported in Neuron that they could also safely and selectively erase old and new memories alike in mice by over-expressing CaMKII while the memory was being recalled

"We want to make sure this is a real phenomenon," Dr. Tsien says of the apparent connection between higher levels of NR2B and better memory. "You should never assume that discovery you made in a cell line or a mouse can be translated to other species or systems unless you do the experiments." He adds that the failure of new drugs and other disappointments result from the lack of sufficient scientific evidence.

The transgenic rat has other practical value as well. There is substantial scientific and behavior data already available on rats and because rats are larger, it's easier to do memory tests and record signals from their brain. For example they are strong enough to press levers to get a food reward and their size and comfort level with water means they won't just float aimlessly in a water maze as "fluffy" mice tend to do.

Review: Pneumococcal conjugate vaccines effective at preventing child deaths

Use of vaccines can save the lives of millions of children

Washington, DC – A study published in The Cochrane Review this month concludes that pneumococcal conjugate vaccines (PCV), already known to prevent invasive pneumococcal disease (IPD) and x-ray defined pneumonia, was also effective against child deaths. The findings were based on a systematic review of the results of 6 randomized and controlled trials conducted in the US, Africa, Philippines, and Finland. Eighty percent of children were less likely to develop vaccine-type IPD, 58% all-serotype IPD, and 27% x-ray defined pneumonia than children who did not receive the vaccine. Eleven percent of child deaths were also prevented. In total, 113,044 children were included in the six trials – 57,015 children in the PCV group and 56,029 in the control group.

"Pneumococcal disease is driving a global health crisis, particularly in the developing world," said Marilla G. Lucero of the Research Institute for Tropical Medicine and primary author of the study. "This study underscores the value of vaccines in preventing this deadly disease and saving children's lives."

Pneumococcal disease, or Streptoccoccus pneumoniae, is a leading cause of pneumonia, meningitis, sepsis and other life-threatening ailments. It takes the lives of 1.6 million people each year, including more than 800,000 children despite the existence of safe and effective vaccines to prevent it. Ninety-five percent of child pneumococcal deaths occur in the developing world, largely unreached by the existing vaccines as yet.

WHO recommends that all countries prioritize introduction of PCV, particularly those with high child mortality rates. In 2000, the United States became the first country to license a 7-valent pneumococcal vaccine (PCV-7), which has virtually eliminated severe pneumococcal disease caused by vaccine serotypes in the U.S. Since then, 37 countries have implemented universal or widespread use of PCV-7, nearly all of which are in the industrialized world. New financial mechanisms, including the GAVI Alliance's Advance Market Commitment, are now in place to help low-income countries prevent pneumococcal deaths in their own countries. Next generation PCVs are expected to shortly become available and will provide expanded serotype coverage of strains common in the developing world.

"While early detection and treatment can save lives, this review highlights the effectiveness of pneumococcal conjugate vaccines for preventing pneumococcal disease before it occurs," said Dr. Orin Levine, executive director of PneumoADIP at the Johns Hopkins Bloomberg School of Public Health. "Low-income countries can now have the opportunity to introduce pneumococcal vaccine on an unprecedented timetable and

at prices their governments can afford. We recommend that all countries eligible for GAVI support apply now and take immediate steps to prioritize prevention."

For more information on the study, please visit http://www.cochrane.org/reviews/en/ab004977.html.

A master mechanism for regeneration?

ANN ARBOR, Mich. - Biologists long have marveled at the ability of some animals to re-grow lost body parts. Newts, for example, can lose a leg and grow a new one identical to the original. Zebrafish can re-grow fins.

These animals and others also can repair damaged heart tissue and injured structures in the eye. In contrast, humans have only rudimentary regenerative abilities, so scientists hoping eventually to develop ways of repairing or replacing damaged body parts are keenly interested in understanding in detail how the process of regeneration works.

Using zebrafish as a model, researchers at the University of Michigan have found that some of the same genes underlie the process in different types of tissues. Genes involved in fin regeneration and heart repair are also required for rebuilding damaged light receptors in the eye, they found, suggesting that a common molecular mechanism guides the process, no matter what body part is damaged.

Zhao Qin a graduate student in the department of Molecular, Cellular and Developmental Biology will present the research Oct. 19 at the annual meeting of the Society for Neuroscience in Chicago. Her coauthors on the paper, which also was published in the Proceedings of the National Academy of Sciences, are professor and chair Pamela Raymond and research laboratory specialist Linda Barthel.

The researchers briefly exposed zebrafish to intense light, which destroys the light receptors in their eyes, just as staring into the sun harms human eyes. But unlike humans, who remain blinded if the damage is severe enough, zebrafish repair the damage with new nerve cells (neurons).

Where do those new cells come from? The U-M researchers suspected they develop from cells in the retina called Müller glia, known to have the ability to give rise to nerve cells, and in previous work another graduate student in Raymond's lab confirmed the suspicion.

In the current work, Qin wanted to find what prompts Müller glia to start the regeneration process. To get at the question, she looked at patterns of gene expression in Müller glia from damaged, regenerating zebrafish retinas and from undamaged zebrafish retinas to see which genes are expressed differently in damaged and undamaged retinas.

"Of course I found a lot of genes - a total of 953," Qin said, "but two were of particular interest." The two genes, hspd1 and mps1, had been found in other studies to be required for fin and heart regeneration in zebrafish, and Qin's work showed that they also were switched on in Müller glia from damaged zebrafish retinas.

"This suggests," Raymond said, "that, although we don't fully understand it yet, there might be a bigger molecular program, involving not just these two genes but a number of cooperating genes that are required for injury-triggered regeneration."

The researchers received funding from the National Institutes of Health.

For more information: "Genetic evidence for shared mechanisms of epimorphic regeneration in zebrafish:" http://www.pnas.org/content/106/23/9310.full?sid=588b36b9-d86b-4c01-a66b-2b8bbcb2b689

Well

Treating Dementia, but Overlooking Its Physical Toll

By TARA PARKER-POPE

Dementia is often viewed as a disease of the mind, an illness that erases treasured memories but leaves the body intact. But dementia is a physical illness, too - a progressive, terminal disease that shuts down the body as it attacks the brain. Although the early stages can last for years, the life expectancy of a patient with advanced dementia is similar to that of a patient with advanced cancer.

The lack of understanding about the physical toll of dementia means that many patients near the end of life are subjected to aggressive treatments that would never be considered with another terminal illness. People with advanced dementia are often given dialysis and put on ventilators; they may even get preventive care that cannot possibly help them, like colonoscopies and drugs for osteoporosis or high cholesterol.

“You can go to an intensive-care unit in most places,” said Dr. Greg A. Sachs, chief of general internal medicine and geriatrics at Indiana University School of Medicine, “and you’ll find people with dementia getting very aggressive treatment.”

The continued focus on treatment to prolong life often means that pain relief is inadequate, and symptoms like confusion and anxiety are worsened. A new study suggests that family members would be far less likely to subject their loved ones to such treatment if they had a better understanding of dementia as progressive, debilitating illness that ultimately shuts down the body after years of mental deterioration.

Harvard researchers recently followed 323 residents of 22 nursing homes. All had end-stage dementia, meaning that they no longer recognized family members, could speak fewer than six words and were incontinent and bedbound. During the 18-month study period, more than half of the patients died.

During the last three months of life, 41 percent of the patients received at least one "burdensome" treatment, like transport to the emergency room, hospitalization, feeding tubes or intravenous treatments. Advanced dementia patients are particularly prone to infections because of incontinence, risk of bedsores, a depressed immune response and inability to report symptoms.

When the investigators looked more deeply into the reasons for treatment decisions, they discovered stark differences based on what family members knew about dementia. When they understood its progressive and terminal nature, only 27 percent of the patients received aggressive care. For family members who did not understand the disease, the figure was 73 percent.

"When family members understood the clinical course of dementia and the poor prognosis, the patients were far less likely to undergo these distressing interventions," said the study's lead author, Dr. Susan L. Mitchell, senior scientist at the Institute for Aging Research of Hebrew SeniorLife in Boston. "Dementia is a terminal illness and needs to be recognized as such so these patients receive better palliative care."

The study also found that pain control was often inadequate. One in four subjects were clearly suffering from pain, but that number may understate the problem, because the patients were unable to talk about their pain.

Dr. Sachs, at Indiana, notes that care for patients with dementia has changed very little in the past 30 years. As a teenager, he watched his grandmother decline from Alzheimer's disease. During her final months, she was repeatedly treated for infections and put in restraints or sedated to control agitation.

"Seeing my grandmother in that state was so distressing that my mother eventually stopped taking the grandchildren to visit," Dr. Sachs wrote last week in an editorial in The New England Journal of Medicine. "My grandmother had little in the way of comfort or company toward the end. In my medical training, I learned how my grandmother's final months were typical for people dying from dementia."

A 2005 report from the Alzheimer's Association showed troubling trends in care at the end of life. In a sweeping review of the medical literature, the investigators found that 71 percent of nursing home residents with advanced dementia died within six months of admission, yet only 11 percent were referred to hospice care, which focuses on comfort rather than active treatment.

Simply transferring a dementia patient from the nursing home to a hospital can lead to confusion, falls or a decline in eating - which in turn, often leads to further aggressive treatment.

Geriatricians say a large part of the problem is that the patients are unable to make their wishes known. In the absence of a living will, family members often struggle with guilt and are afraid to stop aggressive treatment because they do not want to be seen as abandoning a loved one in mental decline.

Dr. Sachs says doctors need to spend more time explaining the prognosis for advanced dementia, making it clear that palliative care does not mean less care.

"We're not talking about aggressive care versus no care," he said. "Palliative care is aggressive and attentive and focused on symptom management and support of the patient and family. It's not any less excellent care."

First Mention

Lou Gehrig's Disease

By NICHOLAS BAKALAR

The first time the words "amyotrophic lateral sclerosis" appeared in The New York Times was in 1876, in an advertisement for a medical text; the disease had first been described by a French doctor in 1869. The Times did not mention it again until Arthur Daley, a Pulitzer Prize-winning sports columnist, reported on Lou Gehrig's diagnosis in June 1939.

The end of Gehrig's record streak of 2,130 straight games came on May 2, but the explanation in The Times the next day was that Gehrig had "recognized his competitive decline" and that his withdrawal from the lineup "does not necessarily mean the end of his playing career." A column by John Kieran the same day expressed certainty that "with a little rest he should begin to feel his oats again," that all he really needed was "a breathing spell."

On June 2, a 120-word article on the sports page reported that Gehrig would be examined at the Mayo Clinic. Yet on June 12, with no public report about the results of the examination, Gehrig was back in the lineup for three innings in an exhibition game against the Kansas City Blues, a Yankee farm club.

Finally on June 22, Daley, quoting Dr. H. C. Habein of the Mayo Clinic, wrote that the Iron Horse had amyotrophic lateral sclerosis, the first mention of the illness in the newspaper in 63 years. An Associated Press release printed below the article quoted the editor of the Journal of the American Medical Association saying that A.L.S. was "a well-established scientific diagnosis of a condition in which there is a hardening of the

tissues in the spinal column and a wasting of the muscles dependent upon it," but although the doctor must have known the facts, he said nothing of a fatal prognosis.

A.L.S. appeared off the sports page on June 26 in an article with the headline, "Gehrig Case Is Expected to Spur Research Into Baffling Malady." The A.P. release gave an accurate account of the illness but again omitted to mention that it was terminal.

On March 13, 1940, The Times adopted what had already become popular usage, referring to "Lou Gehrig's Disease" in a report claiming "the first successful treatment" of the illness using vitamin E. "Remedy Found for 'Gehrig Disease' " said the overly optimistic headline on Page 25, and the unsigned article told readers that "amyotrophic lateral sclerosis has heretofore been considered a chronic, progressive and invariably fatal disease."

Gehrig died on June 2, 1941.

Really?

The Claim: Garlic Can Be Helpful in Warding Off a Cold

By ANAHAD O'CONNOR

THE FACTS For centuries, garlic has been extolled not just for its versatility in the kitchen but also for its medicinal powers.

Whatever the reason, studies seem to support an effect. In one double-blind study, published in 2001, British scientists followed 146 healthy adults over 12 weeks from November to February. Those who had been randomly selected to receive a daily garlic supplement came down with 24 colds during the study period, compared with 65 colds in the placebo group. The garlic group experienced 111 days of sickness, versus 366 for those given a placebo. They also recovered faster.

Besides the odor, studies have found minimal side effects, like nausea and rash.

One possible explanation for such benefits is that a compound called allicin, the main biologically active component of garlic, blocks enzymes that play a role in bacterial and viral infections. Or perhaps people who consume enough garlic simply repel others, and thus steer clear of their germs.

In a report this year in The Cochrane Database of Systematic Reviews, scientists who examined the science argued that while the evidence was good for garlic's preventive powers, more studies were needed.

They pointed out that it was still unclear whether taking garlic at the very start of a cold, as opposed to weeks in advance, would make any difference.

THE BOTTOM LINE Research is limited, but it suggests that garlic may indeed help ward off colds.

Cosmic pattern to UK tree growth

By Matt Walker Editor, Earth News

The growth of British trees appears to follow a cosmic pattern, with trees growing faster when high levels of cosmic radiation arrive from space. Researchers made the discovery studying how growth rings of spruce trees have varied over the past half a century.

As yet, they cannot explain the pattern, but variation in cosmic rays impacted tree growth more than changes in temperature or precipitation. The study is published in the scientific journal New Phytologist.

"We were originally interested in a different topic, the climatological factors influencing forest growth," says Ms Sigrid Dengel a postgraduate researcher at the Institute of Atmospheric and Environmental Science at the University of Edinburgh.

To do this, Ms Dengel and University of Edinburgh colleagues Mr Dominik Aeby and Professor John Grace obtained slices of spruce tree trunks.

These had been freshly-felled from the Forest of Ae in Dumfriesshire, Scotland, by Forest Research, the research branch of the UK's Forestry Commission. The trees had been planted in 1953 and felled in 2006.

The researchers froze the trunk slices, to prevent the wood shrinking, then scanned them on to a computer and used software to count the number and width of the growth rings.

As the trees aged, they showed a usual decline in growth. However, during a number of years, the trees' growth also particularly slowed. These years correlated with periods when a relatively low level of cosmic rays reached the Earth's surface.

