Biological link connects childhood trauma and risk for chronic fatigue syndrome

Childhood trauma is a potent risk factor for development of chronic fatigue syndrome (CFS), according to a study by researchers at Emory University School of Medicine and the Centers for Disease Control and Prevention (CDC). The study is published in the Jan. 5, 2009 Archives of General Psychiatry.

Results of the study confirm that childhood trauma, particularly emotional maltreatment and sexual abuse, is associated with a six-fold increased risk for CFS. The risk further increases with the presence of posttraumatic stress disorder symptoms.

The study also found that low levels of cortisol, a hallmark biological feature of CFS, are associated with childhood trauma. Cortisol is frequently referred to as the "stress hormone" and is important to regulate the body's response to stress. A lack of cortisol's effects may cause altered or prolonged stress responses.
"The study indicates that low cortisol levels may actually reflect a marker for the risk of developing CFS rather than being a sign of the syndrome itself," said Christine M. Heim, PhD, lead author of the study and associate professor in the Department of Psychiatry and Behavioral Sciences, Emory University School of Medicine.

The population-based study analyzed data from 113 people with CFS, and a control group of 124 people without CFS, drawn from a sample of almost 20,000 Georgians. The results confirm earlier findings from a 2006 study conducted in Wichita, Kan.

Study participants completed a self-reported questionnaire on five different types of childhood trauma including emotional, physical and sexual abuse, and emotional and physical neglect. Researchers also collected saliva samples from participants to record levels of cortisol over one hour after awakening, typically an individual's highest cortisol levels for the day.

"When looking at CFS cases with and without histories of childhood trauma, only those with childhood trauma had the classic low cortisol levels often seen in CFS cases," explains Heim.

"It is important to emphasize that not all patients with CFS have been through childhood trauma," she says. "CFS may be part of a spectrum of disorders associated with childhood adversity, which includes depression and anxiety disorders."

Certain experiences children have while the brain is developing and vulnerable can make a difference in the way the body reacts to stress later in life, and may have long-term health consequences.

"Trauma that occurs at different times in childhood may be linked to different long term changes. It's an area in which more work is needed," says Heim.

This study was supported by a grant from the Centers for Disease Control and Prevention.
Reference: Childhood Trauma and Risk for Chronic Fatigue Syndrome: Association with Neuroendocrine Dysfunction, Archives of General Psychiatry 2009; Vol. 66 (1): 72-80

Adult-onset diabetes slows mental functioning in several ways, with deficits appearing early

WASHINGTON - Adults with diabetes experience a slowdown in several types of mental processing, which appears early in the disease and persists into old age, according to new research. Given the sharp rise in new cases of diabetes, this finding means that more adults may soon be living with mild but lasting deficits in their thought processes.

A full analysis appears in the January issue of Neuropsychology, which is published by the American Psychological Association.

Researchers at Canada's University of Alberta analyzed a cross-section of adults with and without adult-onset Type 2 diabetes, all followed in the Victoria Longitudinal Study. At three-year intervals, this study tracks three independent samples of initially healthy older adults to assess biomedical, health, cognitive and neurocognitive aspects of aging. The Neuropsychology study involved 41 adults with diabetes and 424 adults in good health, between ages 53 and 90.

The research confirmed previous reports that diabetes impairs cognition and added two important findings. First, it teased out the specific domains hurt by diabetes. Second, it revealed that the performance gap was not worse in the older group. Thus, the reductions in executive function and processing speed seem to begin earlier in the disease.

Healthy adults performed significantly better than adults with diabetes on two of the five domains tested: executive functioning, with significant differences across four different tests, and speed, with significant differences or trends across five different tests. There were no significant differences on tests of episodic and semantic memory, verbal fluency, reaction time and perceptual speed.

When researchers divided participants into young-old and old-old, with age 70 as the cutoff, they found the same pattern of cognitive differences between young-old and old-old in the diabetes and control groups. Thus, the researchers concluded, the diabetes-linked cognitive deficits appear early and remain stable.

"Speed and executive functioning are thought to be among the major components of cognitive health," says co-author Roger Dixon, PhD. With Type 2 diabetes a growing concern among adults of all ages, but especially those above age 30, Dixon says that public health programs could check the cognitive status of people with more advanced or severe cases; ensure that diet and medications are effectively employed in all early diagnosed cases; and enact possible cognitive monitoring or training programs for people with diabetes. According to the U.S. Centers for Disease Control and Prevention, new cases of diabetes nearly doubled in the past decade, with nearly one new case for every 100 adults between the years 2005 and 2007.

The normal age-related slowing of thought processes could be exacerbated by diseases such as Type 2 diabetes, says Dixon. But, he continues, "There could be some ways to compensate for these declines, at least early and with proper management." The level of impairment detected, he adds, should not make it hard for people to manage their condition.

Diabetes is a known risk factor for late-life neurodegenerative diseases such as Alzheimer's. Although the deficits detected in the current sample were not clinically significant, they appear (according to subsequent research by the authors) to foreshadow additional deficits. Only further study would reveal whether it's possible to "connect the dots" between mild early deficits in speed and executive function, and later signs of a progressive cognitive impairment.

Article: "Exploring Effects of Type 2 Diabetes on Cognitive Functioning in Older Adults," Sophie E. Yeung, PhD, Ashley L. Fischer, PhD, and Roger A. Dixon, PhD, University of Alberta; Neuropsychology, Vol. 23, No. 1.
Full text of the article is available from the APA Public Affairs Office and at http://www.apa.org/journals/releases/neu2311.pdf

'Relocation' plan of metastatic cancer cells uncovered by Stanford researchers

STANFORD, Calif. - Few things are as tiresome as house hunting and moving. Unfortunately, metastatic cancer cells have the relocation process down pat. Tripping nimbly from one abode to another, these migrating cancer cells often prove far more deadly than the original tumor. Although little has been known about how these rogue cells choose where to put down roots, researchers at the Stanford University School of Medicine have now learned just how nefarious they are.

"Metastasis is not a passive process," said cancer biologist Amato Giaccia, PhD. "Cells don't just break off the primary tumor and lodge someplace else. Instead the cells actually secrete substances to precondition target tissue and make it more amenable to subsequent invasion."

In other words, the cells plan ahead by first sending molecular emissaries to orchestrate a breach in the body's natural defenses. Blocking this cascade of events in mice hobbled the cells' migration and prevented the metastatic cancer that developed in control animals. The researchers are hopeful that a similar tactic will be equally successful in humans.

Giaccia, the Jack, Lulu and Sam Willson Professor and professor of radiation oncology at Stanford, is the senior author of the research, which will be published in the Jan. 6 issue of Cancer Cell. Giaccia is also a member of the Stanford Cancer Center.

Scientists have known for some time that certain primary cancers metastasize preferentially to other organs - breast cancer often spreads to the lungs, for example. This is in part due to the patterns of blood flow in the body. They also knew that such future colonization sites, called pre-metastatic niches, harbor large numbers of cells derived from the bone marrow that somehow facilitate the cancer cells' entry. What they didn't know is how the bone-marrow-derived cells were summoned, and what, if any, role the primary tumor cells played in site selection.

Giaccia and his colleagues turned their attention to a substance that they had previously shown to be involved in metastasis: a protein called lysyl oxidase, or LOX. In healthy people, LOX works to strengthen developing connective tissue by modifying collagen and elastin, which are components of the extracellular matrix surrounding many organs. LOX expression increases in cancer cells deprived of oxygen - a condition called hypoxia that begins to occur when blood vessels fail to reach the inner cells of a growing tumor mass. Inhibiting LOX expression decreases tumor cell invasion and metastasis in the lungs of mice implanted with human breast cancer cells.

The researchers wanted to know how LOX affected metastasis. In the current study, they found that blocking LOX expression in the mice not only prevented metastases; it also kept the bone-marrow-derived cells necessary for niche formation from flocking to the site. When LOX was present, it accumulated in the lungs of the mice and was associated with one particular type of bone-marrow-derived cell known as a CD11b cell. CD11b cells, in turn, secreted a protein that breaks apart collagen and provides a handy entry point for the soon-to-arrive cancer cells.

"We've never really understood before how normal tissues are modified to allow metastases to target and successfully invade them," said Giaccia, who is hoping to devise a clinical trial to study the effect of blocking

LOX activity in humans with primary cancers. "Now we know that LOX goes to the target tissue and attracts CD11b and other bone-derived cells to the pre-metastatic niche. If the mouse data is transferable to humans, and we have reasons to think it will be, we really believe way may have found an effective way to treat human disease."

Other Stanford researchers include former postdoctoral scholars Janine Erler, PhD, who is now a group leader at the Institute of Cancer Research at Chester Beatty Laboratories in London, and Kevin Bennewith, PhD, who is now a research scientist at the British Columbia Cancer Research Centre in Vancouver; Albert Koong, MD, PhD, assistant professor of radiation oncology; and Quynh-Thu Le, MD, professor of radiation oncology. The research was supported by the National Institutes of Health, the Canadian Institutes of Health Research, the Institute of Cancer Research and Cancer Research UK.

This photograph from NASA's Spitzer Space Telescope shows the young star cluster NGC 2362. By studying it, astronomers found that gas giant planet formation happens very rapidly and efficiently, within less than 5 million years, meaning that Jupiter-like worlds experience a growth spurt in their infancy. **NASA/JPL-Caltech/T. Currie (CfA)**

Baby Jupiters must gain weight fast

The planet Jupiter gained weight in a hurry during its infancy. It had to, since the material from which it formed probably disappeared in just a few million years, according to a new study of planet formation around young stars.

Smithsonian astronomers examined the 5 million-year-old star cluster NGC 2362 with NASA's Spitzer Space Telescope, which can detect the signatures of actively forming planets in infrared light. They found that all stars with the mass of the Sun or greater have lost their protoplanetary (planet-forming) disks. Only a few stars less massive than the Sun retain their protoplanetary disks. These disks provide the raw material for forming gas giants like Jupiter. Therefore, gas giants have to form in less than 5 million years or they probably won't form at all.

"Even though astronomers have detected hundreds of Jupiter-mass planets around other stars, our results suggest that such planets must form extremely fast. Whatever process is responsible for forming Jupiters has to be incredibly efficient," said lead researcher Thayne Currie of the Harvard-Smithsonian Center for Astrophysics. Currie presented the team's findings at a meeting of the American Astronomical Society in Long Beach, Calif.

Even though nearly all gas giant-forming disks in NGC 2362 have disappeared, several stars in the cluster have "debris disks," which indicates that smaller rocky or icy bodies such as Earth, Mars, or Pluto may still be forming.

"The Earth got going sooner, but Jupiter finished first, thanks to a big growth spurt," explained co-author Scott Kenyon.

Kenyon added that while Earth took about 20 to 30 million years to reach its final mass, Jupiter was fully grown in only 2 to 3 million years.

Previous studies indicated that protoplanetary disks disappear within 10 million years. The new findings put even tighter constraints on the time available to create gas giant planets around stars of various masses.

NASA's Jet Propulsion Laboratory, Pasadena, Calif., manages the Spitzer mission for NASA's Science Mission Directorate, Washington. Science operations are conducted at the Spitzer Science Center at the California Institute of Technology, also in Pasadena. Caltech manages JPL for NASA.

Uncultured bacteria found in amniotic fluids of women who experience preterm births

CLEVELAND -Researchers from Case Western Reserve University and Yale University have made a significant advancement in understanding the cause behind why some pregnant women suffer from inflammations in the inner womb without any signs of an infection.

Using gene-cloning techniques, researchers discovered that approximately 60 percent of the bacteria present in women with intra-amniotic inflammations were missed by traditional culture testing - considered the gold standard for finding bacterial infections. The findings were reported in the January issue of the Journal of Clinical Microbiology.

For the first time, the researchers identified a comprehensive list of microbial species in intra-amniotic infections by using new DNA methods to track down the presence of bacteria. To increase their accuracy the investigators used a combination of analyses including proteomics results of amniotic fluid and histological analysis of the placenta to corroborate the infection and inflammation.

Intra-amniotic inflammation is known to set off spontaneous births of preterm babies at less than 32 weeks, said Yiping Han, associate professor of dental medicine at Case Western Reserve University and lead

investigator on the study of 46 women of which 44 experienced preterm births. Han has previously done a number of research projects examining the link between oral bacteria and preterm birth.

In the present study, bacteria levels from the amniotic fluids of pregnant women with signs or symptoms of preterm births were compared to those from a control group of 16 women without such manifestations and who delivered at term. The amniotic fluid of the control group came from amniocenteses for genetic screenings or analyses to check fetal lung maturity and showed no signs of bacteria even by DNA methods.

"Because culturing is not finding all bacteria present in the amniotic fluid, this calls for new detection methods," Han said. "It is also important to identify which germ is causing the infection and inflammation leading to preterm birth so that antibiotics are initiated early in this pathophysicological chain of events."

In addition to the bacteria identified by cultures by using a new detection process which amplifies the 16SrRNA bacterial gene and clones it in order to identify its sequence, the researchers were able to identify a number of harmful bacteria not detected by cultures of which some have not been previously linked with preterm birth.

"By employing 16s rRNA gene-based polymerase chain reactions (PCR) followed by the clone analysis, we stand to determine the identity and true relationship between intra-amniotic bacterial infection and the onset of preterm birth," said Han.

The researchers also found it was not just one bacterial species causing the inflammation but an abundance of different species in the sample. "Unrecognized, uncultivated or difficult-to-cultivate species may play a key role in initiating spontaneous preterm births," said Han.

These bacteria either reach the placenta through the genital tract or through the blood to the placenta. Han suspects some originate in the mouth which has hundreds of dozens of bacteria present. Among the oral bacteria is Fusobacterium nucleatum, which is ubiquitous in the mouth. Once it enters the blood stream, however, it has been linked to a number of health issues.

Other members of Han's research team included Tao Shen and Peter Chung from Case Western Reserve's Department of Periodontics and Irina Buhimschi and Catalin Buhimschi from the Department of Obstetrics, Gynecology and Reproductive Sciences at Yale University The study was supported partially with funding from the National Institutes of Health.

Medical errors, apologies and apology laws

Apologizing for medical errors is both ethically and professionally responsible and also crucial for improving patient safety and quality of care, write Dr. Noni MacDonald and Dr. Amir Attaran and the CMAJ editorial team http://www.cmaj.ca/press/pg11.pdf. They point out that an apology can have significant healing effects for the patient, family and physician. However, Canada lacks apology laws in every jurisdiction and these provinces and territories should be pressed to enact these laws. Early settlement or no fault compensation needs to be considered.

Medical errors, apologies and apology laws

CMAJ Editorial

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In everyday life when an error occurs, disclosure, apology and restitution are expected. In health care when a medical error occurs, disclosure and apology are often overridden by the fear of malpractice litigation.

Full disclosure to the patient is the ethically and professionally responsible course of action. It is also vital for improvement of patient safety and quality of care.[1] By not disclosing adverse events, the physician fails the patient in terms of honesty, openness and respect. Furthermore, nondisclosure may put the patient at risk for future harms because he or she does not know what happened. Disclosure provides the patient with potentially vital information for making future health care choices and decisions. Candour about errors among colleagues is also critical for professional learning, patient safety improvements and public trust in the health care system.1

Offering an apology with disclosure is an important component of addressing medical errors. An apology includes an acknowledgement of the event and one's role in the event, as well as a genuine expression of regret for the patient's predicament. An apology can have profound healing effects for all parties. For the physician, an apology can help diminish feelings of guilt and shame. For the patient, it can facilitate forgiveness and provide the basis for reconciliation.[2]

To address the competing demands between the ethical and safety imperatives of disclosure and apology and the strong instinct to remain silent for fear of inciting malpractice action, apology laws were designed to reduce concerns about legal implications of disclosure and apology. They emerged in the United States in the 1990s as part of efforts to enhance medical error reporting and patient safety. Since then, physicians and hospitals have become more transparent, honest and open with early explanation of unforeseen outcomes. This, as well as early settlement offers by hospitals, has led to a dramatic decrease in malpractice claims.[3]

However, the actual impact of apologies and of apology laws on this outcome is less clear because both are components of broader regulatory and institutional efforts to overcome the complex problem of the silence about medical errors. Furthermore, restitution and early settlement may be an important driver of the reduction in claims.[4] Countries with nofault compensation systems, such as Sweden and France, experience less frequent complaints.

Under Canada's constitution, the provinces and territories are responsible for liability laws. The first Canadian apology legislation was passed in 2006 by British Columbia[5] and Saskatchewan,[6] followed in 2008 by Manitoba.[7] Ontario and Alberta have since introduced similar legislation.[8] The protection afforded by apology laws is similar across Canadian jurisdictions.

Some have argued that apology laws are unnecessary to allow health care workers to discharge their professional responsibility toward disclosure and that such laws will make it more difficult for legitimate malpractice claims to succeed.[9] However, it seems unlikely that apologies would shield physicians in cases of gross negligence. Moreover, the Canadian Medical Protective Association advises that in jurisdictions without apology legislation, physicians "should be aware that the fact that an apology was made and any admission of fault that might have been made during an apology could be admissible in legal or College proceedings related to the adverse event."[10] This statement, designed to protect physicians, threatens to inhibit apologies and supports a code of silence. As a consequence, apology legislation will play an important role in the advice given to physicians faced with a medical error or adverse event and his or her subsequent actions.

Effective disclosure and apology is neither simple nor pain free. Physicians and other health care workers need training in how best to do this when a medical error or adverse event has occurred. They also need a greater awareness of their legal, ethical and professional obligations in this regard.

Errors demand a response that simultaneously addresses the needs of the patient, the health care worker and the system.

Given the apology-chilling advice from the Canadian Medical Protective Association, the remaining provinces and territories also need to be pressed to enact apology laws.Noni MacDonald MD MSc Section *Editor, Population and Public Health Amir Attaran LLB DPhil Associate Editor, Editorials, CMAJ*

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With the Editorial-Writing Team (Paul C. Hebert MD MHSc, Matthew B. Stanbrook MD PhD, Barbara Sibbald BJ, and Ken Flegel MDCM MSc) Competing interests: See www.cmaj.ca/misc/edboard.shtml.

Scientists can now differentiate between healthy cells and cancer cells

One of the current handicaps of cancer treatments is the difficulty of aiming these treatments at destroying malignant cells without killing healthy cells in the process. But a new study by McMaster University researchers has provided insight into how scientists might develop therapies and drugs that more carefully target cancer, while sparing normal healthy cells

Mick Bhatia, scientific director of the McMaster Stem Cell and Cancer Research Institute in the Michael G. DeGroote School of Medicine, and his team of investigators have demonstrated – for the first time – the difference between normal stem cells and cancer stem cells in humans.

The discovery, published in the prestigious journal Nature Biotechnology today, could eventually help with the further customization and targeting of cancer treatments for the individual patient. It will immediately

provide a model to discover drugs using robotic screening for available molecules that may have untapped potential to eradicate cancer.

"Normal stem cells and cancer stem cells are hard to tell apart, and many have misconstrued really good stem cells for cancer stem cells that have gone bad - we now can tell the ones masquerading as normal stem cells from the bad, cancerous ones," said Bhatia.

"This also allows us to compare normal versus cancer stem cells from humans in the laboratory - define the differences in terms of genes they express and drugs they respond to. Essentially, we can now use this to find the "magic bullet", a drug or set of drugs that kill cancer stem cells first, and spare the normal healthy ones," he said.

"McMaster is uniquely positioned for this discovery platform, and this was the missing ingredient - we have one of the best screening/robotic platforms, chemical libraries and expertise in professors Eric Brown and Gerry Wright, who have discovered molecules to combat infectious disease. Now we can combine it all. This team now aims to kill cancer."

This work is funded by the Canadian Institutes of Health Research, the Canadian Cancer Society; the Ontario Institute for Cancer Research and the National Cancer Institute of Canada.

Collagen VI may help protect the brain against Alzheimer's disease

SAN FRANCISCO, CA – Scientists from the Gladstone Institute of Neurological Disease (GIND), UCSF, and Stanford have discovered that a certain type of collagen, collagen VI, protects brain cells against amyloid-beta (Aβ) proteins, which are widely thought to cause Alzheimer's disease (AD). While the functions of collagens in cartilage and muscle are well established, before this study it was unknown that collagen VI is made by neurons in the brain and that it can fulfill important neuroprotective functions.

The team of investigators led by GIND director Lennart Mucke, MD, reported in the current edition of the journal Nature Neuroscience, that collagen VI is increased in brain tissues of Alzheimer's patients.

"We first noticed the increase in collagen VI in the brain of AD mouse models, which inspired us to look for it in the human condition and to define its role in the disease," said Dr. Mucke.

The Gladstone team had profiled changes in gene expression using DNA microarrays, which provides an unbiased method for identifying key biological pathways. By comparing all of the genes that are active in disease and normal tissue, one can get valuable information on new pathways and potential therapeutic targets.

The researchers looked at the dentate gyrus, a specific area of the brain that is critical to memory and particularly vulnerable in AD, and compared the genes that were turned on and off in normal mice and a mouse model of AD. This analysis revealed the striking increase in collagen VI in the brains of mice that model AD.

Building on this initial finding, the team examined brain tissue from AD patients and normal non-demented humans and found that collagen VI expression was also higher in the AD patients. They further discovered that the cellular source of the collagen VI in the brain was neurons, the very cells that the disease attacks and that we all need to think and remember.

"These findings were really surprising and exciting to us because nobody knew anything about collagen VI in the brain," said Jason Cheng, MD, co-lead author of the study. "We were particularly curious whether collagen VI contributed to neuronal damage in AD or was produced as a defense mechanism against it," added Dena Dubal, MD, PhD, co-lead author of the study.

To answer this and other questions, the scientists carried out a series of informative cell culture experiments. These experiments revealed found that Aβ added to neurons grown in culture increased the expression of collagen VI and that this process involved the immune regulatory cytokine TGFβ. What is more, the team discovered that increasing the amount of collagen VI in the cultures effectively protected the neurons against Aβ toxicity.

"This striking protective effect suggests that increased neuronal production of collagen VI is an important component of the brain's defense against Aβ," said Dr. Mucke. "It made us really curious about the underlying mechanisms."

To clinch these mechanisms, Dr. Mucke's team examined the direct interactions of collagen VI with Aβ. They looked at how Aβ attacks individual neurons in cell culture. Small poisonous Aβ assemblies, called oligomers, bind strongly to vulnerable neurons in the brain, but in the presence of collagen VI, this binding was blocked. Using immunohistochemistry and atomic force microscopy, they showed that collagen VI and Aβ form large aggregates with each other that may sequester the smaller, more toxic Aβ complexes away from neurons.

"We are eager to explore how this kind of process might be enhanced therapeutically and how we can best leverage it for the development of more effective treatments for this devastating condition," said Dr. Dubal.

Other members of the research team were Gladstone's Irene Cheng, Daniel Kim, and Gui-Qiu Yu. Ina Tesseur and Tony Wyss-Coray of Stanford University and Paolo Bonaldo of the University of Padova, Italy also contributed to this study. The research was supported by the National Institutes of Health, the Howard Hughes Medical Institute, and the Larry L. Hillblom Foundation.

New hope for cancer comes straight from the heart

Johns Hopkins researchers discover new use for digoxin

Digitalis-based drugs like digoxin have been used for centuries to treat patients with irregular heart rhythms and heart failure and are still in use today. In the Dec. 16 issue of the Proceedings of the National Academy of Sciences, researchers at the Johns Hopkins University School of Medicine now report that this same class of drugs may hold new promise as a treatment for cancer. This finding emerged through a search for existing drugs that might slow or stop cancer progression.

"This is really exciting, to find that a drug already deemed safe by the FDA also can inhibit a protein crucial for cancer cell survival," says Gregg L. Semenza, M.D., Ph.D., director of the vascular program at the Johns Hopkins Institute for Cell Engineering and a member of the McKusick-Nathans Institute of Genetic Medicine.

Semenza and his team have long studied the hypoxia-inducible factor, or HIF-1, protein, which controls genes that help cells survive under low-oxygen conditions. HIF-1 turns on genes that grow new blood vessels to help oxygen-starved cells survive. Regions of low oxygen are common within the environment of fast-growing solid tumors.

"Oxygen-deprived cancer cells increase their HIF-1 levels to survive in these unfavorable conditions," says Semenza. "So turning down or blocking HIF-1 may be key to slowing or stopping these cells from growing."

The researchers took advantage of the Johns Hopkins Drug Library, a collection of more than 3,000 drugs already FDA approved or currently being tested in phase II clinical trials, assembled by Hopkins pharmacology professor Jun O. Liu. In this study, the research team tested every drug in the library for its ability to turn down HIF-1in cancer cells. The top 20 candidates identified were able to reduce HIF-1 by more than 88 percent, and more than half of these 20 belong to a class of drugs already commonly used for treating heart failure, and included digoxin.

The researchers focused on digoxin because of its already well-established clinical use. They treated prostate cancer cells grown at normal and low-oxygen levels with digoxin for three days and counted the number of cells each day. They found that cells treated with digoxin significantly slowed their growth, with fewer total cells after three days and increased numbers of cells that had stopped growing when compared to untreated cells.

"Many drugs may appear promising when used to treat cancer cells in a dish in the lab, but may have little or no effect on tumors in living animals," says Huafeng Zhang, Ph.D., a research associate in the Department of Oncology and the Institute for Cell Engineering at Hopkins.

To see if digoxin had the same effect on cancer cells in the physiological context of a whole animal, the team administered daily injections of digoxin to mice with tumors. In untreated mice, tumors were large enough to be felt within nine days, but in treated mice, tumors could first be felt only after as long as 15 to 28 days. The team then examined tumors from the mice and found that HIF-1 levels were lower than tumors from untreated mice. The team then went on to show that it is digoxin specifically reducing HIF-1 that leads to the anti-tumor results they saw.

While Zhang thinks it is possible that drugs like digoxin could someday be used for treating cancer, she cautions that a great deal of work remains to be done to understand in detail how these drugs inhibit HIF-1 and slow or stop tumor growth. Also, since this class of drugs acts by both strengthening and slowing down the rhythm of the heart, she notes that patients can safely tolerate them in only a limited dosage range - a range that is lower than the concentrations of digoxin used in this study. "We're trying to kill a tumor," she says, "We don't want to stop a heart."

Authors of this paper are Huafeng Zhang, David Z. Qian, Yee Sun Tan, KangAe Lee, Ping Gao, Yunzhao R. Ren, Sergio Rey, Hans Hammers, Daniel Chang, Roberto Pili, Chi V. Dang, Jun O. Liu, and Gregg L. Semenza, all of Hopkins.
This work was funded by the Flight Attendant Medical Research Institute and the Johns Hopkins Institute for Cell Engineering.

Low-carb diets prove better at controlling type 2 diabetes

DURHAM, NC -- In a six-month comparison of low-carb diets, one that encourages eating carbohydrates with the lowest-possible rating on the glycemic index leads to greater improvement in blood sugar control, according to Duke University Medical Center researchers.

Patients who followed the no-glycemic diet experienced more frequent reductions, and in some cases elimination, of their need for medication to control type 2 diabetes, according to lead author Eric Westman, MD, director of Duke's Lifestyle Medicine Program. The findings are published online in Nutrition and Metabolism.

"Low glycemic diets are good, but our work shows a no-glycemic diet is even better at improving blood sugar control," he says. "We found you can get a three-fold improvement in type 2 diabetes as evidenced by a standard test of the amount of sugar in the blood. That's an important distinction because as a physician who is faced with the choice of drugs or diet, I want a strong diet that's shown to improve type 2 diabetes and minimize medication use."

Eight-four volunteers with obesity and type 2 diabetes were randomized to either a low-carbohydrate ketogenic diet (less than 20 grams of carbs/day) or a low-glycemic, reduced calorie diet (500 calories/day). Both groups attended group meetings, had nutritional supplementation and an exercise regimen.

After 24 weeks, their glycemic control was determined by a blood test that measured hemoglobin A1C, a standard test used to determine blood sugar control in patients with diabetes. Of those who completed the study, the volunteers in the low-carbohydrate diet group had greater improvements in hemoglobin A1C. Diabetes medications were reduced or eliminated in 95 percent of the low-carbohydrate volunteers, compared to 62 percent in the low-glycemic group. The low-carbohydrate diet also resulted in a greater reduction in weight.

"It's simple," says Westman. "If you cut out the carbohydrates, your blood sugar goes down, and you lose weight which lowers your blood sugar even further. It's a one-two punch."

The diet is not easy for everybody. "This is a therapeutic diet for people who are sick," says Westman. "These lifestyle approaches all have an intensive behavioral component. In our program, people come in every two weeks to get reinforcements and reminders. We've treated hundreds of patients this way now at Duke and what we see clinically and in our research shows that it works." *This research is funded by the Robert C. Atkins Foundation.*

Understanding Extinct Microbes May Influence the State of Modern Human Health

For Immediate Release
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The study of ancient microbes may not seem consequential, but such pioneering research at the University of Oklahoma has implications for the state of modern human health. Cecil Lewis, assistant professor in the Department of Anthropology, says results of this research raise questions about the microbes living on and within people.

A National Institutes of Health initiative is looking at helpful bacteria found on the skin, in the esophagus and in the stomach, by characterizing the microbe's collective genomes as an ecosystem. These collective genomes are referred to as "human microbiomes." Appropriately named, NIH refers to this initiative as the "Human Microbiome Project," analogous to the "Human Genome Project," which published the first human genome in 2000.

The Human Microbiome Project has new challenges. The project is more daunting than sequencing one organism because researchers are sequencing trillions of organisms. There are 10 times as many bacteria cells on and within one's body than there are on human body cells. And these bacteria are important. Within the gut, microbes are known to assist in human digestion, improve energy intake, produce vitamins and even help in the development of a healthy immune system.

The NIH Microbiome Project is searching for the "core" human microbiome. In other words, they are trying to determine if there are certain aspects of the ecology that all humans share. Lewis says ancient DNA research can provide an important perspective on this search.

Lewis is one of the few people in the United States that conducts ancient DNA research. One of his primary interests is ancient human microbiomes. According to Lewis, "We've introduced bacteria into our system through foods from around the world. Fruits imported from various parts of the world contribute to the global microbiomes that now inhabit our bodies." Interestingly, ancient microbiome studies provide a view of these ecosystems prior to the modern world economy.

In living people, the gut microbiome is frequently studied using fecal samples. This gave Lewis and his colleagues an idea. To understand the state of microbiomes before the global world economy, they would compare two ancient coprolites, which are old dry or fossilized feces. The coprolites were 1,300 years old from Central Mexico. Researchers performed genetic testing to determine that the two coprolites were from two different people, and then analyzed the microbiomes within the coprolites.

The researchers retrieved ancient DNA evidence for bacteria species similar to that seen in human microbiomes today. The types of bacteria present were typical of the human gut. Lewis and his collaborators were also able to characterize the functional aspects of these extinct microbiomes. Comparing the two ancient samples, they found them to be very similar to one another.

These findings were compared to human microbiomes today. Lewis and colleagues found that the two ancient microbiomes were more similar to each other functionally than a sample of modern microbiomes. They proposed that prehistoric microbiomes were more geographically structured than those found today - a discovery that, if true, would change the way NIH and others look at human microbiomes.

Geographically structured microbiomes have ramifications for human health. Pioneering work on modern microbiomes has shown that certain bacteria can impact disease and health states, including diabetes and immune systems disorders. In fact, modern medicine may have caused some of these negative impacts. For example, antibiotic treatment of young children is known to increase their risks of developing allergies later in life because their immune system develops improperly. Understanding ancient microbiomes provides a better picture of microbiomes as they coadapted with our ancestors.

The human microbiome effort is relatively new. Lewis considers his findings preliminary, stating that many new challenges are ahead. But this research will be of interest to many, including medical professionals and biologists and the public. “We should be thinking of ourselves as “superorganisms” harboring microbes from around the world. This is much more complicated than just the cells that make up the body. We have more than just our body to nurture to be in good health,” says Lewis.

Lewis says that science needs to be better prepared for the moral and ethical consequences of microbiome research. He and his collaborators started a new project considering these consequences. They will continue their study of ancient microbiomes hoping to obtain a better understanding of exactly how these important ecologies change over time and space.

More information about his research can be found at www.anthdna.com. His publication on ancient human microbiomes is available from one of the Public of Library of Science journals, PLoS ONE, www.plosone.org.

Darwin missed 'earliest' Galapagos species

*** 19:58 05 January 2009 by Rowan Hooper**

It is one of the most studied parts of the world, and played a major part in shaping Darwin's thinking about the origin of species - yet the Galapagos Islands continue to give more to our understanding of biology.

It was finches that led Darwin to understand that species could change with environmental pressures, and now genetic analysis has revealed that a long-overlooked pink iguana is a species in its own right and may be one of the earliest examples of species diversification on the islands.