When the intensity of cosmic rays reaching the Earth's surface was higher, the rate of tree growth was faster.

The effect is not large, but it is statistically significant.

The intensity of cosmic rays also correlates better with the changes in tree growth than any other climatological factor, such as varying levels of temperature or precipitation over the years.

"The correlation between growth and cosmic rays was moderately high, but the correlation with the climatological variables was barely visible," Ms Dengel told the BBC.

Here comes the Sun

Cosmic rays are actually energetic particles, mainly protons, as well as electrons and the nuclei of helium atoms, that stream through space before hitting the Earth's atmosphere.

The levels of cosmic rays reaching the Earth go up and down according to the activity of the Sun, which follows an 11-year cycle. Every 11 years or so, the Sun becomes more active, producing a peak of sunspots. These sunspots carry a magnetic field that blocks and slows the path of energetic particles.

When the researchers looked at their data, they found that tree growth was highest during periods of low sunspot activity, when most cosmic rays reached Earth. But growth slowed during the four periods of cosmic ray-blocking high sunspot activity, which have occurred between 1965 and 2005.

"We tried to correlate the width of the rings, i.e. the growth rate, to climatological factors like temperature. We also thought it would be interesting to look for patterns related to solar activity, as a few people previously have suggested such a link," explains Ms Dengel.

"We found them. And the relation of the rings to the solar cycle was much stronger than it was to any of the climatological factors we had looked at. We were quite hesitant at first, as solar cycles have been a controversial topic in climatology." "As for the mechanism, we are puzzled."

Ms Dengel's team proposes two main hypotheses as to how cosmic ray particles could influence the growth of trees. The first idea is that cosmic rays ionise gases in the atmosphere, creating molecules around which clouds condense, therefore increasing cloud cover. This mechanism is hotly debated among scientists, and evidence for it is weak.

One study published in 2006 suggested it may account for as little as 2% of the variation in cloud cover across the UK. But if it does occur, then an increase in cloud cover and haze would diffuse the amount of solar radiation reaching the trees.

As diffuse radiation penetrates forest canopies better than direct light, it would increase the amount of radiation that plants capture, and increase photosynthesis by trees, boosting growth.

Explaining the unexplained

"Or there is some direct effect," says Ms Dengel. What that might be is unknown, but experiments in space have shown that cosmic rays can have some positive impacts on biological materials.

Ms Dengel says that much more work needs to be done to investigate the effect further, and their results have received a mixed reaction from other scientists. "We sent the paper to 161 international colleagues. We are still harvesting the emails. We've identified four groups who would like to work with us on this.

"Locally, one of our colleagues is a cloud physicist. He was encouraging but sceptical at the same time." If further research backs up the team's findings, the implications could be significant. “We want to repeat this work for larger data sets, and understand the mechanism better, before we speculate," says Ms Dengel.

But the influence of cosmic rays could resolve other as yet unexplained cycles in tree growth found in studies in North America.

It also suggests the amount of aerosols that humans emit into the atmosphere could impact tree growth, as high levels of aerosols cause "global dimming", an effect that occurs when the levels of light reaching the Earth's surface fall.

"If it is true that the mechanism is all about rays enhancing diffuse radiation, it would mean that 'global dimming' and 'global brightening' would have a big effect on tree growth and therefore on the absorption of carbon dioxide," warns Ms Dengel.

Prolonged thumb sucking in infants may lead to speech impediments

Using a pacifier for too long may be detrimental to your child's speech. Research published in the open access journal BMC Pediatrics suggests that the use of bottles, pacifiers and other sucking behaviors apart from breast-feeding may increase the risk of subsequent speech disorders in young children.

A research team from the A research team from the Corporacion de Rehabilitacion Club De Leones Cruz del Sur and the University of Washington Multidisciplinary International Research Training Program, led by Clarita Barbosa, evaluated the associations between sucking behaviors and speech disorders in 128 three- to five- year old preschoolers from Patagonia, Chile. The team combined parents' reports of infant feeding and sucking behaviors with evaluations of their child's speech. They found that delaying bottle use until the child was at least 9 months old reduced the risk of later developing speech disorders while children who sucked their fingers, or used a pacifier for more than 3 years were three times more likely to develop speech impediments.

"These results suggest extended use of sucking outside of breast-feeding may have detrimental effects on speech development in young children", according to Barbosa. This finding is particularly relevant, as use of bottles and pacifiers has increased dramatically over the last few decades. However, Barbosa is careful to note, "Although results of this study provide further evidence for the benefits of longer duration of breast feeding of infants, they should be interpreted with caution as these data are observational."

***Notes to Editors** 1. **The relationship of bottle feeding and other sucking behaviors with speech disorder in Patagonian preschoolers** Clarita Barbosa, Sandra Vasquez, Mary A Parada, Juan Carlos Velez Gonzalez, Chanaye Jackson, N. David Yanez, Bizu Gelaye and Annette L. Fitzpatrick BMC Pediatrics (in press)*

Calling it in: New emergency medical service system may predict caller's fate

Japanese researchers have developed a computer program which may be able tell from an emergency call if you are about to die. Research published in the open access journal BMC Emergency Medicine shows that a computer algorithm is able to predict the patient's risk of dying at the time of the emergency call.

Kenji Ohshige and a team of researchers from the Yokohama City University School of Medicine in Japan assessed the new Yokohama computer-based triage emergency system from its inception on 1st October 2008 until 31st March 2009, collecting information from over 60,000 emergency calls. For each call, triage information was entered into the computer system, which then categorized patients according to the severity of their condition. The researchers then compared the computer-estimated threat of dying at the time of the emergency call with the actual patients' condition upon arrival at the hospital emergency department. They found that the algorithm was effective in assessing the life risk of a patient with over 80% sensitivity.

According to Ohshige, "A patient's life threat risk can be quantitatively expressed at the moment of the emergency call with a moderate level of accuracy. The algorithm for estimating a patient's like threat risk should be improved further as more data are collected."

Ambulance response time has risen rapidly with the increased demand for this service in developed countries such as Japan. This emphasises the need to prioritise ambulance responses according to the severity of the patient's condition. "As delayed response time reduces the number of patients who survive from sudden cardiac arrest priority dispatch of ambulances to patients in critical condition has become a matter of importance", says Ohshige.

***Notes to Editors:** 1. **Evaluation of an algorithm for estimating a patient's life threat risk from an ambulance call** Kenji Ohshige, Chihiro Kawakami, Shunsaku Mizushima, Yoshihiro Moriwaki and Noriyuki Suzuki BMC Emergency Medicine (in press)*

Alzheimer's researchers find high protein diet shrinks brain

One of the many reasons to pick a low-calorie, low-fat diet rich in vegetables, fruits, and fish is that a host of epidemiological studies have suggested that such a diet may delay the onset or slow the progression of Alzheimer's disease (AD). Now a study published in BioMed Central's open access journal Molecular Neurodegeneration tests the effects of several diets, head-to-head, for their effects on AD pathology in a mouse model of the disease. Although the researchers were focused on triggers for brain plaque formation, they also found that, unexpectedly, a high protein diet apparently led to a smaller brain.

A research team from the US, Canada, and the UK tested four differing menus on transgenic mouse model of AD, which express a mutant form of the human amyloid precursor protein (APP). APP's role in the brain is not fully understood; however it is of great interest to AD researchers because the body uses it to generate the amyloid plaques typical of Alzheimer's. These mice were fed either (1) a regular diet, (2) a high fat/low carbohydrate custom diet, (3) a high protein/low carb version or (4) a high carbohydrate/low fat option. The researchers then looked at the brain and body weight of the mice, as well as plaque build up and differences in the structure of several brain regions that are involved in the memory defect underlying AD.

Unexpectedly, mice fed a high protein/low carbohydrate diet had brains five percent lighter that all the others, and regions of their hippocampus were less developed. This result was a surprise, and, until researchers test this effect on non-transgenic mice, it is unclear whether the loss of brain mass is associated with AD-type plaque. But some studies in the published literature led the authors to put forward a tentative theory that a high protein diet may leave neurones more vulnerable to AD plaque. Mice on a high fat diet had raised levels of plaque proteins, but this had no effect on plaque burden.

Aside from transgenic mice, the pressing question is whether these data have implications for the human brain. "Given the previously reported association of high protein diet with aging-related neurotoxicity, one wonders whether particular diets, if ingested at particular ages, might increase susceptibility to incidence or progression of AD," says lead author, Sam Gandy, a professor at The Mount Sinai School of Medicine in New York City and a neurologist at the James J Peters Veterans Affairs Medical Center in the Bronx NY. The only way to know for sure would require prospective randomised double blind clinical diet trials. According to Gandy, "This would be a challenging undertaking but potentially worthwhile. If there is a real chance that the ravages of AD might be slowed or avoided through healthy eating. Such trials will be required if scientists are ever to make specific recommendations about dietary risks for AD."

***Notes to Editors:** 1. **Dietary composition modulates brain mass and amyloid beta levels in a mouse model of aggressive Alzheimer's amyloid pathology** Steve Pedrini, Carlos Thomas, Hannah Brautigam, James Schmeidler, Lap Ho, Paul Fraser,*

David Westaway, Peter Hyslop, Ralph Martins, Joseph Buxbaum, Giulio Pasinetti, Dara Dickstein, Patrick Hof, Michelle Ehrlich and Sam Gandy Molecular Neurodegeneration (in press)

2-million-year-old evidence shows tool-making hominins inhabited grassland environments

In an article published in the open-access, peer-reviewed journal PLoS ONE on October 21, 2009, Dr Thomas Plummer of Queens College at the City University of New York, Dr Richard Potts of the Smithsonian Institution National Museum of Natural History and colleagues report the oldest archeological evidence of early human activities in a grassland environment, dating to 2 million years ago. The article highlights new research and its implications concerning the environments in which human ancestors evolved.

Scientists as far back as Charles Darwin have thought that adaptation to grassland environments profoundly influenced the course of human evolution. This idea has remained well-entrenched, even with recent recognition that hominin origins took place in a woodland environment and that the adaptive landscape in Africa fluctuated dramatically in response to short-term climatic shifts.

During the critical time period between 3 and 1.5 million years ago, the origin of lithic technology and archeological sites, the evolution of Homo and Paranthropus, selection for endurance running, and novel thermoregulatory adaptations to hot, dry environments in H. erectus have all been linked to increasingly open environments in Africa.

However, ecosystems in which grassland prevails have not been documented in the geological record of Pliocene hominin evolution, so it has been unclear whether open habitats were even available to hominins, and, if so, whether hominins utilized them. In their new study, Plummer and colleagues provide the first documentation of both at the 2-million-year-old Oldowan archeological site of Kanjera South, Kenya, which has yielded both Oldowan artifacts and well-preserved faunal remains, allowing researchers to reconstruct past ecosystems.

The researchers report chemical analyses of ancient soils and mammalian teeth, as well as other faunal data, from the ~2.0-million-year-old archeological sites at Kanjera South, located in western Kenya. The principal collaborating institutions of the Kanjera project are Queens College of the City University of New York, the Smithsonian Institution's Human Origins Program, and the National Museums of Kenya. The findings demonstrate that the recently excavated archeological sites that preserve Oldowan tools, the oldest-known type of stone technology, were located in a grassland-dominated ecosystem during the crucial time period.

The study documents what was previously speculated based on indirect evidence – that grassland-dominated ecosystems did, in fact, exist during the Plio-Pleistocene (ca. 2.5-1.5 million years ago) and that early human tool-makers were active in open settings. Other recent research shows that the Kanjera hominins obtained meat and bone marrow from a variety of animals and that they carried stone raw materials over surprisingly long distances in this grassland setting. A comparison with other Oldowan sites shows that by 2.0 million years ago, hominins, almost certainly of the genus Homo, lived in a wide range of habitats in East Africa, from open grassland to woodland and dry forest.

Plummer and colleagues conclude that early Homo was flexible in its habitat use and that the ability to find resources in both open and wooded habitats was a key part of its adaptation. This strongly contrasts with the habitat usage of older species of Australopithecus and appears to signify an important shift in early humans' use of the landscape.

Funding: Funding from the L. S. B. Leakey Foundation, the Leverhulme Trust, the National Geographic Society, the National Science Foundation, the Professional Staff Congress-City University of New York Research Award Program, and the Wenner-Gren Foundation for Kanjera field and laboratory research is gratefully acknowledged. Logistical support was provided by the Human Origins Program of the Smithsonian Institution. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Better blood screening process needed to prevent babesiosis transmission

Research finds dramatic increase in number of transfusion-transmitted babesiosis cases

Babesiosis is a potentially dangerous parasitic disease transmitted by ticks and is common in the Northeast and the upper Midwest. Babesia lives inside of red blood cells, meaning it can also be transmitted through a blood transfusion from an infected but otherwise asymptomatic blood donor.

Now a new study led by researchers at Rhode Island and The Miriam hospitals finds a dramatic increase in the number of transfusion-transmitted babesiosis cases (TTB), leading the investigators to call for a better screening test in blood donors living in areas of the country where babesiosis is prevalent. Their paper is published in an upcoming edition of the journal Transfusion, and is now available online in advance of print.

Infectious diseases specialist Leonard Mermel, DO, is the medical director of infection control for Rhode Island Hospital and corresponding author of the paper. He and his colleagues, Shadaba Asad, MD, a hospitalist

at The Miriam Hospital (sister hospital to Rhode Island and also a Lifespan partner), and Joseph Sweeney, MD, director of transfusion services at Rhode Island and The Miriam hospitals, observed an increase in the number of TTB cases, and initiated a retrospective study to gauge the extent of TTB in Rhode Island.

Babesiosis became a reportable disease in Rhode Island in 1994. For the purpose of this study, cases of babesiosis reported to the Rhode Island Department of Health (RIDOH) between January 1999 and December 2007 were reviewed, along with information on blood donors from the Rhode Island Blood Center.

People who are infected with the parasite may go undiagnosed as symptoms may not occur. In others, however, the disease can cause severe illness that may include fever, fatigue, jaundice, and anemia. Mermel, who is also a professor of medicine at The Warren Alpert Medical School of Brown University and a member of the University Medicine Foundation, says, “At present, the only means of screening blood donors is a questionnaire that includes a query regarding a known history of babesiosis. Because many babesiosis cases are minimally symptomatic or asymptomatic in otherwise healthy people, the questionnaire may not effectively exclude all donors who may transmit the disease by donating blood.”