Galapagos land iguanas belong to the genus Conolophus, of which there are currently three recognised species. Remarkably, given their colour, pink iguanas were apparently not seen until they were noticed by park rangers in 1986. They are sometimes known as "rosada" iguanas, from the Spanish for pink.

Gabriele Gentile of Tor Vergata University of Rome, Italy, and colleagues took blood samples of rosada iguanas and the other two species in order to test their relatedness.

The DNA of the Galapagos pink or "rosada" iguana suggests its diversification from other species of iguana occurred before most of the volcanic islands had even formed **(Image: Gabriele Gentile)**

Already endangered

Genetic analysis shows that the rosada iguana originated in the Galapagos more than five million years ago, and diverged from the other land iguana populations even as the archipelago was still forming.

The species came into being even before the appearance of the Volcán Wolf volcano in the north of Isabela Island - the only place the rosada is now found.

The pink form, says Gentile, should be considered a third species, and is evolutionarily older than the other two species. And though it has only recently been discovered, Gentile says conservation measures are needed to prevent the pink iguana from going extinct.

"Available data suggest that the population size of the pink iguana is very small," he says. Feral cats in the region could be eating eggs and young iguanas, Gentile speculates. Direct hunting by humans is also blamed.

'Good food'

Darwin spent five weeks exploring the Galapagos, but did not encounter the pink iguanas. We can assume, however, that he would not have been endeared to them. Of the island's famous marine iguanas, Darwin had this to say: "hideous-looking creatures, of a dirty black colour, stupid and sluggish in their movements", though he added in his diary that the animals swam "with perfect ease and swiftness".

He didn't think much of land iguanas either: "hideous animals, but are considered good food".

Journal reference: Proceedings of the National Academy of Sciences (DOI: 10.1073/pnas.0806339106)

Physical activity may not be key to obesity epidemic, Loyola study finds

Maywood, Ill. -- A recent international study fails to support the common belief that the number of calories burned in physical activity is a key factor in rising rates of obesity.

Researchers from Loyola University Health System and other centers compared African American women in metropolitan Chicago with women in rural Nigeria. On average, the Chicago women weighed 184 pounds and the Nigerian women weighed 127 pounds.

Researchers had expected to find that the slimmer Nigerian women would be more physically active. To their surprise, they found no significant difference between the two groups in the amount of calories burned during physical activity.

"Decreased physical activity may not be the primary driver of the obesity epidemic," said Loyola nutritionist Amy Luke, Ph.D., corresponding author of the study in the September 2008 issue of the journal Obesity. Luke is an associate professor in the Department of Preventive Medicine and Epidemiology at Loyola University Chicago Stritch School of Medicine.

Physical activity is defined as anything that gets your body moving. U.S. government guidelines say that each week, adults need at least 2 ½ hours of moderate aerobic activity (such as brisk walking) or 75 minutes of vigorous activity (such as jogging). Adults also should do muscle-strengthening activities, such as weight-lifting or sit-ups, at least twice a week.

Physical activity has many proven benefits. It strengthens bones and muscles, improves mental health and mood, lowers blood pressure, improves cholesterol levels and reduces the risk of cardiovascular disease, diabetes, breast cancer and colon cancer.

But Loyola research suggests that weight control might not be among the main benefits. People burn more calories when they exercise. But they compensate by eating more, said Richard Cooper, Ph.D., co-author of the study and chairman of the Department of Preventive Medicine and Epidemiology.

"We would love to say that physical activity has a positive effect on weight control, but that does not appear to be the case," Cooper said.

The recent study included 149 women from two rural Nigerian villages and 172 African American women from the west side of Chicago and suburban Maywood.

Adjusted for body size, the Chicago women burned an average of 760 calories per day in physical activity, while the Nigerian women burned 800 calories. This difference was not statistically significant.

Diet is a more likely explanation than physical activity expenditure for why Chicago women weigh more than Nigerian women, Luke said. She noted the Nigerian diet is high in fiber and carbohydrates and low in fat and animal protein. By contrast, the Chicago diet is 40 percent to 45 percent fat and high in processed foods.

Results of the new study are similar to those of a 2007 study of men and women in Jamaica. Researchers from Loyola and other centers found there was no association between weight gain and calories burned during physical activity.

"Evidence is beginning to accumulate that dietary intake may be more important than energy expenditure level," Luke said. "Weight loss is not likely to happen without dietary restraint."

Other centers involved in the study of Chicago and Nigerian women include University of Ibadan in Nigeria, Howard University, Johns Hopkins Bloomberg School of Public Health and University of Wisconsin.

Cassiopeia A comes alive across time and space

Two new efforts have taken a famous supernova remnant from the static to the dynamic. A new movie of data from NASA's Chandra X-ray Observatory shows changes in time never seen before in this type of object. A separate team will also release a dramatic three-dimensional visualization of the same remnant.

Nearly ten years ago, Chandra's "First Light" image of Cassiopeia A (Cas A) revealed previously unseen structures and detail. Now, after eight years of observation, scientists have been able to construct a movie that tracks the remnant's expansion and changes over time.

"With Chandra, we have watched Cas A over a relatively small amount of its life, but so far the show has been amazing," said Daniel Patnaude of the Smithsonian Astrophysical Observatory in Cambridge, Mass. "And, we can use this to learn more about the aftermath of the star's explosion."

A separate, but equally fascinating visualization featuring Cas A was presented, along with the Patnaude team's results, at a press conference at the American Astronomical Society meeting in Long Beach, Calif. Based on data from Chandra, NASA's Spitzer Space Telescope, and ground-based optical telescopes, Tracey DeLaney and her colleagues have created the first three-dimensional fly-through of a supernova remnant.

"We have always wanted to know how the pieces we see in two dimensions fit together with each other in real life," said DeLaney of the Massachusetts Institute of Technology. "Now we can see for ourselves with this 'hologram' of supernova debris."

This ground-breaking visualization of Cas A was made possible through a collaboration with the Astronomical Medicine project based at Harvard. The goal of this project is to bring together the best techniques from two very different fields, astronomy and medical imaging.

"Right now, we are focusing on improving three-dimensional visualization in both astronomy and medicine," said Harvard's Alyssa Goodman who heads the Astronomical Medicine project. "This project with Cas A is exactly what we have hoped would come out of it."

While these are stunning visuals, both the data movie from Patnaude and the 3-D model from DeLaney are, more importantly, rich resources for science. The two teams are trying to get a much more complete understanding of how this famous supernova explosion and its remnant work.

This movie of X-ray data from Chandra was made by combining observations taken in January 2000, February 2002, February 2004 and December 2007. In these images, the lowest-energy X-rays Chandra detects are shown in red, intermediate energies in green and the highest energies in blue. Scientists have used the movie to measure the expansion velocity of the leading edge of the explosion's outer blast wave (shown in blue). The researchers find that the velocity is 11 million miles per hour, which is significantly slower than expected for an explosion with the energy estimated to have been released in Cas A. **NASA/CXC/SAO/D. Patnaude et al.**

Patnaude and his team have measured the expansion velocity of features in Cas A from motions in the movie, and find it is slower than expected based on current theoretical models. Patnaude thinks the explanation for this mysterious loss of energy is cosmic ray acceleration.

Using estimates of the properties of the supernova explosion, including its energy and dynamics, Patnaude's group show that about 30% of the energy in this supernova has gone into accelerating cosmic rays, energetic particles that are generated, in part, by supernova remnants and constantly bombard the Earth's atmosphere. The flickering in the movie provides valuable new information about where the acceleration of these particles occurs.

Likewise, the new 3-D model of Cas A provides researchers with unique ability to study this remnant. With this new tool, Delaney and colleagues found two components to the explosion, a spherical component from the outer layers of the star and a flattened component from the inner layers of the star.

This visualization is a 3-D model constructed from data from Chandra, Spitzer and ground-based optical telescopes. Scientists determined the positions of the different telescopes, represented by the various colors, using the Doppler effect. That information was then put into a medical imaging program adapted for astronomical use before commercial software was used to create the final visualization. This is the first time such a multiwavelength 3-D model of a supernova remnant has been created. **NASA/CXC/MIT/T. Delaney et al.**

Notable features of the model are high-velocity plumes from this internal material that are shooting out from the explosion. Plumes, or jets, of silicon appear in the northeast and southwest, while plumes of iron are seen in the southeast and north. Astronomers had known about the plumes and jets before, but did not know that they all came out in a broad, disk-like structure.

The implication of this work is that astronomers who build models of supernova explosions must now consider that the outer layers of the star come off spherically, but the inner layers come out more disk like with high-velocity jets in multiple directions.

Cassiopeia A is the remains of a star thought to have exploded about 330 years ago, and is one of the youngest remnants in the Milky Way galaxy. The study of Cas A and remnants like it help astronomers better understand how the explosions that generate them seed interstellar gas with heavy elements, heat it with the energy of their radiation, and trigger shock waves from which new stars form.

Lawrence Rudnick of the University of Minnesota led the Spitzer part of the Delaney study. NASA's Marshall Space Flight Center in Huntsville, Ala., manages the Chandra program for NASA's Science Mission Directorate in Washington. The Smithsonian Astrophysical Observatory controls Chandra's science and flight operations from Cambridge, Mass.

Vital Signs

A Note to the Wise on MySpace Helps

By ERIC NAGOURNEY

Teenagers often use social networking sites like MySpace to post intimate personal information they come to regret, as it lets future employers (or online predators) learn about sex activity and substance abuse. Enter “Dr. Meg.” When teenagers got a note from “Dr. Meg” warning them about what they had posted, many thought twice about their postings, a new study says.

Dr. Meg was Dr. Megan A. Moreno, the lead author of two studies about networking sites in the January issue of Archives of Pediatrics and Adolescent Medicine.

In one study, the researchers looked at 500 publicly available MySpace profiles posted by people who said they were 18. More than half contained what the researchers described as “risk behavior information,” including talk of sex and alcohol use. Some also discussed violence.

For a second study, the researchers built a MySpace page for Dr. Meg that identified her as a doctor. They searched the network for users who identified themselves as 18 to 20 and talked about sex activity and substance use. (Dr. Moreno, then at the University of Washington, is now at the University of Wisconsin.)

The researchers sent them a note about the risk of disclosing personal information, with a link to a Web site about sexually transmitted diseases. Three months later, they found 42 percent of the MySpace pages had been changed.

Sniff of sickness makes mums prime babies for life

THE odour of disease makes pregnant mice boost their babies' immunity. It is the first proof that social or environmental cues detected by a pregnant mother can alter traits in its babies.

Female mice are attuned to the odour of male mice as it helps them pick a mate. Olivia Curno of the University of Nottingham, UK, and her team housed pregnant mice next to male mice infected with a parasite. A partition meant the females could smell the males but not come into contact to catch the disease.

Offspring of these mice exposed to the parasite after birth cleared the infection up to five days sooner than those of control mice (Proceedings of the Royal Society B, DOI: 10.1098/rspb.2008.1612). They were also less aggressive. The team found that mothers exposed to infected mice had levels of the stress hormone corticosterone twice as high as normal.

Curno thinks the pregnant mice respond to a subtle odour given off by sick animals. The hormone spike could then warn the fetus of disease, and prompt it to invest heavily in its immune system.

This also explains why pups of control mice tended to be stronger. "If there's no disease, it's worth putting everything into fighting, but if there's disease it's better to invest in immunity," says Curno.

Cases

The Instincts to Trust Are Usually the Patient’s

By SANDEEP JAUHAR, M.D.

Joe Morse

Not long ago, I took care of an elderly man with congestive heart failure. A few days into his stay in the hospital, he told me he was not going to make it out alive. “I am going to die here,” he whispered, as if letting me in on a secret.

I tried to reassure him: on the scale of disease I normally treat, his case was relatively mild. But then he became sicker.

His bloated legs dripped fluid, soaking his bed sheets and puddling on the tile floor. His blood pressure dropped. He became delirious. I was perplexed by the precipitous downturn. What did my patient know that I did not?

After several days of keeping round-the-clock vigil in the intensive care unit, his wife of nearly 50 years could no longer bear his suffering and requested hospice care. A few hours before he died, groggy from morphine, he managed to summon a few moments of lucidity. Gripping his wife’s hand, he said to her, “You’re doing the right thing.”

Every day in medicine there are examples of patients who know they are about to die, even if no one else does. They often have a feeling of impending doom before a catastrophic event like a heart attack or a fatal infection, and though doctors don’t know how to explain it, most of us take it seriously.

When we talk about instinct in medicine, we usually talk about expert clinicians grasping diagnoses in ways that seem to defy analytical explanation. These doctors appear to know almost intuitively which data to focus on and which to ignore. Of course, their decision-making is based on experience and deductive reasoning (and perhaps on evidence, too), yet it seems almost mystical.

I will never forget the time in medical school when we presented a baffling case to the chief of medicine. He made a diagnosis of primary pulmonary hypertension within seconds, on the basis (he claimed) of the loudness of the second heart sound, an incredible feat of observation and logical synthesis.

This sort of diagnostic intuition is becoming rare in the current era of technological medicine. Patients today often receive a battery of tests even before a physician examines them. The results, usually expressed in numbers that give a misleading impression of absolute precision, tend to lull doctors into a sort of laziness that has atrophied instinct.

On the other hand, doctors' prognostic instincts have always been poor. In my work as a critical care cardiologist, I am often asked to predict how long someone is going to live. I know how useful such projections can be to patients and their families, but I rarely, if ever, venture a guess because they are so often inaccurate. (I am usually too optimistic.)

So it amazes and baffles me when patients have a sixth sense about their own deaths. Last year, my team cared for a woman who told us calmly on morning rounds that she had a feeling she was going to die that day.

A few hours later she complained of belly pain, and when a tube was inserted through her nose and into her stomach, old digested blood - "coffee ground" secretions - came up. Her blood count plummeted, and within a few hours she had spiraled into shock and multiple organ failure, even before we could get a CAT scan to see what was going on. It was totally unexpected, one of the most rapid noncardiac deaths I have ever witnessed.

I don't know how my patient was seemingly able to predict her own demise. Perhaps high levels of circulating adrenaline caused a reaction similar to a panic attack; I don't know. But I have learned over time to take such intuitions very seriously.

Sometimes, morbid instincts derive from other sources. In 2007, The New England Journal of Medicine had the story of a cat named Oscar who lives in a nursing home in Providence, R.I., and seems to have an uncanny sense for when elderly residents are about to die.

He goes to their rooms, curls up beside them - even those residents for whom he has previously shown little interest - and purrs. Staff members at the facility have learned that this is a telltale sign of impending death, having witnessed this behavior in the deaths of at least 25 patients. "This is a cat that knows death," one doctor said. "His instincts that a patient is about to die are often more acute than the instincts of medical professionals."

No doubt there are more such animals. But I have learned that the best instincts in medicine derive from the patients themselves. Their intuitions about their own health may be denigrated by doctors. But we must learn to pay attention to them. As my patients have taught me, they often hold the vital clue.

Sandeep Jauhar is a cardiologist on Long Island and the author of the recent memoir "Intern: A Doctor's Initiation."

Second Opinion

Should Patients Be Told of Better Care Elsewhere?

By DENISE GRADY

Six years ago, a relative of mine found out that she had rectal cancer and would need surgery, radiation and chemotherapy. She lives in a small town, and she consulted a local surgeon at a community hospital.

He was pleasant and kind, and clearly explained her condition and the operation he would perform. He was also painfully honest, and said that because the tumor was large, he doubted that he would be able to save the sphincter muscles that make bowel control possible. She would very likely need a colostomy, a procedure to divert wastes out through an opening cut in the abdomen, and would have to wear a colostomy bag for the rest of her life.

My relative thought it over. Being treated close to home had seemed so easy and convenient, and she dreaded the thought of shopping around for doctors when she was feeling sick, vulnerable and anxious. It was tempting to think that she would receive first-rate treatment no matter where she went.

But she also recognized that this was a small hospital, and a surgeon who probably spent more time fixing hernias and taking out gallbladders than he did operating on cancer patients. She decided that she wanted a doctor who operated on patients like her all the time, and that the two-hour trip to a cancer center would be worth the trouble.

And so it was: she found a surgeon who specialized in rectal cancer, and today she's in good health, with no need for a bag. She might have done just as well with the local surgeon, but we both doubt it.

An article published online in October in the journal PLoS Medicine really hit home with me. Noting that the quality of cancer care is uneven, its authors argued that as part of the informed-consent process, doctors have an ethical obligation to tell patients if they are more likely to survive, be cured, live longer or avoid complications by going to Hospital A instead of Hospital B. And that obligation holds even if the doctor happens to work at Hospital B, and revealing the truth might mean patients will take their business someplace else.

“It’s only fair,” said Dr. Leonidas G. Koniaris, an author of the article and a cancer surgeon at the Miller School of Medicine at the University of Miami.

Studies have confirmed the common-sense notion that practice makes perfect, and the medical profession has known for at least 30 years that how well people fare after surgery often depends on where it was performed. For a given operation, outcomes are generally best at “high volume” hospitals, which perform it often. The difference between high- and low-volume centers is not just the surgeon’s skill, but also the level of expertise in other areas that are crucial after surgery, like nursing, intensive care, respiratory therapy and rehabilitation, Dr. Koniaris said. The same principles apply to treating cancer.

But patients are not often told during the informed-consent process that the results of cancer treatment can vary among hospitals, according to Dr. Koniaris and his co-author, Nadine Housri, a medical student.

“I think it’s sort of starting to happen but hasn’t really become a dialogue yet,” Dr. Koniaris said.

The strongest evidence that volume makes a difference comes from studies of surgery for pancreatic and esophageal cancer, but Dr. Koniaris said the experience of the surgeon and the whole medical team was important in any major cancer surgery.

He was not surprised to hear about my relative. He was an author of a study published in 2007 that found that people with rectal cancer survived longer and were more likely to have operations that saved the sphincter at teaching hospitals than at community ones - even though the university hospitals were more likely to take on difficult cases with large tumors. Another study in which he participated suggested that women with advanced breast cancer received more comprehensive therapy and survived somewhat longer when treated at teaching hospitals rather than at community ones.

Some medical experts say complicated treatments like surgery for cancer or heart problems should be regionalized - done strictly at specialized, high-volume centers, not at centers that don’t perform the operations often enough to become really good at them. But Dr. Koniaris and Ms. Housri suggested still another option.

“We brought up the idea that maybe it should just be up to the patient,” Dr. Koniaris said.

Studies have found that some people still prefer to be treated close to home even if the risks are higher there. Maybe they shouldn’t be forced to travel, especially if the difference is not large, Dr. Koniaris said.

Asked if he practiced what he preached, Dr. Koniaris said yes, that as a surgeon he sometimes sent patients to other doctors, especially for pancreatic cancer and liver tumors.

His article pointed out that in a few cases in the United States and Australia, courts have ruled that doctors who had operated on people with poor results should have informed the patients that more experienced surgeons were available.

PLoS Medicine framed the article by Dr. Koniaris and Ms. Housri as a debate, with two other researchers taking different views. Dr. Robert J. Weil, a neurosurgeon at the Cleveland Clinic, argued that although it might seem a good idea to inform patients of differences in outcomes among hospitals, there would be “a variety of hurdles.”

Which hospitals would be chosen for comparison? And as medicine advances and changes, Dr. Weil asked, “is it possible to compare hospitals or even recent time periods, especially when faced with disease courses that may extend over years?” He also suggested that if hospitals were forced to give patients comparative information, it might lead some to avoid difficult cases, to make their numbers look better. And he pointed out that patients might have no idea what to make of the information, because most people have a hard time gauging risk or understanding that statistics apply to a population but don’t predict the fate of an individual.

David I. Shalowitz, a bioethicist, said that expecting surgeons and hospitals to disclose information about other doctors and medical centers would create an untenable conflict of interest for them and should be avoided.

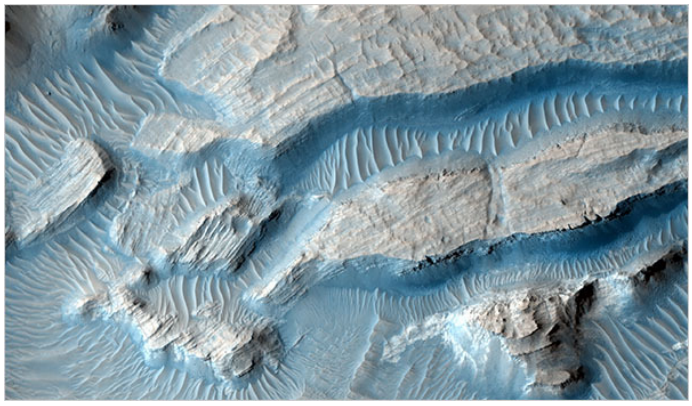
The question of what the doctor’s obligation is remains unresolved. People can ask doctors for comparative information, but many patients would fear giving offense. And judging by volume alone may have its pitfalls, because there are bound to be some hospitals that do lots of operations badly and some that perform few but do them well.

(For people who want to find out how a specific hospital performs in treating certain illnesses and performing operations, the government Web site www.hospitalcompare.hhs.gov provides information. In addition, some states require that hospitals publish their infection rates; that information is at www.hospitalinfection.org.)

Some people will try to sort out whatever information they can obtain or, as my relative did, simply figure that the odds will be most in their favor if they can find their way to a doctor or surgeon who takes care of a lot of people who are a lot like them. For now, many patients facing tough decisions are pretty much on their own.

Orbiter, Finishing a Mission, Offers a Peek at Mars' Wrinkles

By KENNETH CHANG



Last month, NASA's Mars Reconnaissance Orbiter wrapped up its two-year primary science phase, and Mars geologists are wallowing in a bounty of data.

"Technically and scientifically, it has certainly met our expectations," said Alfred S. McEwen, a planetary geologist at the University of Arizona and principal investigator for the orbiter's high-resolution camera.

Images taken by the camera, able to see features down to about a yard in size, have revealed details like rippled textures in what had looked like bland dusty regions, and researchers can now count tiny craters, enabling them to better estimate the age of terrains.

RIPPLES A crater between the southern highlands and northern lowlands, intersected by what may have been a shoreline of an ocean. ***More Photos >***

A sensitive spectrometer discovered rocks made of carbonate minerals, which may have formed when young Mars possessed a more benign environment: wet and maybe warm.

"That's telling us something about the early history of Mars," said Scott L. Murchie of the Johns Hopkins Applied Physics Laboratory and principal investigator for the spectrometer.

Most of the carbonates were washed away by acidic waters in later epochs.

The orbiter will continue its observations, which will allow places to be photographed more than once to capture changes in the landscape.

Meanwhile, the two Martian rovers, Spirit and Opportunity, mark their fifth anniversary this month, far outliving their original three-month mission. Spirit has recently begun moving again after sitting still through the winter while Opportunity is crossing the plains en route to a 13.7-mile-wide crater named Endeavour, a journey that could take at least another two years.

Steven W. Squyres, the principal investigator of the rovers, said it struck him as an odd milestone for people to mark. "It's kind of like celebrating your birthday in Mars years," he said. "Of course, I'd be younger that way." (In Mars years, Dr. Squyres is 28.)

Is love just a chemical cocktail?

By Pallab Ghosh BBC News science correspondent

It is said that love is a drug. But is it just a drug?

That is the contention of Larry Young, a professor of neuroscience at Emory University in Atlanta, Georgia.

Writing in the respected scientific journal Nature, Professor Young argues that love can be explained by a series of neurochemical events in specific brain areas.

If it is true, he says, people will no longer have to rely on oysters or chocolates to create a loving mood.

Instead, it will be possible for scientists to develop aphrodisiacs - chemicals that would make people fall in love with the first person they see.

And for those who have fallen in love with someone they shouldn't have, there could be an antidote to unrequited love. There is even the prospect of a genetic "love test" to assess whether two potential love-birds are predisposed to a happy married life.

Not poetry

Poets would have us believe that love is one of those things that are beyond understanding.

But that concept is anathema to Professor Young.

"I'm not sure we'll be able to understand it fully," he said.

"But my belief is that our emotions have evolved from behaviours and emotions that are in the animal kingdom. "I don't think that the way a mother loves her baby is that different to a mother's love in a chimpanzee or a rhesus monkey - or even a rat."

In animals, scientists have observed that a chemical called oxytocin is involved in developing a bond between a mother and her young.

Professor Young believes it is very likely that a similar process is going on in humans. "It's just that when we experience these emotions they are so rich we can't imagine that they are just a series of chemical events," he said.

But even if that is true of maternal love, is romantic love simply down to a squirt of oxytocin and a few other love chemicals at a timely moment? Professor Young thinks it might be.

Intense bonds

Researchers have found that oxytocin is involved in the bonding of male and the female prairie voles, which like humans, form an intense bond with each other that lasts for a very long time. And there have been studies in humans that show that oxytocin increases trust - the ability to read the emotions of others.

So, Professor Young argues that it makes sense that the same sort of molecule might be involved in strengthening the bond between individuals. He believes there are other chemicals involved too - it is just a matter of doing the research and finding out which ones they are.

"I'm sure that we are just beginning to tap the surface," he said. "There are hundreds of signalling molecules in the brain - they all act in different brain areas. "I think one day we will have a much better understanding of how all these chemicals interact and act in specific brain areas that have specific function that give rise to these complex emotions."

Other scientists argue that upbringing and psychology play a part.

Professor Nick Bostrom, director of Oxford University's Future of Humanity Institute, said: "We shouldn't think that this perspective on its own provides a full understanding of what love is.

"There are also evolutionary, psychological, sociological, phenomenological (a philosophical approach and method of qualitative research) and humanistic perspectives that offer important insights."

"Nurture has an important part to play," Professor Young concedes. "But the way nurture works is through changing neurochemistry. "We know from studies in humans that women that have experienced abuse or neglect early in their life have decreased levels of oxytocin in their brain. "So I totally agree that our experiences have a huge impact on our ability to form relationships - but that impact occurs through changes in neurochemistry and gene expression."

So, if love really is just a complex chemical reaction, could that most powerful of human emotions be manipulated?

"Oxytocin increases eye gaze, increases our ability to recognise emotions in others," Professor Young said.

"It may actually enhance our ability to form relationships, and so it is a very real possibility that something like oxytocin could be used in conjunction with marital therapies to bring back that spark."

There are already perfumes on the market containing oxytocin, but Professor Young believes the levels are too low for it to be an effective aphrodisiac. "But I think in the future we can develop drugs that readily pass into the brain and can target certain brain areas that could do this," he said.

Professor Bostrom believes it will become increasingly possible to manipulate the neurological mechanisms that play a role in romantic attachment. "Used wisely, such pharmacology could enhance human experience and mitigate unnecessary suffering. "However, this kind of manipulation would raise a thicket of ethical and cultural issues, which would need to be carefully explored."

A protein that protects against Alzheimer's?

Montreal - Research on the mechanisms involved in neurodegenerative diseases such as Alzheimer's, stroke, dementia, Parkinson's and multiple sclerosis, to name a few, has taken a step forward thanks to the work of biological sciences Ph.D. student Sonia Do Carmo, supervised by Professor Éric Rassart of the Université du Québec à Montreal (UQAM) Biological Sciences Department, in collaboration with researchers at the Armand-Frappier Institute and the University of Valladolid in Spain.

Do Carmo and her collaborators have successfully demonstrated the protective and reparative role of apolipoprotein D, or ApoD, in neurodegenerative diseases. Their discovery suggests interesting avenues for preventing and slowing the progression of this type of illness.

These studies were inspired by work done ten years ago by Professor Rassart's team, who then discovered increased levels of ApoD in the brains of people with several types of neurodegenerative disorders, including Alzheimer's. The team hypothesized that this protein might play a protective and restorative role but were unable to demonstrate this at the time.

The experiments

To establish the protective and reparative role of ApoD, the researchers used two types of genetically modified mice: one type with increased levels of ApoD in the brain and a second type with no ApoD. The mice were then exposed to neurodegenerative agents. A group of the modified mice and a control group (unmodified) were exposed to paraquat, a widely used herbicide that has been shown to increase the risk of Parkinson's. Then the same type of experiment was performed by injecting two groups with a virus that causes encephalitis. In both cases, the mice modified for increased levels of ApoD had the best outcomes, with a better ability to combat the diseases and a higher survival rate than the unmodified mice. The knockout mice with no ApoD displayed the poorest outcomes. These experiments serve to illustrate the protective and reparative role of this protein.

When can we expect medication?

A number of steps remain before this research can translate into effective drugs against neurodegenerative conditions. The original investigator, Professor Éric Rassart, explains, "You cannot simply inject ApoD, as it has to enter the brain in order for it to be active. We have successfully demonstrated the role of ApoD, but now we need to understand the action of this protein. Only then will we be able to think about creating a drug to prevent these types of diseases and to slow their progression. All the same, this discovery by Sonia Do Carmo and her collaborators is a significant breakthrough, as we know very little about the mechanisms of neurodegenerative diseases."

The discovery has aroused considerable interest among the molecular biology community. Two major scientific journals have already published the research findings: Aging Cell (Vol. 7: 506-515, 2008) and Journal of Neuroscience (Vol. 28: 10330-10338, 2008).

Four, three, two, one . . . Pterosaurs have lift off!

Hopkins researcher reports that ancient flying reptiles used four legs to launch

Pterosaurs have long suffered an identity crisis. Pop culture heedlessly - and wrongly - lumps these extinct flying lizards in with dinosaurs. Even paleontologists assumed that because the creatures flew, they were birdlike in many ways, such as using only two legs to take flight.

Now comes what is believed to be first-time evidence that launching some 500 pounds of reptilian heft into flight required pterosaurs to use four limbs: two were ultra-strong wings which, when folded and balanced on a knuckle, served as front "legs" that helped the creature to walk - and leap.

Publishing in Zitteliana, Michael B. Habib, M.S., of the Center for Functional Anatomy and Evolution at the Johns Hopkins University School of Medicine, reports his comparison of bone strength in the limbs of pterosaurs to that of birds and concludes that pterosaurs had much stronger "arms" than legs. The reverse is true of birds.

"We've all seen birds take off, so that's what's most familiar," says Habib. "But with pterosaurs, extinct 65 million years and with a fossil history that goes back 250 million years, what's familiar isn't relevant."

A supersized glitch is inherent in the traditional bipedal launch model, Habib notes: "If a creature takes off like a bird, it should only be able to get as big as the biggest bird."

Birds use legs to launch, wings to flap. They don't get launch power from wings or flight power from legs. In fact, when a bird is aloft, its legs become payload, or cargo. The muscle on the two back limbs that provides the power to launch must be carried and therefore limits size. Released of that handicap by employing all four legs to launch, giant pterosaurs could fly despite the fact that they were roughly the same size and shape as modern-day giraffes.

A modern-day man and giraffe, drawn to scale, flank the extinct pterosaur known as Hatzegotpteryx. Unlike birds, pterosaurs used four legs to launch themselves into flight, according to new research.
Illustration by Mark Witton.
** click on illustration for higher resolution version*

If man had lived 65 million years ago, here's how he would have measured up to two of the flying reptiles known as pterosaurs which, unlike birds, used four legs to launch themselves into flight, according to new research. The massive 30-foot wingspan of the toothless pteranodon (left) was surpassed by that of Hatzegopteryx (right) at 40 feet or more.
Illustration by Mark Witton.

"The difference between pterosaurs and birds with regard to critical mechanical properties is very, very large," Habib says, especially when you're talking about the big pterosaurs; as the size gets bigger, the difference gets bigger too."

For example, the wings of these fantastic hairy reptiles, most notably those of Quetzalcoatlus northropi, which spanned to an impressive 35 feet when the creatures were aloft, propelled the creatures into the air during take-offs that Habib describes as leap-frogging long-jumps: "Pterosaurs had long, huge front limbs, so no partner was required. Then, with wings snapping out, off they'd fly."

Using computer scans to obtain cross-sectional images and geometric data for 155 bird specimens representing 20 species, Habib calculated the strengths of bones in bird limbs and compared these to three species of pterosaurs, the bones strengths of which he calculated using measurements from previously published sources. Structural strength, taking into account length and diameter, among other things, is a measure of how much force a bone can take before it fractures.

Habib also spent time crunching the numbers using the old, bipedal launch model and simply couldn't find a mathematical solution that would enable the largest of the pterosaurs - using hind legs alone - to launch at all.

"But using all four legs, it takes less than a second to get off of flat ground, no wind, no cliffs," he said. "This was a good thing to be able to do if you lived in the late Cretaceous period and there were hungry tyrannosaurs wandering around."

It stands to reason that a large-bodied animal needing to produce lots of power at take-off would use four legs instead of two, Habib says: "We put V8 engines in our biggest, heaviest cars, not V-4s, like the one in my Camry."

Assumption and convention - rather than reason or data - held sway for centuries, ever since the classical bipedal model of pterosaur take-off was first championed, he notes.