Mermel and his colleagues found that a total of 346 cases of babesiosis were reported to the RIDOH between 1999 and 2007. Of these, 21 cases appear to have been transmitted by blood transfusion rather than from a tick. During this time period, the number of TTB cases per number of units of blood transfused increased annually. On average, there was at least one case of TTB per 15,000 units of red blood cells transfused during the entire period. However, from 2005 to 2007, the incidence approached one case per 9,000 units. In 2007, TTB accounted for 10 percent of the total babesiosis cases reported in Rhode Island.

Based on their findings, Mermel suggests, “The diagnosis of babesiosis in winter and early spring in northern latitudes, when deer ticks are less prevalent, should raise suspicion of Babesia transmission due to a blood transfusion.”

Drinking coffee slows progression of liver disease in chronic hepatitis C sufferers

Patients with chronic hepatitis C and advanced liver disease who drink three or more cups of coffee per day have a 53% lower risk of liver disease progression than non-coffee drinkers according to a new study led by Neal Freedman, Ph.D., MPH, from the National Cancer Institute (NCI). The study found that patients with hepatitis C-related bridging fibrosis or cirrhosis who did not respond to standard disease treatment benefited from increased coffee intake. An effect on liver disease was not observed in patients who drank black or green tea. Findings of the study appear in the November issue of Hepatology, a journal published by Wiley-Blackwell on behalf of the American Association for the Study of Liver Diseases.

Hepatitis C virus (HCV) infects approximately 2.2% of the world's population with more than 3 million Americans infected. The Centers for Disease Control and Prevention (CDC) cites HCV as the leading cause of liver transplantation in the U.S. and accounts for 8,000 to 10,000 deaths in the country annually. Globally, the World Health Organization (WHO) estimates 3 to 4 million persons contract HCV each year with 70% becoming chronic cases that can lead to cirrhosis of the liver and liver cancer.

This study included 766 participants enrolled in the Hepatitis C Antiviral Long-Term Treatment against Cirrhosis (HALT-C) trial who had hepatitis C-related bridging fibrosis or cirrhosis and failed to respond to standard treatment of the anti-viral drugs peginterferon and ribavirin. At the onset of the study, HALT-C patients were asked to report their typical frequency of coffee intake and portion size over the past year, using 9 frequency categories ranging from 'never' to 'every day' and 4 categories of portion size (1 cup, 2 cups, 3-4 cups, and 5+ cups). A similar question was asked for black and green tea intake. "This study is the first to address the association between liver disease progression related to hepatitis C and coffee intake," stated Dr. Freedman.

Participants were seen every 3 months during the 3.8-year study period to assess clinical outcomes which included: ascites (abnormal accumulation of fluid in the abdomen), prognosis of chronic liver disease, death related to liver disease, hepatic encephalopathy (brain and nervous system damage), hepatocellular carcinoma (liver cancer), spontaneous bacterial peritonitis, variceal hemorrhage, or increase in fibrosis. Liver biopsies were also taken at 1.5 and 3.5 five years to determine the progression of liver disease.

Results showed that participants who drank 3 or more cups of coffee per day had a relative risk of .47 for reaching one of the clinical outcomes. Researchers did not observe any association between tea intake and liver disease progression, though tea consumption was low in the study. "Given the large number of people affected by HCV it is important to identify modifiable risk factors associated with the progression of liver disease," said Dr. Freedman. "Although we cannot rule out a possible role for other factors that go along with drinking coffee, results from our study suggest that patients with high coffee intake had a lower risk of disease progression." Results from this study should not be generalized to healthier populations cautioned the authors.

For the preceding study you may also contact: NCI Office of Media Relations 301-496-6641 ncipressofficers@mail.nih.gov

Article: "Coffee Intake Is Associated with Lower Rates of Liver Disease Progression in Chronic Hepatitis C," *Neal D. Freedman, James E. Everhart, Karen L. Lindsay , Marc G. Ghany, Teresa M. Curto, Mitchell L. Shiffman, William M. Lee, Anna S. Lok, Adrian M. Di Bisceglie, Herbert L. Bonkovsky, John C. Hoefs, Jules L. Dienstag, Chihiro Morishima, Christian C. Abnet, Rashmi Sinha1, and the HALT-C Trial Group. Hepatology; Published Online: July 13, 2009 (DOI: 10.1002/hep.23162); Print Issue Date: November 2009. http://www3.interscience.wiley.com/journal/122511224/abstract*

Presidential election outcome changed voters' testosterone

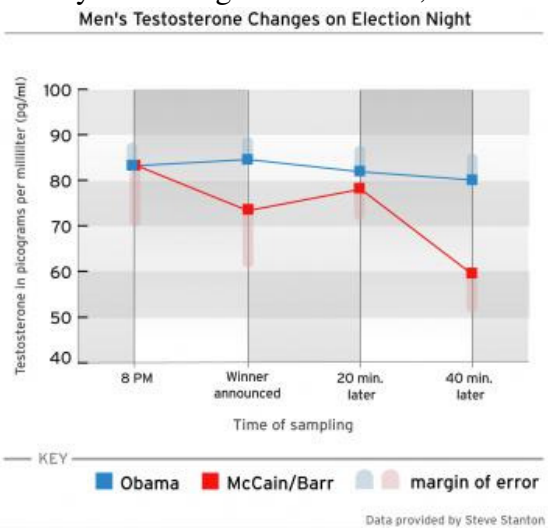
DURHAM, N.C. -- Young men who voted for Republican John McCain or Libertarian candidate Robert Barr in the 2008 presidential election suffered an immediate drop in testosterone when the election results were announced, according to a study by researchers at Duke University and the University of Michigan. In contrast, men who voted for the winner, Democrat Barack Obama, had stable testosterone levels immediately after the outcome.

Female study participants showed no significant change in their testosterone levels before and after the returns came in.

The men who participated in the study would normally show a slight night-time drop in testosterone levels anyway. But on this night, they showed a dramatic divergence: The Obama voters' levels didn't fall as they should, and the McCain and Barr voters lost more than would have been expected.

"This is a pretty powerful result," said Duke neuroscientist Kevin LaBar. "Voters are physiologically affected by having their candidate win or lose an election."

In a post-election questionnaire, the McCain and Barr backers were feeling significantly more unhappy, submissive, unpleasant and controlled than the Obama voters.



Vicarious participation in a contest had a measurable effect on the physiology of men in a study conducted at Duke and the University of Michigan. **Credit: Duke University**

The findings mirror what other studies have found in men who participate directly in an interpersonal contest -- the winner gets a boost of testosterone, while the loser's testosterone drops. Testosterone is a steroid hormone manufactured by the testes that is linked to aggression, risk-taking and responses to threats. Women have it too but in much lesser amounts and originating from different sources (their ovaries and adrenal glands), which makes them less likely to experience rapid testosterone changes following victory or defeat.

Researchers in Durham and Ann Arbor had 183 men and women chew a piece of gum and then spit into a sample tube at 8 p.m. as the polls closed on Nov. 4, 2008. When the election results were announced at about 11:30 p.m., the subjects provided a second sample, and then two more at 20-minute intervals. Those spit samples were then analyzed for concentrations of testosterone and some related stress hormones.

It would appear that even vicarious participation in such a "macro-scale dominance competition" is enough to change hormone levels, said Duke post-doctoral researcher Steven Stanton, who is the first author on a paper appearing in PLOS One on Wednesday. (http://www.plosone.org) "Voters participate in elections both directly by casting their ballots, and vicariously because they don't personally win or lose the election," Stanton said. "This makes democratic political elections highly unique dominance contests."

Stanton said the scientific consensus suggests the testosterone response to fighting and competition in males affects their future behavior in a beneficial way. The loser chills out a bit so he doesn't continue to press his case and perhaps become injured. In contrast, the winner may be motivated to pursue further gains in social status. "The research on this extends beyond humans and other primates," Stanton said.

The study also looked at levels of cortisol in the spit samples, a stress hormone behind the "fight or flight" response, and will discuss those findings in a forthcoming paper.

The college-aged men involved in this study would generally have more testosterone than older men, so perhaps the study provided a better opportunity to see the dominance response at work, LaBar said. "It would be interesting to see how this shakes out in older men."

Hormonal shifts from vicarious competition are also likely to occur around hotly contested collegiate football and basketball contests, the researchers note.

To find out, they're going to be repeating this kind of study on Duke and University of North Carolina basketball fans during one of their games this winter. "They'll spit before the game and spit after the game, and we'll just see," LaBar said. "What a perfect place to study this," said Stanton.

Researchers find ways to encourage spinal cord regeneration after injury

Animal studies suggest new protocols for helping human spinal cord injury patients

CHICAGO - Animal research is suggesting new ways to aid recovery after spinal cord injury. New studies demonstrate that diet affects recovery rate and show how to make stem cell therapies safer for spinal injury patients. The findings were presented at Neuroscience 2009, the annual meeting of the Society for Neuroscience and the world's largest source of emerging news on brain science and health.

In other animal studies, researchers identified molecules that encourage spinal cord regeneration and ways to block molecules that discourage it. The findings may help shape therapies for the more than one million people in North America who have spinal cord injuries. Research released today shows that:

* A diet high in fat and low in carbohydrates speeds recovery in rats with spinal cord injuries. The study suggests that dietary content may affect spinal cord injury recovery rates in people (Wolfram Tetzlaff, MD, PhD, abstract 542.10, see attached summary).

* In animal studies, stem cell implants pre-screened for "unsafe" immature cells helped repair injured spinal cords without dangerous side effects, like tumor formation. The findings suggest best practices for human stem cell therapies (Masaya Nakamura, MD, PhD, abstract 642.14, see attached summary).

Other findings discussed at the meeting show that:

* Researchers are discovering how to encourage the spinal cord to regenerate and form functional connections after injury. Growth factors, enzymes, and molecular tools show promising results in animal models (Eric Frank, PhD, see attached speaker's summary).

"Some injuries harm nerve cells, but the brain often recovers from stress, damage, or disease," said press conference moderator Oswald Steward, PhD, of the University of California, Irvine, an expert on spinal cord injury and synaptic plasticity. "We are learning a great deal about how to encourage the recovery process and harness the plasticity of the nervous system to offer hope to spinal cord injury patients," Steward said.

Full study information is available online here.

This research was supported by national funding agencies, such as the National Institutes of Health, as well as private and philanthropic organizations.

Experts issue call to reconsider screening for breast cancer and prostate cancer

Laura Esserman, MD, MBA

Twenty years of screening for breast and prostate cancer – the most diagnosed cancer for women and men – have not brought the anticipated decline in deaths from these diseases, argue experts from the University of California, San Francisco and the University of Texas Health Science Center at San Antonio in an opinion piece published in the “Journal of the American Medical Association.”

Instead, overall cancer rates are higher, many more patients are being treated, and the incidence of aggressive or later-stage disease has not been significantly decreased, the authors conclude. Current screening programs are leading to “potential tumor over detection and over treatment,” they write in the Oct. 21, 2009 issue of JAMA.

“Screening does provide some benefit, but the problem is that the benefit is not nearly as much as we hoped and comes at the cost of over diagnosis and over treatment,” said Laura Esserman, MD, MBA, professor of surgery and radiology, director of the UCSF Carol Franc Buck Breast Care Center, and co-leader of the breast oncology program at the UCSF Helen Diller Family Comprehensive Cancer Center.

“We need to focus on developing new tools to identify men and women at risk for the most aggressive cancers, to identify at the time of diagnosis those who have indolent or ‘idle’ tumors that are not life-threatening,” she added. “If we can identify groups of patients that don’t need much treatment, or don’t need to be screened, wouldn’t that be great? Screening is by no means perfect. We should want to make it better. For both breast and prostate cancer we need to invest in changing our focus from the cancers that won’t kill people to the ones that do.”

Breast cancer, the most common cancer in women, is a devastating and costly disease, striking more than 200,000 women annually and killing more than 40,000 women each year, reports the American Cancer Society. Prostate cancer is the most common form of cancer in men and the second most common cause of cancer death after lung cancer. This year, an estimated 192,280 men will be diagnosed with the disease, and 27,360 men will die from it, according to estimates from the American Cancer Society.

The two diseases account for 26 percent of all cancers in the U.S., with an estimated 386,560 patients diagnosed annually.

Because of remarkable survival rates when the diseases are treated before they spread, screening for both cancers has been promoted on the assumption that early detection and treatment is the best way to reduce deaths. In turn, much of the U.S. population undergoes routine screening for the cancers: About half of at-risk men have a routine prostate-specific antigen test and 75 percent have previously had a PSA test, and about 70

percent of women older than 40 report having had a recent mammogram. More than $20 billion is spent annually screening for the two diseases in the U.S.

The screenings have resulted in a "significant increase" in early cancers being detected, according to the article authors. Because of PSA testing, the chances of a man being diagnosed with prostate cancer have nearly doubled: In 1980, a white man's lifetime risk of the cancer was 1 in 11; today it is 1 in 6. Similarly, a woman's lifetime risk of breast cancer was 1 in 12 in 1980; today it is 1 in 8. And, if ductal carcinoma in situ is included, the risk of being diagnosed with breast cancer, like prostate cancer, has nearly doubled as well.

But the authors found that while deaths have dropped for both cancers over the last 20 years, "the contribution from screening is uncertain." They also found that many patients are undergoing treatment from cancers that actually pose minimal risk.

A comparison of prostate cancer incidence rates in the U.S. to the United Kingdom, where PSA screening has not been widely adopted, "did not result in significant differences in mortality," the authors write. For breast cancer the relative reduction in deaths from screening has also been limited.

The authors said that breast cancer and prostate cancer screening has not led to a more significant drop in deaths in the U.S. for two primary reasons: Screening increases the detection of slow growing and indolent tumors, and it often misses the most aggressive cancers because many may not be detected early enough for cure. "In other words, tumor biology dictates and trumps stage, so the basic assumption of these screening programs that finding and treating early stage disease will prevent late stage or metastatic disease may not always be correct," they state.