The research was funded by the Jurassic Foundation. Habib, of Johns Hopkins, is the sole author of the paper.

A modern-day man and giraffe, drawn to scale, flank the extinct pterosaur known as Hatzegotpteryx. Unlike birds, pterosaurs used four legs to launch themselves into flight, according to new research

On the Web: ***http://www.hopkinsmedicine.org/fae/*** ***http://www.palmuc.de/zitteliana/***

Old gastrointestinal drug slows aging, McGill researchers say

Clioquinol inhibits action of the CLK1 aging gene, may alleviate Alzheimer's

Recent animal studies have shown that clioquinol – an 80-year old drug once used to treat diarrhea and other gastrointestinal disorders – can reverse the progression of Alzheimer's, Parkinson's and Huntington's diseases. Scientists, however, had a variety of theories to attempt to explain how a single compound could have such similar effects on three unrelated neurodegenerative disorders.

Researchers at McGill University have discovered a dramatic possible new answer: According to Dr. Siegfried Hekimi and colleagues at McGill's Department of Biology, clioquinol acts directly on a protein called CLK-1, often informally called "clock-1," and might slow down the aging process. The advance online edition of their study was published in Oct. 2008 in the Journal of Biological Chemistry.

"Clioquinol is a very powerful inhibitor of clock-1," explained Hekimi, McGill's Strathcona Chair of Zoology and Robert Archibald & Catherine Louise Campbell Chair in Developmental Biology. "Because clock-1 affects longevity in invertebrates and mice, and because we're talking about three age-dependent neurodegenerative diseases, we hypothesize that clioquinol affects them by slowing down the rate of aging."

Once commonly prescribed in Europe and Asia for gastrointestinal problems like diarrhea and shigella, clioquinol was withdrawn from the market after being blamed for a devastating outbreak of subacute myelo-optic neuropathy (SMON) in Japan in the 1960s. However, because no rigorous scientific study was conducted at the time, and because clioquinol was used safely by millions before and after the Japanese outbreak, some researchers think its connection to SMON has yet to be proven.

The exact mechanism of how clioquinol inhibits CLK-1 is still under investigation, Hekimi said. "One possibility is that metals are involved as clioquinol is a metal chelator," he explained. Chelation is a type of binding to metal ions and is often used to treat heavy metal poisoning.

Hekimi is optimistic but cautious when asked whether clioquinol could eventually become an anti-aging treatment. "The drug affects a gene which when inhibited can slow down aging," he said. "The implication is that we can change the rate of aging. This might be why clioquinol is able to work on this diversity of diseases that are all age-dependent."

However, he admits to being concerned about how people may interpret his results.

"The danger is that you can buy a kilogram of this compound at a chemical wholesaler, but we don't want people to start experimenting on themselves. Clioquinol can be a very toxic substance if abused, and far more research is required."

Polarized light pollution leads animals astray

'Ecological traps' cause animal behaviors that can lead to death

Human-made light sources can alter natural light cycles, causing animals that rely on light cues to make mistakes when moving through their environment. In the journal Frontiers in Ecology and the Environment, a collaboration of ecologists, biologists and biophysicists has now shown that in addition to direct light, cues from polarized light can trigger animal behaviors leading to injury and often death.

Artificial light that occurs at unnatural times or places – often called light pollution – can attract or repulse animals, resulting in increased predation, migrating in the wrong direction, choosing bad nest sites or mates, collisions with artificial structures and reduced time available to spend looking for food, just to name a few. In a classic example, baby sea turtles use the direction of star- and moonlight reflected off the water surface to help them find the ocean when they emerge from their beach nests; in urbanized areas, many turtles turn the wrong way and migrate toward the brighter lights of buildings or streetlamps.

"Environmental cues, such as the intensity of light, that animals use to make decisions occur at different levels of severity in the natural world," explains Bruce Robertson, an ecologist at Michigan State University. "When cues become unnaturally intense, animals can respond unnaturally strongly to them." That heightened response, he says, happens because of the way humans have changed the environment.

In their study, lead author Gabor Horvath, Robertson and their colleagues explain that many animals are also thrown off course by light reflecting from man-made structures. The darker and smoother a surface is, the more highly polarized its reflected light. In most cases, artificial polarized light symbolizes one thing to animals. "For example, the primary source of horizontally polarized light in nature is water," says Robertson. "Biologists discovered in the 1980s that such polarized light is an amazingly reliable cue for finding bodies of water."

Especially in the case of dragonflies and other insects, which often lay their eggs and spend their first phase of life in ponds, streams and lakes, mistaking human-made objects for water can be deadly. Horizontal, shiny, dark surfaces – such as dark glass surfaces of buildings, asphalt, dark-colored cars and black plastic sheeting – reflect horizontally polarized light that is more strongly polarized than that reflected by water, which augments the animals' attraction to it. Polarized light pollution can disrupt the entire food web in an ecosystem: When insects mistake the sheen of an oil slick for water, their predators often follow the insects to the source and risk becoming trapped and drowning, as in the La Brea tar pits of Los Angeles and other oil-slicked lakes around the world.

Even in the absence of a physical trap, if the attraction is great enough, animals can't remove themselves from a polarized light source, ultimately causing death from dehydration and exhaustion. For example, a dragonfly laying its eggs on a shiny black highway may become paralyzed by attraction to the pavement after laying its eggs, effectively dooming its fate and that of its offspring. These so-called ecological traps occur when environmental change happens more quickly than animals can evolve to react to it. If large numbers of animals fall victim to these false cues, says Robertson, it could cause populations to decline, perhaps to extinction.

There are several ways humans can ameliorate the effects of their overlarge dark, shiny structures. Preliminary studies show that white hatch marks on roads can prevent insects from mistaking them for bodies of water. The addition of white curtains to shiny black buildings, suggests Robertson, also deters insects, bats and birds.

"It's yet another case where we're faced with a choice between what's more expensive or what's better for biodiversity," Robertson says. "Aquatic insects are the foundation of the food web, and what's harmful to them is harmful to entire ecosystems and the services they provide."

Half-baked asteroids have Earth-like crust

Washington, D.C.—Asteroids are hunks of rock that orbit in the outer reaches of space, and scientists have generally assumed that their small size limited the types of rock that could form in their crusts. But two newly discovered meteorites may rewrite the book on how some asteroids form and evolve. Researchers from the Carnegie Institution, the University of Maryland, and the University of Tennessee report in the January 8th edition of Nature that these meteorites are ancient asteroid fragments consisting of feldspar-rich rock called andesite. Similar rocks were previously known only from Earth, making these samples the first of their kind from elsewhere in the Solar System.

The two meteorites were discovered during the Antarctic Search for Meteorites (ANSMET) 2006/2007 field season in a region of the Antarctic ice known as the Graves Nunatak icefield. The light-colored meteorites, designated GRA 06128 and GRA 06129, were immediately recognized as being different from previously known meteorites.

Field image of the achondrite meteorite GRA 06129, found in blue ice of the Graves Nunatak region of the Antarctica during the ANSMET 2006/2007 field-season. GRA 06129 and its pair, GRA 06128, are achondrite meteorites with compositions unlike any previously discovered Solar System materials. **Image courtesy of the Antarctic Search for Meteorites (PI - Ralph Harvey, Case Western Reserve University)**

"What is most unusual about these rocks is that they have compositions similar to Earth's andesite continental crust - what makes up the ground beneath our feet," says University of Maryland's James Day, lead author of the study. "No meteorites like this have ever been seen before."

Andesite is an igneous rock common on Earth in areas where colliding tectonic plates generate volcanoes, such as those of the Andes mountain range. The meteorites contain minerals thought to require large-scale processes such as plate tectonics to concentrate the right chemical ingredients. In view of this, some researchers had suggested that the meteorites were fragments of a planet or the Moon, not an asteroid. But analysis of the

meteorites' oxygen isotopes at the Carnegie Institution's Geophysical Laboratory by Douglas Rumble ruled out that possibility.

"A number of solar system objects including parent bodies of meteorites, planets, moons, and asteroids have their own oxygen isotope signatures," says Rumble. "Just by analyzing 16O-17O-18O ratios we can tell if a meteorite came from Mars, from the Moon, or from a particular asteroid. One extensively studied parent is the asteroid 4 Vesta. In the majority of cases the actual location of the parent body is unknown, but a particular group of meteorites may be assigned to the same parent body based on the isotope ratios even if the specific location of the body isn't known. When the ratios in meteorites are plotted against one another the result is mutually parallel lines offset from one another. The GRA 06128 and GRA 06129 meteorites, and some similar ones called brachinites, plot below Earth-Moon rocks and are nearly coincident with meteorites from 4 Vesta."

The meteorites' age, more than 4.5 billion years, suggests that they formed very soon after the birth of the solar system. This makes it unlikely that they came from the crust of a differentiated planet. The chemical signature of some rare precious metals, notably osmium, in the meteorites also points to their origin on an asteroid that was not fully differentiated.

The researchers hypothesize that that the asteroid had a diameter somewhat larger than 100 kilometers, which would be sufficient to hold enough heat for the asteroid's rocks to partially, but not completely, melt. The asteroid would remain undifferentiated, but the melted portions could erupt on the asteroid's surface to form the andesitic crust.

"Our work illustrates that the formation of planet-like andesite crust has occurred by processes other than plate tectonics on solar system bodies," says Day. "Ultimately this may shed light on how evolved crust forms on planets, including Earth, during the earliest stages of their birth."

This study was supported by the NASA Cosmochemistry Program.

Alien asteroid dust hints at Earth-like planets

* 17:22 06 January 2009 **by Rachel Courtland**, Long Beach

Dust made up of similar stuff as the Earth has been found in and around a handful of dead stars. The dust, which was left behind when the stars chewed up errant asteroids, suggests terrestrial planets may be common.

Six white dwarfs, the burned-out embers of Sun-like stars, showed heavy elements, or metals, in their atmospheres. That is unusual because white dwarfs contain about as much mass as the Sun squeezed into bodies the size of the Earth, giving them surface gravities 10,000 times stronger than the Sun's. That should cause heavy elements to sink towards their centres - and out of sight.

In addition, the six stars also shine more brightly than expected in infrared light. That suggests the stars are surrounded by dust, which glows at infrared wavelengths. The dusty debris is thought to be the remains of asteroids that once orbited the white dwarfs but were gravitationally torn apart when they wandered too close to the stars.

Michael Jura of the University of California, Los Angeles, and colleagues measured the infrared light from these stars using NASA's Spitzer Space Telescope.

White dwarfs can chew apart errant asteroids, leaving only dusty remains. New infrared observations suggest the dust left behind in six such stars has a composition similar to rocky objects in the inner solar system, suggesting the stars may have hosted rocky planets. **(Illustration: NASA/JPL-Caltech)**

Earth-like composition

The team found the dust contains a glassy silicate material similar to olivine, which is common on Earth and has also been seen on the Moon and Mars.

The dust also seems to have no carbon, consistent with Earth's composition, which has little carbon compared to the Sun. The results were presented on Monday at the American Astronomical Society meeting in Long Beach, California.

Two previously studied white dwarfs have dust of a similar composition, bringing the tally of such stellar gluttons up to eight. "What was once kind of a freak is now a systematic pattern," Jura said.

Rocky planets

Since asteroids form in the same way as planets, by bulking up through collisions between smaller rocky objects, they have a similar composition to their larger brethren. That suggests terrestrial planets might have once existed in these systems. "This strengthens suspicions that Earth-like planets are common," Jura said.

Many white dwarfs may host rocky discs, but they may be impossible to detect because asteroids were not jostled out of position and sent careening towards the star, leaving traces of their existence in the star's atmosphere and in surrounding dust.

And even when an asteroid has plunged into a star, the evidence of its violent end does not last long. Single asteroids no larger than 200 kilometres across could explain the dust around each of the newly studied white dwarfs, and their remains could be gobbled up and 'digested' - sinking to the star's centre - in as little as 10,000 years. "In a way it's amazing that any dust at all survives," Jura told New Scientist.

Journal reference: Astrophysical Journal (forthcoming)

Rise of the garage genome hackers

* 07 January 2009 **by Phil McKenna**, Boston

KATHERINE AULL's laboratory in Cambridge, Massachusetts, lacks a few mod cons. "Down here I have a thermocycler I bought on eBay for 59 bucks," she says, pulling out a large, box-shaped device she uses to copy short strands of DNA. "The rest is just home brew," she adds, pointing to a centrifuge made out of a power drill and plastic food container, and a styrofoam incubator warmed with a heating pad normally used in terrariums.

In fact, Aull's lab is a closet less than 1 square metre in size in the shared apartment she lives in. Yet amid the piles of clothes she recently concocted vials of an entirely new genetically modified organism.

Aull, who works as a synthetic biologist for a biotech company by day, created her home lab after hearing about a contest on the science fiction website io9.com for "mad scientists with homebrew closet labs, grassroots geneticists, and garage genome hackers".

After two months of tinkering, she engineered a microbe that she says is capable of performing simple logic operations, which could be the forerunner to basic biological computers. "Biology is wet, squishy and imprecise. It drives engineers insane," Aull says. "This would allow us to take the noise out of biology."

Despite her success, Aull was edged out of first place in the competition by Vijaykumar Meli, a graduate student at the National Centre for Plant Genome Research in New Delhi, India, who designed bacteria that could help rice plants process nitrogen more efficiently, reducing fertiliser use.

The competition is part of a do-it-yourself movement that hopes to spark a revolution in biotechnology. It is based on the emerging field of synthetic biology, which uses genes and other cell components as the building blocks for new organisms or devices. The movement is trying to open up this field to anyone with a passion for tweaking DNA in their spare time - from biologists to software engineers to people who just like it as a hobby. The hope is that encouraging a wider mix of people to take part could lead to advances that would not happen otherwise, just as tinkering by the Homebrew Computer Club hackers of the 1970s spawned the first personal computers.

"Biology is becoming less of a science and more of a technology," says Mackenzie Cowell, co-founder of the group DIYbio, which aims to be an "Institution for the Amateur", providing scientists with resources akin to those found in academia or industry. "There will be more opportunity for people who didn't spend up to seven years getting a PhD in the field," he says.

Meredith Patterson, a software engineer in San Francisco, is one such amateur. She is engineering fluorescent yoghurt by zapping bacteria with a $40 ultrasonic jewellery cleaner she set up in her kitchen. The sound waves create pores in the bacteria's cell walls which stay open for long enough for Patterson to insert genes that code for green fluorescent proteins she bought from a biological supply company.

You might say that making glow-in-the-dark yoghurt is an end in itself, but Patterson has a serious goal in mind: to engineer bacteria that light up in the presence of melamine, the industrial chemical recently found in infant formula in China, which injured hundreds of children and killed at least six. At present, the principal test for the toxin is chromatography, an expensive laboratory procedure. "Here is a problem that was difficult to solve by conventional means," Patterson says. "People should have an inexpensive and portable test to make sure their food is safe, but no lab was working on this, so I said let's do it ourselves."

Patterson took up DIY biology as a hobby after doing some bioinformatics work for a biotech company. "Biology is an interesting puzzle. I learned the informatics tools to solve those puzzles, now I'm interested in taking that to the next level and producing novel organisms to solve problems," she says.

It's not hard to get in on the act either. Patterson uses resources such as openwetware.org for research, and found the best growth medium for yoghurt bacteria in a 1950s edition of a dairy science journal. "Knowing how to do research helps, but the barrier for entry is pretty low," she says.

DIYbio, which so far has around 20 active participants, held its first meeting in Cambridge, MA, in May 2008. Amateurs were invited to extract DNA for analysis from apples, oatmeal and their own saliva, and learned how to make gel boxes and dyes - essential tools for genetic fingerprinting.

Is it a good idea, though, to encourage "freelance" researchers to experiment with DNA, however well-intentioned they may be? Not everyone thinks so. Inexperienced hackers could pose a significant public health threat, warns Richard Ebright, a biochemist at Rutgers University in Piscataway, New Jersey. "Without any oversight from an institution, colleagues or peers, the probability that a cataclysmic entity might be constructed by someone unaware of known cautions is significant," he says.

The greatest potential danger, he says, is that someone might intentionally synthesise or recreate deadly pathogens like the 1918 flu strain, which killed an estimated 40 million people worldwide. "That is on the edge of being within the technical capabilities of someone working outside the laboratory environment."