Periodic screening may find some tumors early, but patients may not be screened often enough for lethal tumors to be detected in time to prevent death, the authors conclude: "Without the ability to distinguish cancers that pose minimal risk from those posing substantial risk and with highly sensitive screening tests, there is an increased risk that the population will be over-treated."

"People will think that we're saying screening is bad, and nothing could be further from the truth," said Ian Thompson, MD, who has authored about 400 scientific articles addressing prevention, early detection, and treatment for prostate, kidney, and bladder cancers. "What we are saying is that if you want to stop suffering and death from these diseases, you can't rely on screening alone."

"The basic assumption that screening programs that find and treat early stage disease will then prevent late-stage disease, or prevent cancer from spreading, may not always be correct," added Thompson. "If a tumor is aggressive, finding it early may not prevent death."

Thompson is professor and chairman of the Department of Urology and holds the Glenda and Gary Woods Distinguished Chair in Genitourinary Oncology at the Cancer Therapy & Research Center at the UT Health Science Center at San Antonio and the Henry B. and the Edna Smith Dielmann Memorial Chair in Urologic Science at the UT Health Science Center. He led the Prostate Cancer Prevention Trial, a study of 18,882 men from around the U.S. that demonstrated that the drug finasteride reduces a man's risk of prostate cancer by 24.8 percent.

In contrast to breast and prostate cancer, screening for cervical and colon cancer - and the removal of abnormal tissue – has led to a significant drop in invasive cancer. Screening is "most successful when pre-malignant lesions can be detected and eliminated" such as during colonoscopies, said the authors.

The authors suggest that to improve screening, "a new focus is recommended for research and care to identify markers that discriminate minimal-risk from high-risk disease (and) identify less aggressive interventions for minimal-risk disease to reduce treatment burden for patients and society."

The authors list four recommendations in their call to action for early detection and prevention:

1. Develop tests to distinguish between cancers that are lethal and those that are low-risk.
2. Reduce treatment for low-risk disease. Diagnosing cancers that don't kill the patient has led to treatment that may do more harm than good.
3. Develop tools for physicians and patients to help them make informed decisions about prevention, screening, biopsy and treatment. Offer treatments individually tailored to a patient's tumor.
4. Work to identify the people at highest risk for cancer and use proven preventive interventions.

"Over the years we have worked hard to find new treatments and new ways of finding disease and many of these interventions when appropriately assessed have saved lives," said Otis W. Brawley, MD, chief medical officer of the American Cancer Society, and professor of hematology, oncology and epidemiology at Emory University.

"It is very appropriate that we occasionally step back, assess and reflect on what we in medicine are doing," he added. "In the case of some screening for some cancers, modern medicine has overpromised. Some

of our successes are not as significant as first thought. Cancer is a complicated disease and too often we have tried to simplify it and simplify messages about it, to the point that we do harm to those we want to help."
Yiwey Shieh, a medical student at the UCSF Medical School and former research assistant with Esserman, is also a co-author of the article.

UF scientists discover new explanation for controversial old patient-care technique

GAINESVILLE, Fla. - You might not know what it's called, but if you've had general anesthesia before surgery, especially after an accident, it is likely you have received Sellick's maneuver. That's when fingers are pressed against a patient's throat to prevent regurgitation and spilling of stomach contents into the airway and lungs while anesthesia is being administered. Such regurgitation could result in serious lung damage and even death.

The maneuver is a longstanding practice, first described in 1961 by British physician Brian Sellick. Performed dozens of times a day in hospitals, the procedure is accepted as "standard of care" and is a basic skill taught in all anesthesiology training programs. Anesthesiologists estimate conservatively that more than 100,000 people a year undergo the procedure.

But recently some physicians have begun to question the technique in the wake of a study challenging its effectiveness and ease of execution. And some have stopped using it altogether.

Now, researchers from University of Florida College of Medicine have used magnetic resonance imaging of the neck region to show that the maneuver works and that doubts about its effectiveness are based on a misunderstanding of what physical changes happen in the neck during the procedure.

"Sellick was right that the maneuver works - but he was a bit off on the anatomy," said UF anesthesiologist Mark J. Rice, M.D., who led the study now online and to be featured on the cover of the November edition of the journal Anesthesia & Analgesia. The journal will also include two editorials on the controversial topic side by side with the UF paper, which has been selected by the editorial board as this month's graduate medical education article for November.

Also called cricoid pressure, the eponymous maneuver has for decades been described as the pinching of the esophagus between the cricoid - a ring of cartilage that surrounds the trachea - and the neck vertebrae.

It is most often used in accident victims whose stomachs might not be empty before surgery, or in patients who have bowel obstructions or slowed emptying of the stomach because of certain drugs or medical conditions.

Some doctors say that the procedure is hard to get right, and that not applying enough pressure and at a proper angle would cancel out any benefit.

A 2003 paper further cast strong doubt on the procedure's effectiveness with a finding that in 90 percent of cases, the esophagus moves to the side during the procedure. It is generally thought that the procedure is effective only if done at the midline of the neck. So researchers concluded that such movement of the esophagus means the maneuver can't effectively prevent regurgitation.

The UF researchers used open MRI imaging of the neck while the procedure was administered to volunteers. That allowed the person performing the technique to do so unimpeded, and increased the chance of reproducing how the procedure is carried out in a clinical setting.

It turns out, the imaging studies show, that the esophagus does not exist at that point in the neck where the procedure is done. Instead, it is a structure called the hypopharynx - above the esophagus - that gets pinched between the cricoid and the bones of the neck. The esophagus exists only lower down, near the shoulders. So movement of the esophagus doesn't affect the procedure since it is not involved, Rice and co-authors Lori Deitte, M.D., Anthony Mancuso, M.D., Nikolaus Gravenstein, M.D., Charles Gibbs, M.D., and Timothy Morey, M.D. found. "This is a major error that's been in the literature for 50 years," said Rice, who is chief of liver transplantation in UF's department of anesthesiology.

As for the sideways movement, the study showed that the hypopharynx and cricoid structures move together, so effective compression is achieved even if it is pushed to the side in the process.
"It turns out it doesn't matter," Rice said. The new findings serve to reassure doctors that the procedure works, and that they don't have to do it "perfectly" for it to be effective.

"Astonishingly enough, our previous assumptions are totally wrong," said professor Scott Springman, M.D., director of ambulatory anesthesia at the University of Wisconsin-Madison. "Now I can explain to my residents more accurately why we're doing it. I will use it in more situations than I would if I still had grave doubts about its efficacy."

Although the study doesn't prove directly that Sellick's maneuver prevents regurgitation, that is reasonably inferred from the images.

"Because of Dr. Rice's study, Sellick's maneuver has again been shown to have anatomic efficacy, despite it occurring in a way that is different from the classic description," Springman said. "It also shows us that previous assumptions are not always correct, and that new technology can help us refine our hypotheses."

When Parents Are Too Toxic to Tolerate

By RICHARD A. FRIEDMAN, M.D.

You can divorce an abusive spouse. You can call it quits if your lover mistreats you. But what can you do if the source of your misery is your own parent? Granted, no parent is perfect. And whining about parental failure, real or not, is practically an American pastime that keeps the therapeutic community dutifully employed. But just as there are ordinary good-enough parents who mysteriously produce a difficult child, there are some decent people who have the misfortune of having a truly toxic parent.

A patient of mine, a lovely woman in her 60s whom I treated for depression, recently asked my advice about how to deal with her aging mother.

"She's always been extremely abusive of me and my siblings," she said, as I recall. "Once, on my birthday, she left me a message wishing that I get a disease. Can you believe it?"

Over the years, she had tried to have a relationship with her mother, but the encounters were always painful and upsetting; her mother remained harshly critical and demeaning. Whether her mother was mentally ill, just plain mean or both was unclear, but there was no question that my patient had decided long ago that the only way to deal with her mother was to avoid her at all costs. Now that her mother was approaching death, she was torn about yet another effort at reconciliation. "I feel I should try," my patient told me, "but I know she'll be awful to me." Should she visit and perhaps forgive her mother, or protect herself and live with a sense of guilt, however unjustified? Tough call, and clearly not mine to make.

But it did make me wonder about how therapists deal with adult patients who have toxic parents. The topic gets little, if any, attention in standard textbooks or in the psychiatric literature, perhaps reflecting the common and mistaken notion that adults, unlike children and the elderly, are not vulnerable to such emotional abuse.

All too often, I think, therapists have a bias to salvage relationships, even those that might be harmful to a patient. Instead, it is crucial to be open-minded and to consider whether maintaining the relationship is really healthy and desirable. Likewise, the assumption that parents are predisposed to love their children unconditionally and protect them from harm is not universally true.

I remember one patient, a man in his mid-20s, who came to me for depression and rock-bottom self-esteem. It didn't take long to find out why. He had recently come out as gay to his devoutly religious parents, who responded by disowning him. It gets worse: at a subsequent family dinner, his father took him aside and told him it would have been better if he, rather than his younger brother, had died in a car accident several years earlier.

Though terribly hurt and angry, this young man still hoped he could get his parents to accept his sexuality and asked me to meet with the three of them. The session did not go well. The parents insisted that his "lifestyle" was a grave sin, incompatible with their deeply held religious beliefs. When I tried to explain that the scientific consensus was that he had no more choice about his sexual orientation than the color of his eyes, they were unmoved. They simply could not accept him as he was.

I was stunned by their implacable hostility and convinced that they were a psychological menace to my patient. As such, I had to do something I have never contemplated before in treatment.

At the next session I suggested that for his psychological well-being he might consider, at least for now, forgoing a relationship with his parents. I felt this was a drastic measure, akin to amputating a gangrenous limb to save a patient's life. My patient could not escape all the negative feelings and thoughts about himself that he had internalized from his parents. But at least I could protect him from even more psychological harm.

Easier said than done. He accepted my suggestion with sad resignation, though he did make a few efforts to contact them over the next year. They never responded.

Of course, relationships are rarely all good or bad; even the most abusive parents can sometimes be loving, which is why severing a bond should be a tough, and rare, decision.

Dr. Judith Lewis Herman, a trauma expert who is a clinical professor of psychiatry at Harvard Medical School, said she tried to empower patients to take action to protect themselves without giving direct advice. "Sometimes we consider a paradoxical intervention and say to a patient, 'I really admire your loyalty to your parents - even at the expense of failing to protect yourself in any way from harm,' " Dr. Herman told me in an interview.

The hope is that patients come to see the psychological cost of a harmful relationship and act to change it.

Eventually, my patient made a full recovery from his depression and started dating, though his parents' absence in his life was never far from his thoughts.

No wonder. Research on early attachment, both in humans and in nonhuman primates, shows that we are hard-wired for bonding - even to those who aren't very nice to us. We also know that although prolonged

childhood trauma can be toxic to the brain, adults retain the ability later in life to rewire their brains by new experience, including therapy and psychotropic medication.

For example, prolonged stress can kill cells in the hippocampus, a brain area critical for memory. The good news is that adults are able to grow new neurons in this area in the course of normal development. Also, antidepressants encourage the development of new cells in the hippocampus.

It is no stretch, then, to say that having a toxic parent may be harmful to a child's brain, let alone his feelings. But that damage need not be written in stone.

Of course, we cannot undo history with therapy. But we can help mend brains and minds by removing or reducing stress. Sometimes, as drastic as it sounds, that means letting go of a toxic parent.

Dr. Richard A. Friedman is a professor of psychiatry at Weill Cornell Medical College.

Study conclusively ties rare disease gene to Parkinson's

Risk of Parkinson's disease is 5 times greater for Gaucher disease carriers

An international team led by a National Institutes of Health researcher has found that carriers of a rare, genetic condition called Gaucher disease face a risk of developing Parkinson's disease more than five times greater than the general public. The findings were published today in the New England Journal of Medicine.

In previous studies, several genes have been linked to Parkinson's disease. However, researchers say their work conclusively shows that mutations in the gene responsible for Gaucher disease are among the most significant risk factors found to date for Parkinson's disease. The discovery was made by investigators from the National Human Genome Research Institute (NHGRI) and the National Institute on Aging (NIA), both parts of the National Institutes of Health, in collaboration with scientists from 16 research centers across four continents.

"This analysis illustrates how studying a rare but important disorder, like Gaucher disease, can provide powerful clues about more common disorders, such as Parkinson's disease," said NHGRI Scientific Director Eric Green, M.D., Ph.D. "Understanding the genetic basis of rare conditions can thus provide insights into normal cellular and biological processes, which in turn may lead to improved diagnostic and therapeutic strategies."

Parkinson's disease, a neurological condition that typically causes tremors and stiffness in movement, affects about 1 to 2 percent of people over the age of 60. The chance of developing Parkinson's disease increases with age and involves a combination of environmental risk factors and genetic susceptibility.

Gaucher disease occurs when an individual inherits two defective copies of the GBA gene, which codes for an enzyme called glucocerebrosidase. This enzyme breaks down a fatty substance called glucocerebroside, which, when not properly disposed of, can harm the spleen, liver, lungs, bone marrow and, in some cases, the brain. The enzyme functions in a part of the cell called the lysosome, where cellular components are broken down, or metabolized, for recycling.

In the past, it was thought that people who carry just one altered GBA gene were unaffected. However, in recent years, research groups at NHGRI and elsewhere have completed small studies suggesting that carriers of GBA alterations may have an increased risk of developing Parkinson's disease.

"The opportunity was right to amass the data into one powerful study," said Ellen Sidransky, M.D., senior investigator in NHGRI's Medical Genetics Branch, who is the lead author of the study and coordinated the effort. "Our analyses of the accumulated data provide a convincing association between GBA alterations and Parkinson's disease."

The research team examined the frequency of GBA alterations in 5,691 patients with Parkinson's disease, including 780 Ashkenazi Jews, a population in which a particular type of Gaucher disease is more prevalent. Those data were matched against 4,898 unaffected volunteers, called controls, which included 387 Ashkenazi Jews. At least one of the two common GBA alterations was found in 3.2 percent of Parkinson's patients and 0.6 percent of controls. Among the Ashkenazi subjects, 15.3 percent of those with Parkinson's disease carried a GBA alteration compared to 3.4 percent of Ashkenazi controls.

In addition to screening for the two common alterations, five of the research centers sequenced the entire GBA gene in 1,642 non-Ashkenazi patients with Parkinson's disease and 609 non-Ashkenazi controls. Using this more thorough method, they found many additional alterations associated with Parkinson's disease, and showed that 7 percent of patients carried an alteration, indicating that it is important to look beyond the two common alterations to gain a true picture of risk in the general population.

Besides significantly increasing the risk of Parkinson's disease, GBA alterations also appear to increase the likelihood of early disease onset. According to the new study, Parkinson's patients with GBA alterations developed symptoms an average of four years earlier than other Parkinson's patients.

Overall, the researchers found that the association between GBA and Parkinson's disease is not confined to any single ethnicity or to specific GBA mutations, though they did find that some gene alterations are seen

more frequently in certain populations. Compared with the general population, in which GBA alterations occur in fewer than one out of 100 people, GBA alterations occur in at least one out of 16 people of Ashkenazi descent. However, many GBA mutation carriers as well as patients with Gaucher disease never develop Parkinson's disease, so this appears to be only one of several risk factors involved.

Further research is in progress to understand the full spectrum GBA alterations, their biological significance and their association with both Parkinson's and Gaucher disease. The researchers are also pursuing ways to provide more accurate guidance based on the findings for genetic counseling and for the development of new therapeutic strategies for these disorders.

Along with NIH, the study included research centers in New York City, Jacksonville, Fla. and Seattle, as well as in Brazil, Canada, France, Germany, Israel, Italy, Japan, Norway, Portugal Singapore and Taiwan. The data were collected and analyzed at NHGRI.

For information about Parkinson's disease, go to http://www.genome.gov/10001217, and for Gaucher disease, go to http://www.genome.gov/25521505.

Study reveals possible link between autism and oxytocin gene via non-DNA sequence mutation

A new study indicates a link between autism and alterations to the oxytocin receptor, OXTR, caused by inherited alterations that do not involve DNA sequence mutation. The study, published in the open access journal BMC Medicine, identified the non-DNA change in 'OXTR' via an autistic child and his mother, who potentially has obsessive-compulsive disorder.

Dr Simon Gregory headed up a team from the US, UK and Italy, who analysed the DNA of 119 people with autism and 54 neurotypical individuals. He said, "As many as 1 in 150 children in the US are born with a form of autism. We have shown that the non-DNA sequence mutation in the gene responsible for the oxytocin receptor is altered in both peripheral blood cells and the temporal cortex of the brain".

The oxytocin pathway has many known effects, from facilitating breast-feeding to childbirth and social interaction. This discovery shows that it also plays a major role in human development.

Dr Gregory concludes, "This study provides additional evidence for the role of oxytocin and its receptor in the development of autism. It also shows that autism will be caused by a number of different factors, not just those involving the sequence of our genomes".

1. Genomic and epigenetic evidence for oxytocin receptor deficiency in autism

Simon G Gregory, Jessica J Connelly, Aaron J Towers, Jessica Johnson, Dhani Biscocho, Christina A Markunas, Carla Lintas, Ruth K Abramson, Harry H Wright, Peter Ellis, Cordelia F Langford, Gordon Worley, G Robert Delong, Susan K Murphy, Michael L Cuccaro, Antonello Persico and Margaret A Pericak-Vance BMC Medicine (in press)

Subterranean microbes revive tired old gas fields

* 21 October 2009 **by Colin Barras**

WHATEVER you may think of our addiction to fossil fuels, there is no shortage of ideas on how to extract every last tonne. Field trials are now showing that all it takes is common fertiliser.

Natural gas is often present in coalfields, clinging to the coal. It is extracted through wells drilled into the coal seam, but once production tails off the industry usually moves on.

That's when biogenic methane companies propose to move in. By pumping water and nutrients back down the wells to feed microbes living in the coal they expect to be able to kick-start the microbes' methane-producing metabolism. More gas can then be harvested.

The US Geological Survey and CSIRO, the Australian national science agency, have been exploring the idea for a number of years. "We have shown that this process works on coal in the lab, and I think that it will be possible to make it work on an industrial scale," says Phil Hendry at CSIRO in North Ryde, New South Wales. The Canadian company Profero Energy intends to test biogenic methane technology in Canadian tar sands (New Scientist, 18 April, p 8).

Although biogenic methane produced this way has been on the agenda for several years, it's unclear which methods will work best, says Elizabeth Jones, a microbiologist at the US Geological Survey.

Mark Finkelstein, vice president of biosciences at Luca Technologies, a firm based in Golden, Colorado, begs to differ. In field experiments in 2007, his company generated enough gas from 100 leased wells in Wyoming to heat 16,000 homes for a year. Finkelstein will not give details of the nutrients his company uses to fertilise the subterranean organisms, but says you could buy most of them "off the shelf".

The results of the 2007 experiment were compelling: "We made 1 billion cubic feet [30 million cubic metres] of methane," Finkelstein says. That's above and beyond what would have been made without the nutrients.

Money from the sale of the extra gas was split between Luca and the wells' owner, who Finkelstein says does not wish to be named. "Most of Luca's expenses in 2008 and part of 2009 were covered by gas sales," he says.

The company now owns and "farms" some 630 wells in the US that the traditional industry classifies as marginal. By the end of this year that number will have risen to 1000, Finkelstein says.

He points out that utility companies are considering converting from coal to methane to cut down on their carbon footprint. "Luca's technology can help make this transformation more reliable and economic," he says. He is also keen to point out that Luca makes use of existing infrastructure. "The wells have been drilled and the roads, pipes and compressors to capture gas are already there."

"Given the demand for fossil fuels, it seems to me inevitable that such 'exotic' forms of fossil carbon will be developed and exploited," says Myles Allen, head of the Climate Dynamics group at the University of Oxford. "This all points to the need to neutralise their impact on climate by developing and implementing technologies for carbon capture and sequestration."

A scientific basis the 'golden rule' of pairing wines and foods

Scientists in Japan are reporting the first scientific explanation for one of the most widely known rules of thumb for pairing wine with food: "Red wine with red meat, white wine with fish." The scientists are reporting that the unpleasant, fishy aftertaste noticeable when consuming red wine with fish results from naturally occurring iron in red wine. The study is in ACS' Journal of Agricultural and Food Chemistry, a bi-weekly publication.

IMAGE: Iron is a key factor in the unpleasant aftertaste of certain wine-seafood pairings, a new study indicates.

Takayuki Tamura and colleagues note that wine connoisseurs established the rule of thumb because of the flavor clash between red wine and fish. They point out, however, that there are exceptions to the rule, with some red wines actually going well with seafood. Until now, nobody could consistently predict which wines might trigger a fishy aftertaste because of the lack of knowledge about its cause.

The scientists asked wine tasters to sample 38 red wines and 26 white wines while dining on scallops. Some of the wines contained small amounts of iron, which varied by country of origin, variety, and vintage. They found that wines with high amounts of iron had a more intensely fishy aftertaste. This fishy taste diminished, on the other hand, when the researchers added a substance that binds up iron. The findings indicate that iron is the key factor in the fishy aftertaste of wine-seafood pairings, the researchers say, suggesting that low-iron red wines might be a good match with seafood.

"Iron Is an Essential Cause of Fishy Aftertaste Formation in Wine and Seafood Pairing"

Earliest evidence of humans thriving on the savannah

* 18:07 21 October 2009 **by Shanta Barley**

Humans were living and thriving on open grassland in Africa as early as 2 million years ago, making stone tools and using them to butcher zebra and other animals. That's according to powerful evidence from artefacts found at Kanjera South, an archaeological site in south-west Kenya.

"There is no clear evidence of any hominin being associated with or foraging in open grassland prior to this 2-million-year-old site," says Thomas Plummer of Queens College at the City University of New York.

All of the other earlier hominins that have been found in the geological record – such as Ardipithecus ramidus and Australopithecus afarensis – known as Ardi and Lucy, respectively - lived either in dense forest or in a mosaic of woodland, shrub and grasses, says Plummer.

The Kanjera South site now offers a glimpse into the lives of our ancestors as they were starting to adapt to life on the plains. "The site occurs in a grassland setting, dominated by grass-eating animals, and is thus the first clear evidence that grasslands were indeed part of the diversity of environments inhabited by early human tool-makers," says team member Richard Potts of the Smithsonian Institution's National Museum of Natural History in Washington DC.

Carbon captured

Plummer's team first started excavating Kanjera South in the 1990s, in search of primitive toolkits consisting of hammer stones, stone cores that were struck to create sharp edges, and stone slivers. In the process, they uncovered the fossils of 2190 different animals and 2471 tools, all deposited within a window of just decades to a few centuries.

To investigate whether they were standing on the site of ancient grassland, Plummer's team analysed the ratio of carbon-13 to carbon-12 in the soil and in the tooth enamel of the fossilised animals. Grass has a higher ratio than trees and shrubs. Both the soil and the tooth enamel of fossilised animals had similarly high ratios.

"These tests showed that the Kanjera site was over 75 per cent grassland 2 million years ago, and that the wider area was teeming with zebras, antelope and other grazers," says Plummer. The telltale carbon isotope ratio was seen in all the animals, suggesting they were all grazing on grass. "This is not what you would see if you were drawing this faunal sample from a heavily wooded region, with a small patch of grassland in it."

The team also found that the site was littered with the fossils of young, butchered zebra carcasses. The youth of the prey suggested that the hominins were hunting these animals rather than scavenging for them.

Open seasons

Plummer's team also found that the ancient humans who lived in Kanjera 2 million years ago carried stone raw materials over surprisingly long distances. "These early humans carried high-quality, hard stone from over 13 kilometres away to the site," says Plummer.

"This is the first really convincing and comprehensive demonstration of an early hominin living on grassland," says anthropologist Bernard Wood of George Washington University in Washington DC.

Rene Bobe at the University of Georgia in Athens, agrees: "This finding actually shows something that has been suspected; that hominids were occupying grasslands by 2 million years ago and that this kind of open environment likely played a key role in the evolution of human adaptations."

Journal reference: ***PLoS ONE, DOI: 10.1371/journal.pone.0007199***

Alzheimer's lesions found in the retina

Eyes are potential gateway to quicker diagnosis, treatment, UCI study suggests

Irvine, Calif. - The eyes may be the windows to the soul, but new research indicates they also may mirror a brain ravaged by Alzheimer's disease.

UC Irvine neuroscientists have found that retinas in mice genetically altered to have Alzheimer's undergo changes similar to those that occur in the brain - most notably the accumulation of amyloid plaque lesions.

In addition, the scientists discovered that when Alzheimer's therapies are tested in such mice, retinal changes that result might predict how the treatments will work in humans better than changes in mouse brain tissue.

These findings are key to developing retinal imaging technology that may help diagnose and treat people with Alzheimer's, which afflicts 5.3 million people in the U.S. and is the leading cause of elderly dementia. Brain imaging techniques are being tested, but retinal imaging could be less invasive, less expensive and easier to perform.

"It's important to discover the pathological changes before an Alzheimer's patient dies," said Zhiqun Tan, a UCI neuroscientist leading the research. "Brain tissue isn't transparent, but retinas are. I hope in the future we'll be able to diagnose the disease and track its progress by looking into the eyes."

For a study appearing in the November issue of The American Journal of Pathology, Tan and colleagues analyzed the retinas of Alzheimer's mice that had been treated with immunotherapy.

Vaccinated mice performed better on learning and memory tests than untreated mice, and their brains had fewer plaque lesions. Similarly, retinas in the treated mice had fewer lesions than in untreated mice. However, the treated mice's retinas had worse inflammation and vascular changes associated with Alzheimer's than did their brains. When immunotherapy was tested in humans, inflammation of brain tissue occurred similar to that observed in the mice retinas. "This tells us the retina may be more sensitive at reflecting changes in the human brain," Tan said.

UCI researchers, including Dr. Steven Schreiber, neurology professor and interim chair, are working on retinal imaging technology for Alzheimer's patients.

"New ways to view various body parts with high resolution are being invented at a rapid pace," Schreiber said. "I expect the imaging field will continue improving as we progress in developing our retinal technique."

In addition to Tan and Schreiber, UCI's Bingqian Liu, Suhail Rasool and Charles Glabe contributed to the study, along with Zhikuan Yang and Jian Ge of the Zhongshan Ophthalmic Center in China. Liu also is affiliated with the center. The UCI scientists are from the departments of neurology, molecular biology & biochemistry, and anatomy & neurobiology, as well as the Institute for Memory Impairments and Neurological Disorders, or UCI MIND.

The research was supported by the Alzheimer's Drug Discovery Foundation, the National Basic Research Program of China, the UC Discovery Grant Program, and the Larry L. Hillblom Foundation.

First in New York: Bionic technology aims to give sight to woman blinded beginning at age 13

Electronic eye implanted at NewYork-Presbyterian Hospital/Columbia mimics human retina

NEW YORK - A 50-year-old New York woman who was diagnosed with a progressive blinding disease at age 13 was implanted with an experimental electronic eye implant that has partially restored her vision. A team led by Dr. Lucian V. Del Priore at NewYork-Presbyterian Hospital/Columbia University Medical Center performed the June 26 surgery - the first case of its kind in New York. The first treatment aimed at restoring limited sight in people blinded by retinal disease, it is currently available as part of a multicenter clinical trial.

The implant -- a component of the Argus™ II Retinal Stimulation System by Second Sight® Medical Products Inc., of Sylmar, Calif. -- is designed to stimulate retinal cells directly. In a healthy eye, photoreceptor cells of the retina receive light and translate it into signals that are sent to the brain via the optic nerve. But in

patients with a genetic, blinding disease called retinitis pigmentosa (RP), these light-processing cells gradually degenerate, leading to severe vision loss or total blindness.

"With this system, people who are functionally blind might begin to distinguish light from dark, recognize visual patterns, make out figures, see food on a plate and navigate in unfamiliar surroundings," says Dr. Del Priore, site principal investigator, professor in the Department of Ophthalmology at Columbia University College of Physicians and Surgeons, and an ophthalmologist at NewYork-Presbyterian Hospital/Columbia University Medical Center. "In its current form, the device won't restore full visual function -- but if it dramatically reduces a patient's disability, that is a major advance."