In response to such fears and in anticipation of calls for the group to be shut down, DIYbio has begun policing itself. Cowell says there is now "a self-imposed moratorium on 'wetwork'", or all synthetic biology experiments, until researchers can show that what they are doing is safe. For the moment, the group is focusing on DNA fingerprinting projects, with the analysis carried out by commercial labs, rather than manipulating genetic information themselves.

The first such project is BioWeatherMap, a plot of the different microbes, or "bioweather", to be found on street crossing buttons. Over the next few months DIYbio hopes to mobilise amateur scientists in Boston, San Francisco, Seattle and other cities to send in swab samples from their nearest street corner. A commercial lab will then sequence the microbes they find and DIYbio will post the results online with the help of mapping software such as Google Maps.

"I think this is a perfect opportunity for high-school biology classes to get exposed to genomics, sequencing and microbiology," says DIYbio co-founder Jason Bobe, who expects to find hundreds or even thousands of different species living on each crosswalk button.

Ultimately, Cowell hopes to set up a public lab where group members can safely conduct experiments of the kind Aull managed in her closet. In this he has the surprising support of George Church, a synthetic biology researcher at Harvard University who in 2004 published a paper claiming that the consequences of synthetic DNA misuse could be more severe than chemical and nuclear weapons. He now says: "The world has an energy crisis and a healthcare crisis that synthetic biology can help solve; we need to go out and do it and the more people working on this, the better."

Church argues that licensing and monitoring would-be DIY biologists is better than alienating them. "It's going to happen anyway; you can make it go underground or you can try to shape it," he says.

Church has agreed to act as an adviser to DIYbio, which will give the group greater academic oversight and could allow it to resume experimental work with less fear of being shut down.

As for Aull, she is coming out of the closet with plans to help DIYbio set up protocols for safe lab practices. She says she will donate her thermocycler to the group if it is able to secure a public lab and she's also planning to carry out further work on her microbe to confirm it really is performing logic operations.

Based on her own experiences of DIY biology, including its limitations, she says warnings of the dangers are overblown. "It's like a baby that just rolled over for the first time and his aunt is crying because she doesn't have anything to wear to his wedding."

Avian flu becoming more resistant to antiviral drugs, says University of Colorado study

A new University of Colorado at Boulder study shows the resistance of the avian flu virus to a major class of antiviral drugs is increasing through positive evolutionary selection, with researchers documenting the trend in more than 30 percent of the samples tested.

The avian flu, an Influenza A subtype dubbed H5N1, is evolving a resistance to a group of antiviral drugs known as adamantanes, one of two classes of antiviral drugs used to prevent and treat flu symptoms, said CU-Boulder doctoral student Andrew Hill, lead study author. The rise of resistance to adamantanes -- which include the nonprescription drugs amantadine and rimantadane -- appears to be linked to Chinese farmers adding the drugs to chicken feed as a flu preventative, according to a 2008 paper by researchers from China Agricultural University, said Hill.

In contrast, resistance of the avian flu virus to the second, newer class of antiviral drugs that includes oseltamivir -- a prescription drug marketed under the brand name Tamiflu -- is present, but is not yet prevalent or under positive genetic selection, said Hill of CU-Boulder's ecology and evolutionary biology department. The CU findings should help health administrators around the world plan for the possibility of an avian flu pandemic.

The CU-Boulder study is the first to show H5N1 drug resistance to adamantanes arose through novel genetic mutations rather than an exchange of RNA segments within cells, a process known as re-assortment, said Hill. The research on the mutations, combined with molecular evolution tests and a geographic visualization

technique using Google Earth, "provides a framework for analysis of globally distributed data to monitor the evolution of drug resistance," said Hill.

The CU-Boulder-led study appears online in the journal Infection, Genetics and Evolution. Co-authors included CU-Boulder Associate Professor Robert Guralnick, recent CU-Boulder graduate Meredith Wilson, Farhat Habib of Kansas State University and Daniel Janies of Ohio State University.

"As these adamantanes have gotten into nonhuman vectors like birds, the positive selection for resistance to avian flu is rising," said Hill. "If Tamiflu is ever used in the manner of adamantanes, we could conceivably see a similar resistance developing through positive selection."

The research team used an interactive "supermap" using Google Earth technology that portrays the individual gene mutations and spread of the avian flu around the globe, said Guralnick of CU-Boulder's ecology and evolutionary biology department. By projecting genetic and geographic information onto the interactive globe, users can "fly" around the planet to see where resistant H5N1 strains are occurring, said Guralnick, also Hill's doctoral adviser.

For the study, the researchers analyzed 676 whole genomes of Influenza A/H5N1 from National Institutes of Health databases of viruses isolated between 1996 and 2007. The team is comparing how often amino acid sequence changes in genes lead to mutations that affect drug resistance in the H5N1 virus and how often such changes evolve into random mutations that don't affect resistance, Hill said.

The next step is to analyze 2008 data, he said.

First detected in China in 1996, the avian flu has spread throughout Asia and to India, Russia, Pakistan, the Middle East, Africa and Europe by various carriers, including poultry and migratory waterfowl, Hill said. While H5N1 is not highly communicable to humans from birds or between humans, experts are concerned future evolution of this subtype or other subtypes, or genetic re-assortment between subtypes, could make an avian influenza strain more contagious with the potential to cause a pandemic.

"Even if H5N1 is not the flu subtype that develops into the next pandemic, this technique can help us understand the properties of flu viruses and we can use these methods to track mutations in other viruses," said Guralnick. "We can harvest genetic influenza data and monitor it in near real-time, which should give this project some traction to help governments make decisions on managing potential pandemics."

Like the legend of a road map, colors and symbols on the supermap indicate which types of hosts carry the virus or the distribution of genotypes of interest, said Hill. A click by users on viral "isolates" generates computer windows revealing H5N1 mutations linked to positive genetic selection resulting from the spread and use of adamantanes.

The information is linked by computer to the National Institutes of Health's GenBank, a database with more than 75 million sequence records.

According to the Centers for Disease Control in Atlanta, an avian flu pandemic could kill millions of people in America, infect 15 percent to 35 percent of the population and cost well over $100 billion.

For still images and a KMZ file of the Google Earth project, visit the Web at http://biodiversity.colorado.edu/.

Martian rock arrangement not alien handiwork

At first, figuring out how pebble-sized rocks organize themselves in evenly-spaced patterns in sand seemed simple and even intuitive. But once Andrew Leier, an assistant geoscience professor at the U of C, started observing, he discovered that the most commonly held notions did not apply.

And even more surprising, was that his findings revealed answers to NASA's questions about sediment transport and surface processes on Mars. Those results are published in this month's edition of Geology.

Leier first studied loose pebbles and rocks, also known as clasts, when he was looking at sand dunes in Wyoming and noticed that the clasts seemed to spread away from each other in an almost organized fashion. It turns out,NASA was examining similar patterns on the sandy surface of Mars. (See figure No. 1 below.)

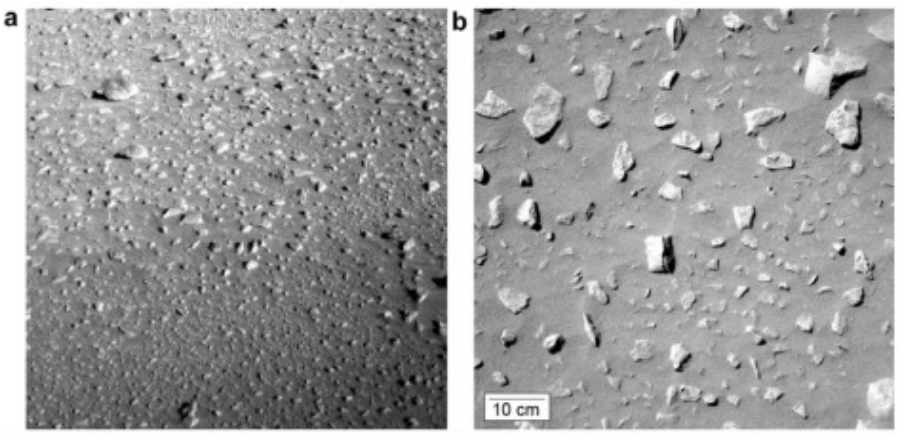


Figure 1. *Spirit* Rover camera images of the intercrater plains between Lahontan Crater and Columbia Hills illustrating examples of uniformly-spaced clast distributions. a. Portion of NAVCAM image ID 2 N 137561115 EFF 47 00 P1827 L0 M1. **b.** Pancam image 2 P 137636467 EFF 47 DQ P2514 R1 C1. After Ward et al.[1]

NASA proposed that wind was moving these rocks around. But Leier, who co-authored the study with Jon Pelletier at the University of Arizona and James Steidtmann at the University of Wyoming, says that would be impossible. They also discovered that rather than being pushed backward by the breeze, clasts actually tend to move into the direction of prevailing winds."The wind is less effective at moving clasts on Mars because the atmosphere is less dense," says Leier. "And for the wind to move the rocks downwind, it would have to be moving on the order of 8,000 kilometres an hour."
Instead, the loose sand around clasts is removed by the wind, causing scour-pits to form in front of larger clasts. Eventually, the rocks fall forward (or laterally) into the scours and then, the process repeats. Behind the larger grains, the sand is protected from the wind erosion and so a "sand-shadow" develops. This shadow prevents the clasts from being pushed downwind and from bunching up with one another. (See figure No. 2 below.)

Leier and his team first came up with these results through observation but then took them to a wind tunnel at the University of Wyoming to test the theory. Here, a tightly grouped bunch of small pebbles were buried in sand and then the wind tunnel was activated and results photographed. Surprisingly, as the sand was eroded by the wind, the larger clasts moved into the wind and spread out from one another.

Numerical models, based on the physics of wind transport, were run to test these ideas. Just like what was observed in the wind tunnel, the numerical models predict that as the sand is blown away, the large pebbles will spread out from one another, and often move into the direction of the wind, regardless of their initial configuration. So through a few simple feedbacks, the larger grains on a windy, sandy surface will inherently spread out and organize (or dis-organize) themselves.

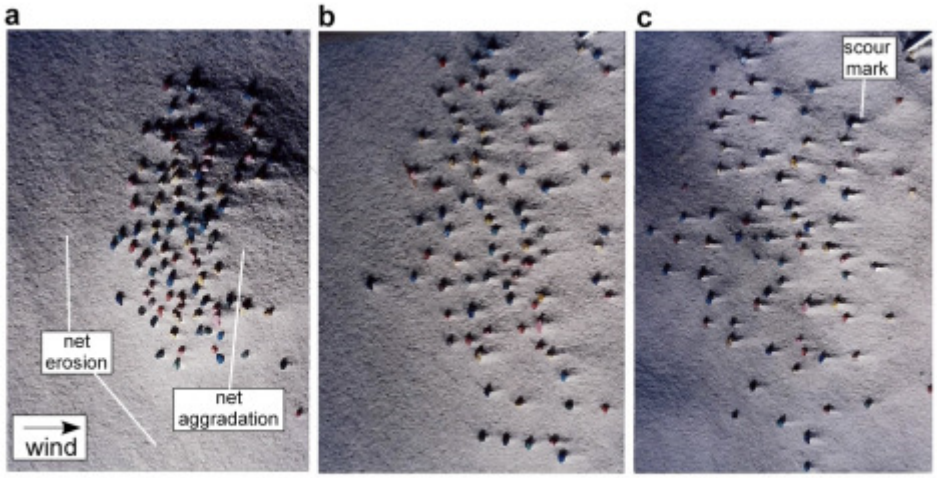


Figure 2. Wind tunnel experiment conducted by coauthor Steidtmann illustrating "repulsion" and upwind migration of pebble-sized clasts on a wind-erodible sandy substrate. a. Early, **b**. imtermediate, and **c**. late times.

"What I find most interesting about this is that something as seemingly mundane as the distribution of rocks on a sandy, wind-blown surface can actually be used to tell us a lot about how wind-related processes operate on a place as familiar as the Earth and as alien as Mars," says Leier. "It's chaotic and simple at the same time."

Leier's article Wind-driven reorganization of coarse clasts on the surface of Mars is published in the January 2009 edition of Geology. It can be viewed online at www.gsajournals.org/.

You Can Look -- But If You Touch, Be Prepared To Buy; Consumers Willing To Pay More For Products They Touch

Columbus, Ohio – Consumers are often told that if they break an item, they buy it. But a new study suggests that if they just touch an item for more than a few seconds, they may also end up buying it.

Researchers from Ohio State University and Illinois State University tested how touching an item before buying affects how much they are willing to pay for an item. A simple experiment with an inexpensive coffee mug revealed that in many cases, simply touching the coffee mug for a few seconds created an attachment that led people to pay more for the item.

The results, which were published recently in the journal Judgment and Decision Making, found that people become personally attached to the mug within the first 30 seconds of contact.

People who held the coffee mug longer than a few seconds seemed not only more compelled to outbid others in an auction setting, but they were also more willing to bid more than the retail price for that item.

"The amazing part of this study is that people can become almost immediately attached to something as insignificant as a mug," said lead author of the study James Wolf, who started the work while he was a doctoral student at Ohio State.

"By simply touching the mug and feeling it in their hands, many people begin to feel like the mug is, in fact, their mug. Once they begin to feel it is theirs, they are willing to go to greater lengths to keep it."

Previous research had documented that many people begin to feel ownership of an item long before they actually acquire it. But this is the first study to demonstrate that strong feelings of ownership can begin in as

little as 30 seconds after initial contact, said Wolf, who is now an assistant professor of information systems at Illinois State University.

To explain how touch can affect a person's valuation of an object, the researchers tested 144 people at a large university. People were asked to bid on mugs in either an open or closed auction after inspecting a coffee mug firsthand for various lengths of time.

Participants were given the mug at the beginning of both experiments. People in the short-duration treatments were asked to inspect a coffee mug for 10 seconds, while those in the longer treatments were asked to inspect it for 30 seconds.

After inspection, they were asked to bid on the mug. Those in closed auctions were asked to write down their maximum bid on a piece of paper for a mug worth $3.95 at the nearby university bookstore. They then flipped the paper over so no one could see their bid during the auction.

Those in the open auctions, on the other hand, were allowed to see other bids. Participants in open auctions placed their bids for a mug worth $4.95 through a computer-based auction similar to eBay, where they could see the current high bid and time remaining in the auction.

The open auctions had "soft" ending times, meaning the length of the auction was extended every time a bid was placed in the last 15 seconds of the auction. Soft ending times were used to reduce the effects of last-second bidding.

All participants were told the retail value of the coffee mug before the auction began. They were also informed that several identical mugs were available for purchase at the campus bookstore adjacent to the testing location.

All participants received $10 for participating in the experiment; they were told that the winning bidders would have their bid amount taken out of their payment if they agreed.

The results showed that people who held the item for 30 seconds bid significantly higher than people who touched the mug for 10 seconds. The average bid in the open auctions was $2.44 for people who touched the mug for 10 seconds and $3.91 for those in the 30 second experiments. This finding was also consistent for those in silent auctions, with people in the 10 and 30 second experiments bidding $2.24 and $3.07, respectively.

The higher bids were particularly significant given the fact that the researchers used seemingly insignificant, inexpensive mugs, said co-author Hal Arkes.

"We took the most minimal type of attachment; not a new car or a suit, but a mug. And we found significant differences in consumer valuations that begin in a matter of seconds," said Arkes, who is a professor emeritus of psychology at Ohio State.

Those differences continued when the researchers looked at how often the winning bid exceeded the retail price of the mug.

All participants were told the price of the mug before bidding started. But people who held their mug for 30 seconds bid more than the retail price four out of seven times. Although the mugs were valued at $4.49, bids went as high as $10 on two different occasions for those in longer duration experiments.

In contrast, the winning bid for people in the 10 second group exceeded the retail price only once.

Co-author Waleed Muhanna, who is an associate professor of management information systems at Ohio State, said the tendency for participants who held the mugs longer to bid over the retail price may come down to the strength of their attachment.

"The strength of this attachment seems to increase with greater physical contact. And one explanation is loss aversion; that is, the longer people have an object, the stronger their attachment and their eagerness to keep it. People become attached and they are willing to pay much more to avoid losing that object," Muhanna said.

While this research may help researchers understand the buying behaviors of consumers, many retailers have been using the try-then-buy tactic for years, Wolf said. Car dealers often tell people to drive cars home and pet stores encourage shoppers to play with puppies because they know the attachment makes consumers more willing to buy their products.

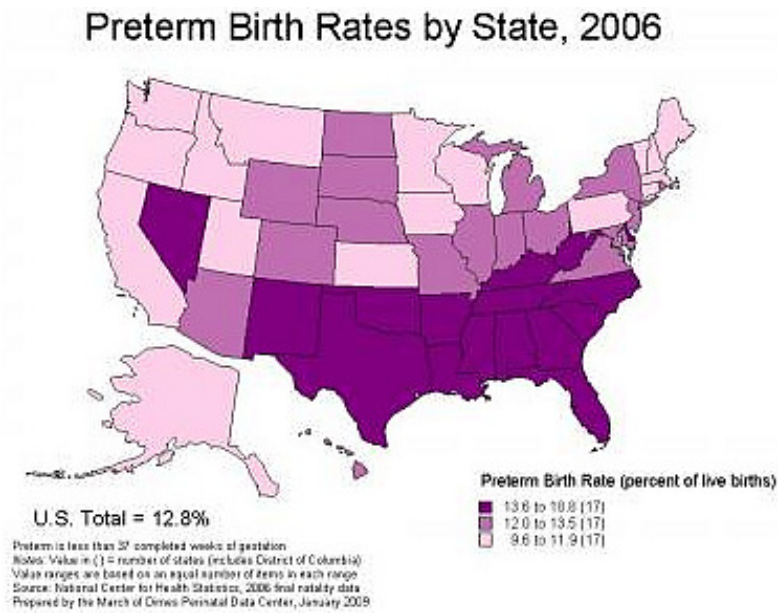
But Wolf said understanding this attachment may help buyers make smarter decisions. "When you sit behind the wheel of a new car, you know you're going to value it more and possibly be ready to pay more. But by going in there knowing that you are going to feel like raising your price, maybe you can be better prepared not to make a hasty purchase that you'll regret later on," he said.

The study was partially funded by Ohio State's Jensen-Wallin-Young Fund and by Illinois State's Caterpillar Scholars Fund.

Preterm births rise 36 percent since early 1980s

Late preterm infants drive the increase

White Plains, N.Y. – New government statistics confirm that the decades-long rise in the United States preterm birth rate continues, putting more infants than ever at increased risk of death and disability.



Nearly 543,000 babies were born too soon in 2006, according to the National Center for Health Statistics, which today released "Births: Final data for 2006," National Vital Statistics Reports; Vol. 57, No. 7. The nation's preterm birth rate (birth before 37 completed weeks gestation) rose to 12.8 percent in 2006 -- that's a 36 percent increase since the early 1980s.

The report attributed much of the increase to the growing number of late preterm infants (those born at 34 to 36 weeks gestation), which increased 25 percent since 1990. The report also noted an increase in preterm births to Hispanic women, while rates were unchanged for non-Hispanic whites and blacks. However, black women continue to have the highest preterm birth rate, at 18.5 percent.

Nearly 543,000 babies were born too soon in 2006, according to new government statistics release Wednesday. The nation's preterm birth rate (birth before 37 completed weeks gestation) rose to 12.8 percent in 2006 -- that's a 36 percent increase since the early 1980s. **March of Dimes Perinatal Data Center**

The preterm birth rate continued to rise despite the fact that multiple births, a known risk factor for preterm birth, have begun to stabilize. The rate of twin births was unchanged in 2005 and 2006, and triplets and higher order multiples declined 5 percent in 2006.

"The health consequences for babies who survive an early birth can be devastating and we know that preterm birth exacts a toll on the entire family – emotionally and financially," said Dr. Jennifer L. Howse, president of the March of Dimes.

"We are committed to raising public awareness about premature birth, and we believe there are concrete steps we can take to solve this problem, including ensuring that all women of childbearing age have access to health insurance and expanding our nation's investment in research into the causes and strategies to prevent preterm birth," Dr. Howse continued.

Preterm birth is the leading cause of death in the first month of life and a contributing cause in more than a third of all infant deaths. Babies who survive an early birth face the risk of serious lifelong health problems and even late preterm infants have a greater risk of breathing problems, feeding difficulties, temperature instability (hypothermia), jaundice, delayed brain development and an increased risk of cerebral palsy and mental retardation.

Last month, the March of Dimes issued its first-ever Premature Birth Report Card, which gave the United States a "D" - and not a single "A" to any state - by comparing 2005 preterm birth rates to the national Healthy People 2010 objective of 7.6 percent. The report card is online at www.marchofdimes.com/petition.

The March of Dimes is the leading nonprofit organization for pregnancy and baby health. Its mission is to improve the health of babies by preventing birth defects, premature birth and infant mortality. For the latest resources and information, visit marchofdimes.com or nacersano.org. For detailed national, state, and county perinatal data, visit marchofdimes.com/peristats.

Heart valves implanted without open-heart surgery

NewYork-Presbyterian/Columbia's Dr. Martin Leon and Dr. Craig Smith lead ongoing multicenter PARTNER clinical trial

NEW YORK - An innovative approach for implanting a new aortic heart valve without open-heart surgery is being offered to patients at NewYork-Presbyterian Hospital/Columbia University Medical Center. Known as the PARTNER (Placement of AoRTic traNscathetER valves) trial, this Phase 3 multicenter study is being led by national co-principal investigators Dr. Martin Leon and Dr. Craig Smith and is focused on the treatment of patients who are at high risk or not suitable for open-heart valve replacement surgery.

The Edwards SAPIEN transcatheter heart valve, made of bovine pericardial tissue leaflets hand-sewn onto a metal frame, is implanted via one of two catheter-based methods -- either navigated to the heart from the femoral artery in the patient's leg, or through a small incision between the ribs and into the left ventricle. It is

then positioned inside the patient's existing valve, using a balloon to deploy the frame, which holds the artificial valve in place. Both procedures are performed on a beating heart, without the need for cardiopulmonary bypass and its associated risks.

"This breakthrough technology could save the lives of thousands of patients with heart valve disease who have no other therapeutic options," says Dr. Leon, the study's national co-principal investigator, associate director of the Cardiovascular Interventional Therapy (CIVT) Program at NewYork-Presbyterian Hospital and Columbia University Medical Center, and professor of medicine at Columbia University College of Physicians and Surgeons.

Annually, some 200,000 people in the U.S. need a new heart valve, but nearly half of them do not receive a new valve for a variety of reasons.

"This study may show that transcatheter valve replacement is a safe and effective alternative to open surgery, which remains the 'gold standard' for most patients," says Dr. Smith, study co-principal investigator, interim surgeon-in-chief and chief of cardiothoracic surgery at NewYork-Presbyterian Hospital/Columbia University Medical Center, and the Calvin F. Barber Professor of Surgery at Columbia University College of Physicians and Surgeons.

The transcatheter valve procedures take about 90 minutes, compared with four to six hours for open-heart surgery. In open-heart surgery, the surgeon cuts through the breastbone, stops the heart, removes the valve and replaces it. Open-heart surgery can require a two- to three-month recovery period, compared to only a few days for the transcatheter approach.

The PARTNER trial is a prospective randomized study with two separate treatment arms. In the surgical arm, patients are randomized to receive either the Edwards SAPIEN transcatheter heart valve or an Edwards surgical valve via open-heart surgery. In the non-surgical, medical management arm, patients considered to be non-operative are randomized to receive either the Edwards SAPIEN transcatheter heart valve or appropriate medical therapy.

The PARTNER trial is designed for patients with severe aortic stenosis -- a narrowing of the valve that restricts blood flow from the heart -- who are not good candidates for surgery due to age or other concurrent health factors. Interested patients may contact NewYork-Presbyterian/Columbia at (212) 305-6061.

The PARTNER trial will also be available at NewYork-Presbyterian Hospital/Weill Cornell Medical Center's Ronald O. Perelman Heart Institute, led by surgeon Dr. Karl H. Krieger and interventional cardiologist Dr. Shing-Chiu Wong.

The Edwards SAPIEN transcatheter heart valve is manufactured by Edwards Lifesciences of Irvine, Calif., which is also funding the study.

Aortic Heart Valve Disease

The heart's four valves each have two or three strong tissue flaps, or leaflets, which open and close with each heartbeat, approximately once every second throughout a person's life. When working properly, heart valves ensure that blood flows in the right direction. But when damaged by congenital conditions or progressive disease, these valves can become defective and inhibit efficient blood flow to the body. The aortic valve in particular is prone to age-related stenosis, a narrowing and calcification of the valve opening that, over time, may inhibit adequate oxygenated blood flow to the circulatory system. Aortic valve stenosis may progress for years, with patients experiencing symptoms similar to those associated with aging such as increased fatigue and shortness of breath. As the condition deteriorates, patients also may experience angina (chest pain), light-headedness or fainting. Left untreated, aortic valve disease can ultimately lead to death. More than 5 million Americans have moderate to severe valve disease, where at least one valve does not work properly.

Hormone therapy associated with reduced colorectal cancer risk

PHILADELPHIA – The combination of estrogen plus progestin, which women stopped taking in droves following the news that it may increase their risk of breast cancer, may decrease their risk of colorectal cancer, according to a report published in the January issue of Cancer Epidemiology, Biomarkers and Prevention, a journal of the American Association for Cancer Research.

"Compared to women who had never taken these hormones, the use of estrogen plus progestin was associated with a reduced risk of colorectal cancer," said Jill R. Johnson, M.P.H., a doctoral student at the University of Minnesota School of Public Health.

The largest risk reduction, approximately 45 percent, was seen among women who had completed use of estrogen plus progestin five or more years previously.

Johnson and her colleagues extracted data from 56,733 postmenopausal women who participated in the Breast Cancer Detection Demonstration Project follow-up study. Hormone therapy use and other risk factors were ascertained through telephone interviews and mailed questionnaires between 1979 and 1998. During an average 15 years of follow-up, Johnson and colleagues identified 960 new cases of colorectal cancer in this population.

Any use of estrogen therapy was associated with a 17 percent reduced risk in colorectal cancer. Among those who used estrogen, the largest reductions were seen among those who were current users (25 percent reduced risk) and users of ten or more years duration (26 percent reduced risk).

Researchers also found a 22 percent reduced risk among those who had ever used estrogen plus progestin in combination. They further found a 36 percent reduction in risk among those who had used progestin sequentially or less than 15 days per month. Past users of estrogen plus progestin, who had stopped at least five years ago, had a 45 percent risk reduction.

Although Johnson's study was not designed to look at biological mechanisms for the protective effect of estrogen therapy, she did say that previous research has suggested that hormones may play a role in decreasing levels of insulin-like growth factors, thereby reducing risk. "The biological mechanism will need to be explored in further studies," said Johnson.

Runaway stars carve eerie cosmic sculptures

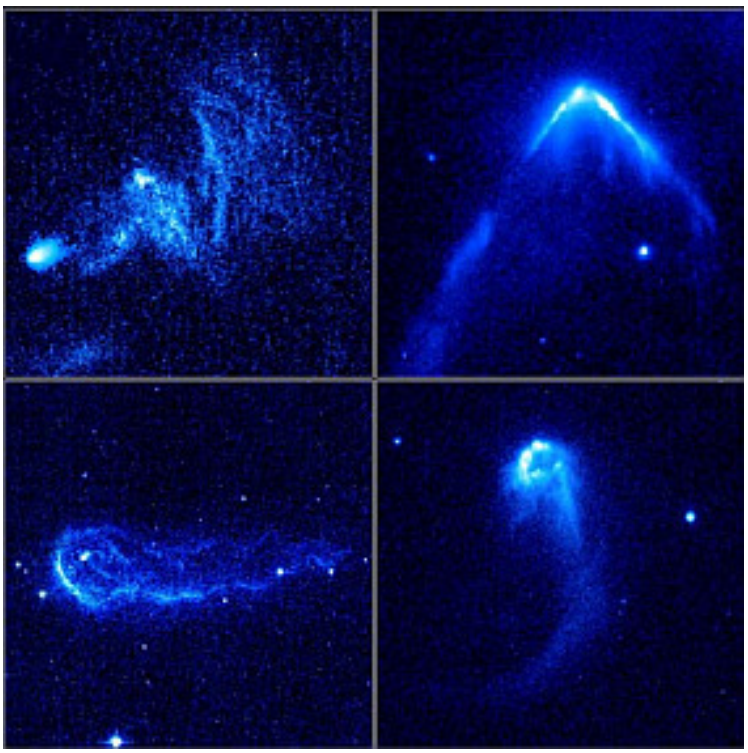
* 19:54 07 January 2009 by **Maggie McKee**

The Hubble Space Telescope has inadvertently caught 14 runaway stars speeding through dense interstellar gas. The discovery may shed light on whether the turbulence they create could prevent surrounding gas from collapsing into new stars.

Astronomers led by Raghvendra Sahai of NASA's Jet Propulsion Laboratory had been searching for ageing, bloated stars with Hubble's Advanced Camera for Surveys in 2005 and 2006 - before the instrument failed permanently in 2007.

But when the researchers studied the images, they noticed 14 young stars that were shooting through interstellar gas, creating 'bow shocks' in front of them that resemble the water waves created at the bow of a speeding boat. The bow shocks form where particles streaming from the stars in stellar 'winds' plough into surrounding gas.

"When I first saw the images, I said, 'Wow, this is like a bullet speeding through the interstellar medium,'" Sahai said in a statement.



Bow shocks are created when winds of particles shed by runaway stars slam into surrounding gas **(Image: NASA/ESA/R Sahai/JPL)**

Stellar winds

Similar bow shocks had been observed in the 1980s by the Infrared Astronomical Satellite. But those bow shocks were much larger than the ones observed by Hubble, suggesting they were produced by more massive stars with more powerful stellar winds.

"The stars in our study are likely the lower-mass and/or lower-speed counterparts to the massive stars with bow shocks detected by IRAS," says Sahai. He adds that low-mass stars outnumber their higher-mass counterparts, suggesting the newly found stars represent most of the universe's stellar runaways.

Kicked out

The stars' winds suggest they are just millions of years old. And their bow shocks suggest they are travelling through the interstellar gas at more than 180,000 kilometres per hour - about five times as fast as most young stars.

What accelerated them to such speeds? One possibility is that the stars began their lives in pairs, but got boosted to high speeds when their partner exploded in a supernova.

Alternatively, the stars may have been involved in a gravitational run-in with two or three other stars and got kicked out in the process. If they are just a million years or so old and are moving at about 180,000 km/h, they must have travelled about 160 light years from their birthplace.

Stellar birth control?

The team plans to search for more such runaway stars and will also continue to scrutinise the existing Hubble observations to see if the stellar speedsters have much of an effect on the gas clouds they are travelling through, since turbulence can prevent gas clouds from condensing into new stars.

"One of the questions that these very showy encounters raise is what effect they have on the clouds," said team member Mark Morris of the University of California, Los Angeles, in a statement. "Is it an insignificant flash in the pan, or do the strong winds from these stars stir up the clouds and thereby slow down their evolution toward forming another generation of stars?"

The research was presented on Wednesday at a meeting of the American Astronomical Society in Long Beach, California.

Insulin grown in plants gets human tests

* 08 January 2009

INSULIN grown in plants has been injected into people for the first time. The hope is that plants will provide a cheaper source of insulin for people with diabetes.

Sembiosys Genetics, a Canadian company based in Calgary, Alberta, inserted human insulin genes into safflowers, causing them to make a compound called pro-insulin. Enzymes then converted this into a type of insulin called SBS-1000.

Previous tests indicated that SBS-1000 is identical to human insulin, so last month Sembiosys compared its effects with insulin from other sources in healthy volunteers. The company plans to release the results later this year.

Most insulin products are produced by bacteria in a fermenter. As this is an expensive process, Sembiosys hopes using plants will be cheaper because they do not need this stage.

Safflowers are not widely grown in North America, and have no wild relatives there. This should minimise the risk of genes escaping from insulin-producing safflowers grown there, says Maurice Maloney of Sembiosys.

SemBioSys begins phase I/II trial of insulin produced in plant seeds

CALGARY, Dec. 3 /CNW/ - SemBioSys Genetics Inc. (TSX:SBS), a biotechnology company developing protein pharmaceuticals in crop plants, today announced that it has initiated a phase I/II clinical trial of its plant-produced insulin with the first injection of its drug in humans. The trial, taking place in the United Kingdom (UK), will include up to 30 healthy volunteers in a three-arm study (SBS-1000 insulin and two commercial standards) to demonstrate the bioequivalence of safflower-produced insulin to comparator insulin products. Full results are expected to be available during the first half of 2009.

"We have commenced the planned phase I/II clinical trial with plant-made insulin. This is the largest volume biopharmaceutical ever produced in plants," stated Bruce Given, M.D., acting chief medical officer at SemBioSys. "This sophisticated trial is designed to show bioequivalence with respect to insulin concentrations as well as insulin action on blood glucose. Bioequivalence is being measured by comparing SBS-1000 to commercially available insulin currently used to treat diabetes."