Retinitis pigmentosa only affects the outer layer of retinal cells, leaving the inner layers healthy and capable of conducting electricity, Dr. Del Priore explains. Therefore, people with glaucoma, diabetic retinopathy, optic nerve disease, or a history of retinal detachment have been excluded from the study, as their level of retinal impairment is likely to be more severe and more generalized. At this point, the device is being tested exclusively in people with RP as part of a clinical trial offered at six sites across the country.

From Video Images to Sight

Argus II and its predecessor, Argus I, have already been implanted to reduce some aspects of vision loss in about 20 patients with RP in the United States. Dr. Del Priore and his surgical team are optimistic about the newest patient's prospects, based on positive results in others who have participated in studies of the system thus far. The device was developed by Second Sight under the lead of Dr. Mark Humayun, who is currently at the University of Southern California. NewYork-Presbyterian/Columbia's study coordinator, Elona Gavazi, was instrumental in screening and recruiting patients for the current study.

Argus II comprises three components: the implanted part, which is placed inside the patient's eye; a tiny camera and transmitter, mounted on a pair of sunglasses; and a wireless microprocessor and battery pack, to be worn on a belt. The implant itself contains 60 tiny electrodes that are attached to the retina via a micro-wire roughly the width of a human hair. These administer electrical impulses to retinal cells, allowing the brain to perceive light.

Learning to See Again

Argus II is an innovative technology, Dr. Del Priore continues, but it is the rehabilitation process that will ensure a patient's ability to benefit from the procedure. In fact, without visual training, the patient may not learn to use or accept the images being received.

The intensive phase of rehab takes about six months, he says, but the process can continue for a year or more. Rehabilitation, device training, along with functional assessment of the patient's vision, will take place at Lighthouse International, a leading international non-profit vision rehabilitation and research organization, which is a collaborating institution with NewYork-Presbyterian/Columbia in the clinical trial.

At the Arlene R. Gordon Research Institute of Lighthouse International, senior fellow in vision science Aries Arditi, Ph.D., principal investigator of the Lighthouse site, will conduct psychophysical testing of the patient with and without the device to assess her performance of specific visual tasks, such as pattern recognition, aiming the device's camera with head movements, and using the system for orientation and navigation. Dr. Arditi will also help determine which training procedures will allow the patient to make the most of her newly restored, if limited, vision -- insights that can be carried forward for the benefit of future device recipients.

"We are very pleased to be a part of this groundbreaking and exciting research and to be working with such outstanding partners. Our collective work could have a profound effect on the estimated 400,000 Americans with retinitis pigmentosa and other retinal diseases," states Dr. Arditi.

Sun's rain could explain why corona heat is insane

* 00:01 22 October 2009 **by David Shiga**

THE sun's million-degree outer atmosphere is the last place you would expect to find rain, yet a form of it does occur there. The stuff could help explain why the sun's outer atmosphere, or corona, is much hotter than closer in.

Coronal rain is made of dense knots thousands of kilometres across consisting of relatively cold gas, at tens or hundreds of thousands of degrees C, which pours down towards the sun's visible surface from the outer atmosphere at speeds exceeding 100 kilometres per second. "There's just this constant rain of these blobs that seem to be coming down from high up," says Judy Karpen of NASA's Goddard Space Flight Center in Greenbelt, Maryland.

Coronal rain forms in the sun's outer atmosphere

Now simulations seem to show that the coronal rain is a result of the process that makes the corona so hot. Two theories have previously been put forward to explain the anomaly. One suggests the corona is heated via small explosions called nanoflares lower in the atmosphere. These would push gas up into the corona, where it radiates away its energy. The other suggests the heat energy is deposited by magnetic waves rippling through the corona.

When Patrick Antolin and Kazunari Shibata of Kyoto University, Japan, simulated the two processes, they found gas heated from below by nanoflares could cool and condense higher up to make the rain, whereas the magnetic waves kept the high-altitude gas too hot to condense.

"It's a little bit like raindrops condensing," says Daniel Müller, a European Space Agency scientist based at the NASA Goddard Space Flight Center. The gas rises "like steam evaporating from a boiling pot of water,", he says. "Then it cools down and when it gets really dense it forms these blob- like features."

Journal reference: www.arxiv.org/abs/0910.2383

Reduced genome works fine with 2000 chunks missing

* 22 October 2009 **by Andy Coghlan**

IT'S the blueprint for life, but not all of our genome is truly mission-critical. Now the first systematic search for non-essential regions of the human genome is providing an estimate of the "minimal genome" needed by a healthy human being, as well as clues to our evolutionary history.

Previous studies suggested it is possible to lead a full and healthy life without every single bit of the genome. "You don't need a complete genome to be a complete person," says Terry Vrijenhoek of the Radboud University Nijmegen Medical Centre in the Netherlands.

To put a figure on how much of our DNA is non-essential, Vrijenhoek and his colleagues screened the genomes of 600 healthy students, searching for chunks of DNA at least 10,000 base pairs in length that were missing in some individuals. Across all the genomes, about 2000 such chunks were missing - amounting to about 0.12 per cent of the total genome.

Just over two-thirds of the "deletions" were found in more than one individual, and a third in more than 5 per cent of people in the study. The deletions disrupted 39 known genes, most of which are involved in immune defence, smell and other senses. Vrijenhoek will present the results on 24 October at the annual meeting of the American Society of Human Genetics in Honolulu, Hawaii.

Why do we have non-essential DNA? Team leader Joris Veltman suggests that the regions his team flagged up may once have been essential but aren't any more, either because we now need different abilities to survive, or genes have evolved elsewhere in the genome to do the same job, perhaps better.

Earlier this year researchers at the Sanger Institute in Cambridge, UK, used a scan of disrupted genes to estimate that around 1 in 200 genes is non-essential. Veltman says his team is the first to search the whole human genome - not just genes - for non-essential elements.

About 2000 chunks of DNA, some of which disrupted genes, were found to be non-essential

He notes that which genes are non-essential may vary between ethnic groups.

New UK study suggests minimal relationship between cannabis and schizophrenia or psychosis

Last year the UK government reclassified cannabis from a class C to a class B drug, partly out of concerns that cannabis, especially the more potent varieties, may increase the risk of schizophrenia in young people. But the evidence for the relationship between cannabis and schizophrenia or psychosis remains controversial. A new study has determined that it may be necessary to stop thousands of cannabis users in order to prevent a single case of schizophrenia.

Scientists from Bristol, Cambridge and the London School of Hygiene and Tropical Medicine took the latest information on numbers of cannabis users, the risk of developing schizophrenia, and the risk that cannabis use causes schizophrenia to estimate how many cannabis users may need to be stopped to prevent one case of schizophrenia. The study found it would be necessary to stop 2800 heavy cannabis users in young men and over 5000 heavy cannabis users in young women to prevent a single case of schizophrenia. Among light cannabis users, those numbers rise to over 10,000 young men and nearly 30,000 young women to prevent one case of schizophrenia.

That's just part of the story. Interventions to prevent cannabis use typically do not succeed for every person who is treated. Depending on how effective an intervention is at preventing cannabis use, it would be necessary to treat even higher numbers of users to achieve the thousands of successful results necessary to prevent a very few cases of schizophrenia.

Matt Hickman, one of the authors of the report published last week in the scholarly journal Addiction, said that "preventing cannabis use is important for many reasons – including reducing tobacco and drug dependence

and improving school performance. But our evidence suggests that focusing on schizophrenia may have been misguided. Our research cannot resolve the question whether cannabis causes schizophrenia, but does show that many people need to give up cannabis in order to have an impact on the number of people with schizophrenia. The likely impact of re-classifying cannabis in the UK on schizophrenia or psychosis incidence is very uncertain."

Ancient 'Lucy' Species Ate A Different Diet Than Previously Thought

(PhysOrg.com) -- Research examining microscopic marks on the teeth of the "Lucy" species Australopithecus afarensis suggests that the ancient hominid ate a different diet than the tooth enamel, size and shape suggest, say a University of Arkansas researcher and his colleagues.

Peter Ungar, professor of anthropology, will present their findings on Oct. 20 during a presentation at the Royal Society in London, England, as part of a discussion meeting about the first 4 million years of human evolution.

A reconstruction of a female Australopithecus afarensis. **Image: Wikimedia Commons.**

"The Lucy species is among the first hominids to show thickened enamel and flattened teeth," an indication that hard, or abrasive foods such as nuts, seeds and tubers, might be on the menu, Ungar said. However, the microwear texture analysis indicates that tough objects, such as grass and leaves, dominated Lucy's diet.

"This challenges long-held assumptions and leads us to questions that must be addressed using other techniques," Ungar said. Researchers thought that with the development of thick enamel, robust skulls and large chewing muscles, these species had evolved to eat hard, brittle foods. However, the microwear texture analysis shows that these individuals were not eating such foods toward the end of their lives.

The researchers used a combination of a scanning confocal microscope, and scale-sensitive fractal analysis to create a microwear texture analysis of the molars from 19 specimens of A. afarensis, the Lucy species, which lived between 3.9 and 2.9 million years ago, and three specimens from A. anamensis, which lived between 4.1 and 3.9 million years ago. They looked at complexity and directionality of wear textures in the teeth they examined. Since food interacts with teeth, it leaves behind telltale signs that can be measured. Hard, brittle foods like nuts and seeds tend to lead to more complex tooth profiles, while tough foods like leaves generally lead to more parallel scratches, which corresponds with directionality.

"The long-held assumption was that with the development of thick enamel, robust skulls and larger chewing muscles marked the beginning of a shift towards hard, brittle foods, such as nuts, seeds and tubers," Ungar said. "The Lucy species and the species that came before it did not show the predicted trajectory."

Next they compared the microwear profiles of these two species with microwear profiles from Paranthropus boisei, known as Nutcracker Man that lived between 2.3 and 1.2 million years ago, P. robustus, which lived between 2 million and 1.5 million years ago, and Australopithecus africanus, which lived between about 3 million and 2.3 million years ago. They also compared the microwear profiles of the ancient hominids to those of modern-day primates that eat different types of diets.

The researchers discovered that microwear profiles of the three east African species, A. afarensis, A. anamensis and P. boisei, differed substantially from the two south African species, P. robustus and A. africanus, both of which showed evidence of diets consisting of hard and brittle food.

"There are huge differences in size of skull and shape of teeth between the species in eastern Africa, but not in their microwear," Ungar said. "This opens a whole new set of questions."

Ungar's colleagues include Robert S. Scott, assistant professor of anthropology at Rutgers University; Frederick E. Grine, professor of anthropology at Stony Brook University; and Mark F. Teaford, professor of anthropology at Johns Hopkins University.

Female choice benefits mothers more than offspring

The great diversity of male sexual traits, ranging from peacock's elaborate train to formidable genitalia of male seed beetles, is the result of female choice. But why do females choose among males? In a new study published today in Current Biology, researchers from Uppsala University found no support for the theory that the female choice is connected to "good genes".

The great diversity of male sexual traits, ranging from peacock's elaborate train to formidable genitalia of male seed beetles, is the result of female choice. But why do females choose among males? Remarkably, there is no consensus among biologists over the key question why females choose among males. At the heart of this debate lie two distinct possibilities - that female choosiness is beneficial to the females themselves or that female choice traits are favoured because of 'good genes' that males contribute to female's offspring.

Across animal kingdom, females often resist male advances and only a small fraction of mating attempts result in copulations. Mating is costly, and one straightforward explanation for female resistance is that non-resistant females will suffer a reduction in their fitness. However, by resisting mating attempts, females are selecting for most 'persistent' males. Could it be that offspring of such 'persistent' males have higher fitness? If yes, female resistance can be viewed as a way of selecting for males that provide their offspring with 'good genes'.

We manipulated female choosiness by altering female ability to reject unwanted males in Adzuki beetle. Female beetles are constantly harassed by ardent males and thwart male mating attempts by vigorously kicking the unwanted suitors with their hind legs. We fitted females with prongs that reduced male ability to impose copulations. Alternatively, we reduced females' ability to resist copulations by shortening their hind legs. Females with increased ability to reject male mating attempts had much higher fitness than females whose resistance was reduced. What about the 'good genes'?

“We found no support for the idea that increased female resistance to mating results in sons that are more successful in competition with other males, or in more fertile daughters. Hence, female resistance is mostly beneficial to the female herself, while inadvertent selection for male 'persistence' plays a minor role,” says Alexei Maklakov, who led the study.

Halloween sex offender policies questioned

Kids more at risk to get hit by a car while trick or treating

Los Angeles, London, New Delhi, Singapore and Washington DC (October 22, 2009) The rates of non-familial sex crimes against children under the age of 12 are no higher during the Halloween season than at any other times of the year, according to a study published in the September issue of Sexual Abuse: A Journal of Research and Treatment the official journal of the Association for the Treatment of Sexual Abusers (published by SAGE). The findings raise questions about the wisdom of law enforcement practices aimed at dealing with a problem that does not appear to exist.

Using the National Incident-Base Reporting System, the study looked at more than 67,000 non-family sex offenses reported to law enforcement in 30 states across nine years. Taking into account such variables as time, seasonality and weekday periodicity, the researchers found no increased rate of sexual abuse during the Halloween season. Additionally, the number of reported incidences didn't vary before or after police procedures were implemented to prevent such abuse.

"We do not suggest that there is no risk on Halloween or that parents should abandon caution and supervision of their children," write the authors in the article. "But there does not appear to be a need for alarm concerning sexual abuse on these particular days. In short, Halloween appears to be just another autumn day where rates of sex crimes against children are concerned."

Research has found that the highest danger for children during the Halloween season was from pedestrian-motor vehicle accidents, not from sexual abuse by strangers.

"It is important for policy makers to consider allocation of resources in light of the actual increased risks that exist in areas besides Halloween sex offender policies," the authors conclude. "Our findings indicated that sex crimes against children by nonfamily members account for 2 out of every 1,000 Halloween crimes, calling into question the justification for diverting law enforcement resources away from more prevalent public safety concerns."

"How Safe Are Trick-or-Treaters?: An Analysis of Child Sex Crime Rates on Halloween" in Sexual Abuse: A Journal of Research and Treatment was written by Mark Chaffin, University of Oklahoma Health Sciences Center; Jill Levenson, Lynn University; Elizabeth Letourneau, Medical University of South Carolina Family Services Research Center; and Paul Stern, Snohomish County Prosecutors Office. It is available free of charge for a limited time at http://sax.sagepub.com/cgi/reprint/21/3/363.

Patients in US 5 times more likely to spend last days in ICU than patients in England

Patients who die in the hospital in the United States are almost five times as likely to have spent part of their last hospital stay in the ICU than patients in England. What's more, over the age of 85, ICU usage among terminal patients is eight times higher in the U.S. than in England, according to new research from Columbia University that compared the two countries' use of intensive care services during final hospitalizations.

"Evaluating the use of intensive care services is particularly important because it is costly, resource intensive, and often traumatic for patients and families, especially for those at the end of life" said Hannah Wunsch, M.D., M.Sc., assistant professor of anesthesiology and critical care medicine, of Columbia University, lead author of the study. "We found far greater use of intensive care services in the United States during terminal hospitalizations, especially among medical patients and the elderly."

Their findings were published in the November 1 issue of the American Journal of Respiratory and Critical Care Medicine, published by the American Thoracic Society.

Dr. Wunsch and colleagues wanted to examine the differences in ICU usage in England and the U.S., because the countries' similar life expectancies and population demographics enabled a comparison of fundamentally different healthcare systems.

England has one-sixth the number of intensive care beds available per capita that are available in the U.S. Furthermore, medical decisions in England are generally considered to be the direct responsibility of the physician, rather than that of the patient or the patient's surrogate decision-maker(s) as it is in the U.S.

"In England, there is universal health care through the National Health Service, and there is also much lower per-capita expenditure on intensive care services when compared to the U.S.," said Dr. Wunsch. "The use of intensive care in England is limited by supply to a greater degree than it is in the U.S., and there are consequently implicit and explicit decisions regarding who gets those limited services. We wished to examine what different decisions are made."

Dr. Wunsch and colleagues examined data from the Hospital Episodes Statistics database (in England) and all hospital discharge databases of seven states (FL, MA, NJ, NY, TX, VA, WA) in the U.S. They found that of all hospital discharges, only 2.2 percent in England received intensive care, compared to 19.3 percent in the U.S.

They also found that hospital mortality among those who received intensive care was almost three times higher in England than in the U.S. (19.6 percent vs. 7.4 percent). But when examining deaths overall, only 10.6 of hospital deaths in England involved the ICU, whereas 47.1 in the U.S. did. Of those over 85, only 1.3 percent received ICU care in England vs. 11 percent in the U.S. But young adults and children received ICU services at similar rates in both countries. "These numbers need to be interpreted with caution," explains Dr. Wunsch, "as the differences in mortality for ICU patients likely reflect the higher severity of illness of patients admitted in the first place in England. The data do bring up the interesting question of how much intensive care is beneficial. Doing more may not always be better."

While these findings highlight important differences within the two countries' use of intensive care services, the research was not designed to determine the direct impact of these differences. Past surveys have suggested that the majority of people would prefer not to die in the hospital, but given that so many do, questions about use of intensive interventions remain.

"Whether less intensive care for very elderly patients who are dying is a form of rationing, or is actually better recognition of what constitutes appropriate care at the end of life warrants further research," said Dr. Wunsch. "These findings highlight the urgent need to understand whether there is over-use of intensive care in the U.S., or under-use in England."

Furthermore, future research must further investigate not just the origins, but the implications of these differences. "Faced with a provocative finding of cross-national difference, the scientific community faces a choice between at least two paths," wrote Theodore Iwashyna, M.D., Ph.D., and Julia Lynch, Ph.D., in an editorial in the same issue of the journal. "One path leads to carefully unpacking the origins of this difference and teaching us something generally true about how critical care systems develop. The other path leads into the hospitals, using observational data to imagine new ways to organize care and generate the equipoise necessary for careful interventional studies of such interventions. The first path helps us shape national policy levers. The latter path helps us redesign care organizations to bring change to patients. Both are necessary."

Cleanliness IS next to godliness: new research shows clean smells unconsciously promote moral behavior

People are unconsciously fairer and more generous when they are in clean-smelling environments, according to a soon-to-be published study led by a Brigham Young University professor.

The research found a dramatic improvement in ethical behavior with just a few spritzes of citrus-scented Windex.

Katie Liljenquist, assistant professor of organizational leadership at BYU's Marriott School of Management, is the lead author on the piece in a forthcoming issue of Psychological Science. Co-authors are Chen-Bo Zhong of the University of Toronto's Rotman School of Management and Adam Galinsky of the Kellogg School of Management at Northwestern University.

The researchers see implications for workplaces, retail stores and other organizations that have relied on traditional surveillance and security measures to enforce rules.

"Companies often employ heavy-handed interventions to regulate conduct, but they can be costly or oppressive," said Liljenquist, whose office smells quite average. "This is a very simple, unobtrusive way to promote ethical behavior."

Perhaps the findings could be applied at home, too, Liljenquist said with a smile. "Could be that getting our kids to clean up their rooms might help them clean up their acts, too."

The study titled “The Smell of Virtue” was unusually simple and conclusive. Participants engaged in several tasks, the only difference being that some worked in unscented rooms, while others worked in rooms freshly spritzed with Windex.

The first experiment evaluated fairness. As a test of whether clean scents would enhance reciprocity, participants played a classic “trust game.” Subjects received $12 of real money (allegedly sent by an anonymous partner in another room). They had to decide how much of it to either keep or return to their partners who had trusted them to divide it fairly. Subjects in clean-scented rooms were less likely to exploit the trust of their partners, returning a significantly higher share of the money.

· The average amount of cash given back by the people in the “normal” room was $2.81. But the people in the clean-scented room gave back an average of $5.33.

The second experiment evaluated whether clean scents would encourage charitable behavior. Subjects indicated their interest in volunteering with a campus organization for a Habitat for Humanity service project and their interest in donating funds to the cause.

· Participants surveyed in a Windex-ed room were significantly more interested in volunteering (4.21 on a 7-point scale) than those in a normal room (3.29).

· 22 percent of Windex-ed room participants said they’d like to donate money, compared to only 6 percent of those in a normal room.

Follow-up questions confirmed that participants didn’t notice the scent in the room and that their mood at the time of the experiment didn’t affect the outcomes.

“Basically, our study shows that morality and cleanliness can go hand-in-hand,” said Galinsky of the Kellogg School. “Researchers have known for years that scents play an active role in reviving positive or negative experiences. Now, our research can offer more insight into the links between people’s charitable actions and their surroundings.”

While this study examined the influence of the physical environment on morality, Zhong and Liljenquist previously published work that demonstrated an intimate link between morality and physical cleanliness. Their 2006 paper in Science reported that transgressions activated a desire to be physically cleansed.

Liljenquist is now researching how perceptions of cleanliness shape our impressions of people and organizations. “The data tell a compelling story about how much we rely upon cleanliness cues to make a wide range of judgments about others,” she said.

Ancient Greeks introduced wine to France, Cambridge study reveals

France's well-known passion for wine may have stemmed from the Ancient Greeks, a Cambridge University study discloses.

By Andrew Hough

The original makers of Côtes-du-Rhône are said to have descended from Greek explorers who settled in southern France about 2500 years ago, it claimed.

The study, by Prof Paul Cartledge, suggested the world's biggest wine industry might never have developed had it not been for a “band of pioneering Greek explorers” who settled in southern France around 600 BC. His study appears to dispel the theory that it was the Romans who were responsible for bringing viticulture to France.

The study found that the Greeks founded Massalia, now known as Marseilles, which they then turned into a bustling trading site, where local tribes of Ligurian Celts undertook friendly bartering.

Prof Cartledge said within a matter of generations the nearby Rhône became a major thoroughfare for vessels carrying terracotta amphorae that contained what was seen as a new, exotic Greek drink made from fermented grape juice. He argued the new drink rapidly became a hit among the tribes of Western Europe, which then contributed to the French’s modern love of wine.

"I hope this will lay to rest an enduring debate about the historic origins of supermarket plonk,” he said.

"Although some academics agree the Greeks were central to founding Europe's wine trade, others argue the Etruscans or even the later Romans were the ones responsible for bringing viticulture to France.”

Archaeologists have discovered a five-foot high, 31.5 stone bronze vessel, the Vix Krater, which was found in the grave of a Celtic princess in northern Burgundy, France.

Prof Cartledge said there were two main points that proved it was the Greeks who introduced wine to the region.

"First, the Greeks had to marry and mix with the local Ligurians to ensure that Massalia survived, suggesting that they also swapped goods and ideas.

"Second, they left behind copious amounts of archaeological evidence of their wine trade (unlike the Etruscans and long before the Romans), much of which has been found on Celtic sites."

The research forms part of Professor Cartledge's study into where the boundaries of Ancient Greece began and ended. Rather than covering the geographical area occupied by the modern Greek state, he argued Ancient Greece stretched from Georgia in the east to Spain in the west.

1 shot of gene therapy and children with congenital blindness can now see

Philadelphia, Pa. – Born with a retinal disease that made him legally blind, and would eventually leave him totally sightless, the nine-year-old boy used to sit in the back of the classroom, relying on the large print on an electronic screen and assisted by teacher aides. Now, after a single injection of genes that produce light-sensitive pigments in the back of his eye, he sits in front with classmates and participates in class without extra help. In the playground, he joins his classmates in playing his first game of softball.

His treatment represents the next step toward medical science's goal of using gene therapy to cure disease. Extending a preliminary study published last year on three young adults, the full study reports successful, sustained results that showed notable improvement in children with congenital blindness.

The study, conducted by researchers from the University of Pennsylvania School of Medicine and the Center for Cellular and Molecular Therapeutics at The Children's Hospital of Philadelphia, used gene therapy to safely improve vision in five children and seven adults with Leber's congenital amaurosis (LCA). The greatest improvements occurred in the children, all of whom are now able to navigate a low-light obstacle course - one result that the researchers call "spectacular."

"This result is an exciting one for the entire field of gene therapy," said Katherine A. High, M.D., co-first author of the study and the director of the Center for Cellular and Molecular Therapeutics, the facility that sponsored the clinical trial at The Children's Hospital of Philadelphia. High, an investigator of the Howard Hughes Medical Institute and a past president of the American Society of Gene Therapy, has been a pioneer in translational and clinical studies of gene therapy for genetic disease. "This study reports dramatic results in restoring vision to patients who previously had no options for treatment," said High. "These findings may expedite development of gene therapy for more common retinal diseases, such as age-related macular degeneration."

Although the patients did not attain normal eyesight, half of them (six of 12) improved enough that they may no longer be classified as legally blind. "The clinical benefits have persisted for nearly two years since the first subjects were treated with injections of therapeutic genes into their retinas," said senior author Jean Bennett, M.D., Ph.D., F.M. Kirby professor of Ophthalmology at the University of Pennsylvania School of Medicine. For Bennett, the results build on nearly 20 years of gene studies on hereditary blindness, starting with pioneering work in mice and dogs. "These remarkable results," she added, "have laid a foundation for applying gene therapy not only to other forms of childhood-onset retinal disease, but also to more common retinal degenerations." The study team reported their findings today in an online article in The Lancet.

"Children who were treated with gene therapy are now able to walk and play just like any normally sighted child," said co-first author Albert M. Maguire, M.D., an associate professor of Ophthalmology at Penn and a physician at Children's Hospital. "They can also carry out classroom activities without visual aids."

Maguire and Bennett have been researching inherited retinal degenerations for nearly 20 years. Leber's congenital amaurosis, the target of this current study, is a group of inherited blinding diseases that damages light receptors in the retina. It usually begins stealing sight in early childhood and causes total blindness during a patient's twenties or thirties. Currently, there is no treatment for LCA.

Walking along a dimly lit, simulated street route, the children were able to negotiate barriers they bumped into before the surgery. Another child, who since birth, could only see light and shadows, stared into his father's face and said he could see the color of his eyes. Later they played soccer together.

For children and adults in the study, functional improvements in vision followed single injections of genes that produced proteins to make light receptors work in their retinas.

The 12 subjects ranged in age from 8 to 44 years old at the time of treatment. Four of the children, aged 8 to 11, are the world's youngest individuals to receive gene therapy for a non-lethal disease (A fifth subject was 17 years old). On the other end of the age scale, the 35-year-old man and 44-year-old woman are the oldest patients to ever receive gene therapy for retinal degeneration.

For the current human trial, the research team used a vector, a genetically engineered adeno-associated virus, to carry a normal version of the gene, called RPE65, that is mutated in one form of LCA, called LCA2, that accounts for 8 to 16 percent of all LCA cases. Jeannette Bennicelli, Ph.D., in Bennett's laboratory, cloned the gene. The clinical vector production facility at Children's Hospital's Center for Cellular and Molecular Therapeutics (CCMT), directed by Fraser Wright, Ph.D., manufactured the vector.

The clinical trial brought together subjects and scientists from two continents. Five patients enrolled in the study were identified at the Department of Ophthalmology at the Second University of Naples, an institution

with a long-standing program in researching inherited retinal diseases, under the supervision of Francesca Simonelli, M.D. Two children from Belgium were recruited through Ghent University Hospital, under the supervision of Bart Leroy, M.D., Ph.D. Jennifer Wellman, of the CCMT, directed all local and federal regulatory interactions for the study. Another co-author, Edwin Stone, M.D., Ph.D., Howard Hughes Medical Institute Investigator and director of the Carver Center, a genetic testing laboratory at the University of Iowa, identified and verified several of the disease-causing mutations in the study subjects.

In April 2008, the current study team published encouraging preliminary results in the New England Journal of Medicine regarding three young adults, the first to receive gene therapy in this current clinical trial. Those subjects showed improvements in their visual function in both objective vision tests and subjective reports by the patients themselves. Patients who could only detect hand movements gained the ability to read lines on an eye chart.

After the first group of three young adults was treated safely, the study team extended gene therapy to five children from the United States, Italy and Belgium, in addition to four other adults. Because animal studies conducted by Bennett and colleagues had shown that visual improvement was age-dependent, the researchers tested the hypothesis that younger human subjects would receive greater benefits from the treatment. "LCA is a progressive disease, so if a treatment was possible, it was plausible to intervene before damage to the retina was severe," said Bennett.

In all, 12 patients received the gene therapy via a surgical procedure performed by Maguire starting in October 2007 at The Children's Hospital of Philadelphia. For each subject, Maguire injected the therapeutic genes into the eye with poorer function. There were three patient cohorts, receiving low, middle and high doses. No serious adverse events occurred in any of the test subjects.

Starting two weeks after the injections, all 12 subjects reported improved vision in dimly lit environments in the injected eye. An objective measurement, which measures how the eye's pupil constricts, showed that all the subjects were able to detect significantly more light after treatment and also showed greater light sensitivity in each patient's treated eye compared to the untreated eye. In addition, before treatment, nine patients had nystagmus, an involuntary movement of the eyes that is common in LCA. After treatment, seven of them had significant improvements in nystagmus.

Some of the most dramatic results, captured on video by the researchers, are apparent as subjects traverse a standardized obstacle course. Before the treatment, the patients had great difficulty avoiding barriers, especially in dim light. After treatment, the children navigated the course more quickly, with fewer errors than before, even at the lowest light levels. Not all the adults performed better on the mobility course, and for those who did, the improvements were more modest compared to the children's.

"In follow-up studies, we will continue to monitor these patients to determine whether this treatment stops the progression of this retinal degeneration," said Maguire. "In the future, we hope to investigate whether other retinal disease will be amenable to this gene therapy approach."

The clinical trial was sponsored and primarily funded by the Center for Cellular and Molecular Therapeutics at The Children's Hospital of Philadelphia. Research support was received from the Foundation Fighting Blindness sponsored CHOP-PENN Pediatric Center for Retinal Degenerations, Research to Prevent Blindness, the Macula Vision Foundation, the Paul and Evanina Mackall Foundation Trust at the Scheie Eye Institute, and the F.M. Kirby Foundation. Additional funding was provided by the Italian Telethon Foundation, the Regione Campania Convenzione, the Foundation for Retinal Research, the Associazione Italiana Amaurosi Congenita di Leber, the Fund for Scientific Research and the Fund for Research in Ophthalmology. Drs. High and Stone are Investigators of the Howard Hughes Medical Institute, which also provided support. Other grant support came from the National Center for Research Resources.

The heart attack myth: Study establishes that women do have same the heart attack symptoms as men

Edmonton – The gender difference between men and women is a lot smaller than we've been led to believe when it comes to heart attack symptoms, according to a new study presented to the Canadian Cardiovascular Congress 2009, co-hosted by the Heart and Stroke Foundation and the Canadian Cardiovascular Society.

"Both the media and some patient educational materials frequently suggest that women experience symptoms of a heart attack very differently from men," says cardiac nurse Martha Mackay, a Canadian Institutes of Health Research clinical research fellow and doctoral student at the UBC School of Nursing. "These findings suggest that this is simply not the case."

Her team's study of 305 consecutive patients undergoing angioplasty - which briefly causes symptoms similar to a heart attack – found no gender differences in rates of chest discomfort or other 'typical' symptoms such as arm discomfort, shortness of breath, sweating, nausea, indigestion-like symptoms, and clammy skin. While both women and men may experience typical or non-typical symptoms, the major difference was that

female patients were more likely to have both the classic symptoms of heart attack plus throat, jaw, and neck discomfort.

"Clear educational messages need to be crafted to ensure that both women and healthcare professionals realize the classic symptoms are equally common in men and women," says Mackay.

So, given this rich array of symptoms, why have studies shown that female cardiac patients do not experience chest discomfort or other 'typical' symptoms as frequently as men?

Mackay notes that previous studies have had some drawbacks. She also thinks a breakdown in communication may be a factor. "In today's fast-paced hospital emergency departments, doctors must try to gather information about a patient's symptoms quickly and efficiently," she says. "Unfortunately this may sometimes mean they ask about a limited 'menu' of symptoms and some may be missed." She advises female patients to tell their doctor all of their symptoms – not just the ones they are asked about.

She recommends that doctors and nurses avoid 'closed' questions when assessing patients. For example, instead of simply asking "are you having chest pain," a question that leads to a yes or no answer, adding "are you having any other discomfort?" may elicit other symptoms that could help make the diagnosis.

"Where women are concerned, some extra probing could result in a speedier and more complete diagnosis," she says. It is important because treatment of heart attack (for both women and men) must be given within a few hours after symptoms begin in order to be effective, so any delay in making the diagnosis could lead to a poorer response to treatment. This is also especially important since women are 16 per cent more likely than men to die after a heart attack.

Heart and Stroke Foundation spokesperson Dr. Beth Abramson says that while women may describe their pain differently than men, the most common symptom in women is still chest pain. She says that the challenge is that women are less likely to believe they're having a heart attack and they are more likely to put off seeking treatment.

"Heart disease and stroke are the leading cause of death of women in Canada," says Dr. Abramson. "Being aware of the warning signs and acting on them quickly could save your life – or the life of someone you love – and minimize the damage to your health." She says that women and their family members should talk to their doctors, be aware of any symptoms, and understand that heart attacks can happen to them too.

The warning signals of a heart attack – for women and men – are:

* Pain
    - o Sudden discomfort or pain that does not go away with rest
    - o Pain that may be in the chest, neck, jaw, shoulder, arms or back
    - o Pain that may feel like burning, squeezing, heaviness, tightness or pressure
    - o In women, pain may be more vague
    - o Chest pain or discomfort that is brought on with exertion and goes away with rest
* Shortness of breath o Difficulty breathing
* Nausea o indigestion o vomiting
* Sweating o Cool, clammy skin
* Fear o Anxiety o Denial

If you are experiencing any of these signals, call 9-1-1 or your local emergency number immediately.
For more information on women and heart disease, visit theheartttruth.ca.

Mantis shrimps could show us the way to a better DVD

The remarkable eyes of a marine crustacean could inspire the next generation of DVD and CD players, according to a new study from the University of Bristol published today in Nature Photonics.

The mantis shrimps in the study are found on the Great Barrier Reef in Australia and have the most complex vision systems known to science. They can see in twelve colours (humans see in only three) and can distinguish between different forms of polarized light.

Special light-sensitive cells in mantis shrimp eyes act as quarter-wave plates – which can rotate the plane of the oscillations (the polarization) of a light wave as it travels through it. This capability makes it possible for mantis shrimps to convert linearly polarized light to circularly polarized light and vice versa. Manmade quarter-wave plates perform this essential function in CD and DVD players and in circular polarizing filters for cameras.

However, these artificial devices only tend to work well for one colour of light while the natural mechanism in the mantis shrimp's eyes works almost perfectly across the whole visible spectrum – from near-ultra violet to infra-red.

Dr Nicholas Roberts, lead author of the Nature Photonics paper said: "Our work reveals for the first time the unique design and mechanism of the quarter-wave plate in the mantis shrimp's eye. It really is exceptional – out-performing anything we humans have so far been able to create."

Exactly why the mantis shrimp needs such exquisite sensitivity to circularly polarized light isn't clear. However, polarization vision is used by animals for sexual signalling or secret communication that avoids the attention of other animals, especially predators. It could also assist in the finding and catching of prey by improving the clarity of images underwater. If this mechanism in the mantis shrimp provides an evolutionary advantage, it would be easily selected for as it only requires small changes to existing properties of the cell in the eye.

"What's particularly exciting is how beautifully simple it is," Dr Roberts continued. "This natural mechanism, comprised of cell membranes rolled into tubes, completely outperforms synthetic designs.

"It could help us make better optical devices in the future using liquid crystals that have been chemically engineered to mimic the properties of the cells in the mantis shrimp's eye."

This wouldn't be the first time humans have looked to the natural world for new ideas, for example the lobster's compound eye recently inspired the design of an X-ray detector for an astronomical telescope.

Mantis Shrimp **by rabani**

The mantis shrimp research was conducted at the University of Bristol's School of Biological Sciences in collaboration with colleagues at UMBC, USA and the University of Queensland, Australia.

Master regulator found for regenerating nerve fibers in live animals

Enzyme could lead to a possible treatment for brain and spinal cord injury

Boston, Mass. -- Researchers at Children's Hospital Boston report that an enzyme known as Mst3b, previously identified in their lab, is essential for regenerating damaged axons (nerve fibers) in a live animal model, in both the peripheral and central nervous systems. Their findings, published online by Nature Neuroscience on October 25, suggest Mst3b – or agents that stimulate it – as a possible means of treating stroke, spinal cord damage and traumatic brain injury. Normally, neurons in the central nervous system (the brain and spinal cord) cannot regenerate injured nerve fibers, limiting people's ability to recover from brain or spinal cord injuries.

The study, led by Nina Irwin, PhD and Larry Benowitz, PhD, of the Laboratories for Neuroscience Research in Neurosurgery and the F.M. Kirby Neurobiology Center at Children's, builds on previous discoveries in the lab. In 2002, they showed that a naturally occurring small molecule, inosine, stimulates axon regeneration, later showing that it helps restore neurological functions in animal models of injury. In 2006, Benowitz and colleagues reported a previously unknown growth factor, oncomodulin, to have dramatic effects on axon growth.

Investigating the mechanisms of action of inosine and oncomodulin, Irwin and Benowitz discovered that both compounds activate Mst3b, an enzyme that appears to be a master regulator of a cell-signaling pathway controlling axon growth. Mst3b, a protein kinase, in turn activates signals that switch on the genes necessary for axons to grow.

Working with live rats whose optic nerve was damaged (a common model of central-nervous-system injury), Irwin, Benowitz and colleagues show that in the absence of Mst3b, axons show very little regeneration, even in the presence of factors known to enhance axon growth. In cell cultures, axon growth increased when activated Mst3b was expressed in the neurons.

"All the growth factors we've tested – oncomodulin, inosine, brain-derived neurotropic factor, nerve growth factor – act through Mst3b," says Benowitz. "In fact, activating Mst3b by itself is enough to cause growth even if there are no growth factors around. In terms of basic understanding of nerve cells, this is a very exciting finding."

Further studies examining how Mst3b exerts this growth-promoting effect may open up new avenues for treating brain and spinal cord injuries, Benowitz says. While this study explains why growth factors work – because they stimulate Mst3b – it's not yet known whether Mst3b is the best stimulator of axon growth from a practical drug-development standpoint, he adds.

Irwin is now working on possible gene therapy approaches involving Mst3b. Activating Mst3b may help overcome some natural "brakes" in the cell-signaling system that prevent nerve regeneration under normal conditions.

Barbara Lorber, PhD, formerly of Children's and now at the University of Cambridge (Cambridge, UK), was the paper's first author. NIH, the European Union, Alseres, Inc., and the Dr. Miriam and Sheldon G. Adelson Medical Research Foundation funded this study.

Testicular tumours linked to offsprings' disease

* 18:00 25 October 2009 **by Linda Geddes**

Genetic disease is more likely in the children of older fathers – but why? Part of the answer may be that benign testicular tumours, more common in older men, give rise to sperm containing disease-causing mutations.

Anne Goriely of the University of Oxford and her colleagues took tumour cells from men with benign testicular tumours and looked for specific mutations in the FGFR3 and HRAS genes. These mutations have been linked to rare developmental diseases such as achondroplasia, or "dwarfism", and Costello syndrome, a condition that involves skin deformities and mental retardation. They have also been linked to some stillbirths.

The researchers found the same mutations in the tumour cells, but not in normal sperm-producing cells located nearby. They concluded that the sperm made by these cells contained the disease-containing mutations and that the mutations may be driving the growth of the tumours.

Older men are more likely to have testicular tumour cells, so more of their sperm-producing cells will contain these mutations.

A lot of men have these cells without knowing it because they often fail to develop into discernible tumours. "In most cases we think the body's growth control mechanisms eventually stop the cells from proliferating further, but in occasional cases where additional mutations occur in the clump of cells, a tumour will eventually develop," says Andrew Wilkie also of the University of Oxford, who supervised the work.

He likens them to moles in the skin, which are also benign tumours that stop growing. "But being located in the testicle, these cells also make sperm – causing children to be born with a variety of serious conditions," Wilkie says.

Because all ageing men may be subject to this process, screening is unlikely to be much help.

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World's Oldest Known Granaries Predate Agriculture

ScienceDaily - A new study coauthored by Ian Kuijt, associate professor of anthropology at the University of Notre Dame, describes recent excavations in Jordan that reveal evidence of the world's oldest known granaries. The appearance of the granaries represents a critical evolutionary shift in the relationship between people and plant foods.

Anthropologists consider food storage to be a vital component in the economic and social package that comprises the Neolithic period, contributing to plant domestication, increasingly sedentary lifestyles and new social organizations. It has traditionally been assumed that people only started to store significant amounts of food when plants were domesticated.

However, in a paper appearing in the June 23 edition of the Proceedings of the National Academies of Sciences, Kuijt and Bill Finlayson, director, Council for British Research in the Levant, describe recent excavations at Dhra' near the Dead Sea in Jordan that provide evidence of granaries that precede the emergence of fully domesticated plants and large-scale sedentary communities by at least 1,000 years.

"These granaries reflect new forms of risk reduction, intensification and low-level food production," Kuijt said. "People in the Pre-Pottery Neolithic Age (11,500 to 10,550 B.C.) were not using new food sources, but rather, by developing new storage methods, they altered their relationship with traditionally utilized food resources and created the technological context for later development of domesticated plants and an agro-pastoralist economy.

"Building granaries may, at the same time, have been the single most important feature in increasingly sedentism that required active community participation in new life-ways."

Designed with suspended floors for air circulation and protection from rodents, the granaries are located between residential structures that contain plant-processing instillations.

The new studies are a continuation of earlier research by Kuijt. As a graduate student from 1987-1995, he worked on and directed several field projects in Jordan that focused on the world's first villages during the Neolithic Period. As part of this research, he did several days of excavation at Dhra' with a Jordanian researcher. This was followed by several other field projects and by research from 2000 to 2005 with Finlayson.

"These granaries are a critical fist step, if not the very evolutionary and technological foundation, for the development of large agricultural villages that appear by 9,500 to 9,000 years ago across the Near East," Kuijt said. "In many ways food storage is the missing link that helps us understand how so many people were able to live together. And much to our surprise, it appears that they developed this technology at least a 1,000 years before anyone thought they did."

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