"The initiation of the phase I/II clinical trial for plant-produced insulin is a major milestone for SemBioSys. The trial is the first in which plant-produced insulin has been injected into humans and supports the exciting potential for the establishment of plant-produced drugs in the pharmaceutical sector," said Andrew Baum, president and chief executive officer of SemBioSys. "This trial verifies the viability of plant made insulin and defines the regulatory path for plant-made biopharmaceuticals. This trial also represents significant risk reduction for potential large pharmaceutical partners for our insulin and Apo AI Milano programs."

SemBioSys prepared the clinical material in its Current Good Manufacturing Practice (cGMP) compliant manufacturing plant, which underwent a successful cGMP inspection as required by European Union (EU) regulations. Successful completion of this clinical trial in Europe should contribute to the satisfaction of regulatory requirements in Europe and North America. Both the United States and European regulatory authorities have confirmed that SBS-1000 insulin is eligible to receive approval through an abbreviated regulatory path.

About SBS-1000

SBS-1000 is human insulin produced from genetically enhanced safflower. SemBioSys has demonstrated that SBS-1000 insulin is physically, structurally and functionally indistinguishable from pharmaceutical-grade human insulin through analytical testing and pre-clinical sub-chronic toxicology studies in rodents and primates.

First Americans arrived as 2 separate migrations, according to new genetic evidence

The first people to arrive in America traveled as at least two separate groups to arrive in their new home at about the same time, according to new genetic evidence published online on January 8th in Current Biology, a Cell Press publication.

After the Last Glacial Maximum some 15,000 to 17,000 years ago, one group entered North America from Beringia following the ice-free Pacific coastline, while another traversed an open land corridor between two ice sheets to arrive directly into the region east of the Rocky Mountains. (Beringia is the landmass that connected northeast Siberia to Alaska during the last ice age.) Those first Americans later gave rise to almost all modern Native American groups of North, Central, and South America, with the important exceptions of the Na-Dene and the Eskimos-Aleuts of northern North America, the researchers said.

" Recent data based on archeological evidence and environmental records suggest that humans entered the Americas from Beringia as early as 15,000 years ago, and the dispersal occurred along the deglaciated Pacific

coastline," said Antonio Torroni of Università di Pavia, Italy. "Our study now reveals a novel alternative scenario: Two almost concomitant paths of migration, both from Beringia about 15,000 to 17,000 years ago, led to the dispersal of Paleo-Indians—the first Americans."

Such a dual origin for Paleo-Indians has major implications for all disciplines involved in Native American studies, he said. For instance, it implies that there is no compelling reason to presume that a single language family was carried along with the first migrants.

When Columbus reached the Americas in 1492, Native American occupation stretched from the Bering Strait to Tierra del Fuego, Torroni explained. Those native populations encompassed extraordinary linguistic and cultural diversity, which has fueled extensive debate among experts over their interrelationships and origins.

Recently, molecular genetics, together with archaeology and linguistics, has begun to provide some insights. In the new study, Ugo Perego and Alessandro Achilli of Torroni's team analyzed mitochondrial DNA from two rare haplogroups, meaning mitochondrial types that share a common maternal ancestor. Mitochondria are cellular components with their own DNA that allow scientists to trace ancestry and migration because they are passed on directly from mother to child over generations.

Their results show that the haplogroup called D4h3 spread from Beringia into the Americas along the Pacific coastal route, rapidly reaching Tierra del Fuego. The other haplogroup, X2a, spread at about the same time through the ice-free corridor between the Laurentide and Cordilleran Ice Sheets and remained restricted to North America.

" A dual origin for the first Americans is a striking novelty from the genetic point of view and makes plausible a scenario positing that within a rather short period of time, there may have been several entries into the Americas from a dynamically changing Beringian source," the researchers concluded.

The researchers include Ugo A. Perego, Universita` di Pavia, Pavia, Italy, Sorenson Molecular Genealogy Foundation, Salt Lake City, UT; Alessandro Achilli, Universita` di Pavia, Pavia, Italy, Universita` di Perugia, Perugia, Italy; Norman Angerhofer, Sorenson Molecular Genealogy Foundation, Salt Lake City, UT; Matteo Accetturo, Universita` di Pavia, Pavia, Italy; Maria Pala, Universita` di Pavia, Pavia, Italy; Anna Olivieri, Universita` di Pavia, Pavia, Italy; Baharak Hooshiar Kashani, Universita` di Pavia, Pavia, Italy; Kathleen H. Ritchie, Sorenson Molecular Genealogy Foundation, Salt Lake City, UT; Rosaria Scozzari, Universita` La Sapienza, Rome, Italy; Qing-Peng Kong, Chinese Academy of Sciences, Kunming, Yunnan, China, Yunnan University, Kunming, Yunnan, China; Natalie M. Myres, Sorenson Molecular Genealogy Foundation, Salt Lake City, UT; Antonio Salas, Unidade de Xenetica, Instituto de Medicina Legal, Universidad de Santiago de Compostela, Galicia, Spain; Ornella Semino, Universita` di Pavia, Pavia, Italy; Hans-Jurgen Bandelt, University of Hamburg, Hamburg, Germany; Scott R. Woodward, Sorenson Molecular Genealogy Foundation, Salt Lake City, UT; and Antonio Torroni, Universita` di Pavia, Pavia, Italy.

Artificial molecule evolves in the lab

* 19:00 08 January 2009 **by Ewen Callaway**

A new molecule that performs the essential function of life - self-replication - could shed light on the origin of all living things.

If that wasn't enough, the laboratory-born ribonucleic acid (RNA) strand evolves in a test tube to double itself ever more swiftly.

"Obviously what we're trying to do is make a biology," says Gerald Joyce, a biochemist at the Scripps Research Institute in La Jolla, California. He hopes to imbue his team's molecule with all the fundamental properties of life: self-replication, evolution, and function.

Joyce and colleague Tracey Lincoln made their chemical out of RNA because most researchers think early life stored information in this sister molecule to DNA. And unlike the stuff of our genomes, RNA molecules can catalyse chemical reactions.

"We're trying to jump in at the last signpost we have back there in the early history of life," Joyce says.

Molecular brew

Rather than start with RNA enzymes - ribozymes - present in other organisms, Joyce's team created its own molecule from scratch, called R3C. It performed a single function: stitching two shorter RNA molecules together to create a clone of itself.

Further lab tinkering made this molecule better at copying itself, but this is not the same as bringing it to life. It self-replicated to a point, but eventually clogged up in shapes that could no longer sew RNA pieces together. "It was a real dog," Joyce says.

To improve R3C, Lincoln redesigned the molecule to forge a sister RNA that could itself join two other pieces of RNA into a functioning ribozyme. That way, each molecule makes a copy of its sister, a process called cross replication. The population of two doubles and doubles until there are no more starting bits of RNA left.

"We just let them cook, let them amplify themselves silly," he says

Lab evolution

Not content with achieving one hallmark of life in the lab, Joyce and Lincoln sought to evolve their molecule by natural selection. They did this by mutating sequences of the RNA building blocks, so that 288 possible ribozymes could be built by mixing and matching different pairs of shorter RNAs.

What came out bore an eerie resemblance to Darwin's theory of natural selection: a few sequences proved winners, most losers. The victors emerged because they could replicate fastest while surrounded by competition, Joyce says.

"I wouldn't call these molecules alive," he cautions. For one, the molecules can evolve only to replicate better. Reproduction may be the strongest - perhaps only - biological urge, yet even simple organisms go about this by more complex means than breakneck division. Bacteria and humans have both evolved the ability to digest lactose, or milk sugar, to ensure their survival, for instance.

Joyce says his team has endowed its molecule with another function, although he will not say what that might be before his findings are published.

More fundamentally, to mimic biology, a molecule must gain new functions on the fly, without laboratory tinkering. Joyce says he has no idea how to clear this hurdle with his team's RNA molecule. "It doesn't have open-ended capacity for Darwinian evolution."

Missing witness

A life-mimicking molecule will also need to assemble itself from simpler components than two halves, says Michael Robertson, a biochemist at the University of California, Santa Cruz.

Both DNA and RNA currently replicate with the help of a protein enzyme that joins individual nucleotide "letters". Early life may have done the same, or it could have joined short stretches of RNA, Robertson says.

Moreover, efforts to create more life in the labs will eventually hit a philosophical wall, not a technical one.

"If somebody makes something great in the lab, it's fantastic. But really the origin of life on Earth is an historical problem that we're never going to be able to witness and verify," he says.

Journal reference: Science (DOI: 10.1126/science.1167856)

Chemopreventive agents in black raspberries identified

PHILADELPHIA – A study published in Cancer Prevention Research, a journal of the American Association for Cancer Research, identifies components of black raspberries with chemopreventive potential.

Researchers at the Ohio State Comprehensive Cancer Center found that anthocyanins, a class of flavonoids in black raspberries, inhibited growth and stimulated apoptosis in the esophagus of rats treated with an esophageal carcinogen.

"Our data provide strong evidence that anthocyanins are important for cancer prevention," said the study's lead author, Gary D. Stoner, Ph.D., a professor in the department of internal medicine at Ohio State University.

Stoner and his team of researchers fed rats an anthocyanin-rich extract of black raspberries and found that the extract was nearly as effective in preventing esophageal cancer in rats as whole black raspberries containing the same concentration of anthocyanins. This study demonstrates the importance of anthocyanins as preventive agents in black raspberries and validated similar in vitro findings. It is among the first to look at the correlation between anthocyanins and cancer prevention in vivo.

Stoner and his colleagues have conducted clinical trials using whole berry powder, which has yielded some promising results, but required patients to take up to 60 grams of powder a day. "Now that we know the anthocyanins in berries are almost as active as whole berries themselves, we hope to be able to prevent cancer in humans using a standardized mixture of anthocyanins," said Stoner.

"The goal is to potentially replace whole berry powder with its active components and then figure out better ways to deliver these components to tissues, to increase their uptake and effectiveness. Ultimately, we hope to test the anthocyanins for effectiveness in multiple organ sites in humans," said Stoner.

New clues to mystery childhood illness: Kawasaki disease

A study looking at the entire human genome has identified new genes that appear to be involved in making some children more susceptible to Kawasaki disease (KD), a serious illness that often leads to coronary artery disease, according to a new international study published in PLoS Genetics. This is the first genetic study of an infectious disease to look at the whole of the genome, rather than just selected genes.

Researchers from UC San Diego School of Medicine Department of Pediatrics joined an international research team, including colleagues from The University of Western Australia, the Genome Institute of Singapore, Emma Children's Hospital, The Netherlands, and Imperial College London, UK. The group studied naturally occurring genetic variation in almost 900 cases of Kawasaki disease from these countries. UC San Diego coordinated the U.S. genetics effort, collecting DNA samples from around the country.

"KD tends to run in families, suggesting that there are genetic components to disease risk," said Jane C. Burns, M.D., professor and Chief, Division of Allergy, Immunology, and Rheumatology, UC San Diego Department of Pediatrics. "We have been trying to understand the step by step development of this disease (pathogenesis) and the chain of events leading to it, using a biological approach but with limited success. This robust, systematic genome wide study is simply letting the genetics tell us what are the key genes in KD pathogenesis. Without this research these newly discovered genes of interest might have continued to remain hidden."

Kawasaki disease is an unusual and serious illness of young children that causes high fever, rash, red eyes and lips, swollen glands, and swollen hands and feet with peeling skin. The disease also causes damage of the coronary arteries in a quarter of untreated children and may increase the risk of atherosclerosis in early adulthood. The cause of Kawasaki disease is unknown, but it seems to be due to an infection in susceptible children. There is no diagnostic test for Kawasaki disease, and current treatment fails to prevent coronary damage in at least one in 10-20 children and death in one in 1,000 children.

This study found that genes involved in cardiovascular function and inflammation may be particularly important and some seem to function together. The authors consider that these findings will lead to new diagnostics and better treatment and may be informative about adult cardiovascular disease as well.

The findings do not yet prove that the new genes are functionally involved. Other genetic variants may be important, especially in different ethnic groups. The authors are planning detailed studies of the function of these genes and larger collaborative studies including East Asian populations, who are at particular risk of Kawasaki disease, with 1 in 150 Japanese children affected.

"So now it is time to come back to the biology and study the genes and the pathways and their role in KD pathogenesis," explained associate project scientist Chisato Shimizu, M.D., Kawasaki Disease Research Center, UC San Diego School of Medicine. "Most importantly, we will be able to use these data to help us predict which children with Kawasaki disease are at most risk for heart disease from their KD."

"Our laboratory is the focal point where the combination of academic research and clinical investigation lead to better treatment and patient outcome," explained Kawasaki Disease Research Center Assistant Director, Adriana Tremoulet, M.D., assistant adjunct professor, UC San Diego Department of Pediatrics and Rady Children's Hospital. "UC San Diego represents the entire U.S. genetics consortium. Through a grant from the NIH we have been able to support DNA collection in Los Angeles, Hawaii, Chicago, and Boston, as well as Japan and Finland. We coordinate the entire U.S. KD genetics effort and are the conduit for U.S. DNA to join the international effort based in Singapore."

Burns says the next steps include "drilling down" on candidate genes and pathways that were discovered in the genome-wide analysis. This detailed analysis will identify the exact genetic differences that influence disease susceptibility and outcome.

"We can already see a way in which this suggests a new treatment for KD that may be much less expensive than the current treatment with IVIG (intravenous immunoglobulin)," said Burns.

The Kawasaki Disease Research Center at UC San Diego:
The Kawasaki Disease Research Program is a joint collaboration between the Departments of Pediatrics and Sociology at UC San Diego, the Scripps Institute of Oceanography, and Rady Children's Hospital of San Diego.
In San Diego County, 20 to 30 children per 100,000 children less than five years of age are affected each year. More than 50 new patients are treated annually at Rady Children's Hospital, San Diego. The illness is four to five times more common than some more publicly recognized diseases of children such as tuberculosis or bacterial meningitis. It is also 10 to 20 times more common in Japanese and Japanese American children than in children of European descent. For more information visit: www.pediatrics.ucsd.edu/kawasaki

Study shows California's autism increase not due to better counting, diagnosis

(Sacramento, Calif.) - A study by researchers at the UC Davis M.I.N.D. Institute has found that the seven- to eight-fold increase in the number children born in California with autism since 1990 cannot be explained by either changes in how the condition is diagnosed or counted - and the trend shows no sign of abating.

Published in the January 2009 issue of the journal Epidemiology, results from the study also suggest that research should shift from genetics to the host of chemicals and infectious microbes in the environment that are likely at the root of changes in the neurodevelopment of California's children.

"It's time to start looking for the environmental culprits responsible for the remarkable increase in the rate of autism in California," said UC Davis M.I.N.D. Institute researcher Irva Hertz-Picciotto, a professor of environmental and occupational health and epidemiology and an internationally respected autism researcher.

Hertz-Picciotto said that many researchers, state officials and advocacy organizations have viewed the rise in autism's incidence in California with skepticism.

The incidence of autism by age six in California has increased from fewer than nine in 10,000 for children born in 1990 to more than 44 in 10,000 for children born in 2000. Some have argued that this change could

have been due to migration into California of families with autistic children, inclusion of children with milder forms of autism in the counting and earlier ages of diagnosis as consequences of improved surveillance or greater awareness.

Hertz-Picciotto and her co-author, Lora Delwiche of the UC Davis Department of Public Health Sciences, initiated the study to address these beliefs, analyzing data collected by the state of California Department of Developmental Services (DDS) from 1990 to 2006, as well as the United States Census Bureau and state of California Department of Public Health Office of Vital Records, which compiles and maintains birth statistics.

Hertz-Picciotto and Delwiche correlated the number of cases of autism reported between 1990 and 2006 with birth records and excluded children not born in California. They used Census Bureau data to calculate the rate of incidence in the population over time and examined the age at diagnosis of all children ages two to 10 years old.

The methodology eliminated migration as a potential cause of the increase in the number of autism cases. It also revealed that no more than 56 percent of the estimated 600-to-700 percent increase, that is, less than one-tenth of the increased number of reported autism cases, could be attributed to the inclusion of milder cases of autism. Only 24 percent of the increase could be attributed to earlier age at diagnosis. "These are fairly small percentages compared to the size of the increase that we've seen in the state," Hertz-Picciotto said.

Hertz-Picciotto said that the study is a clarion call to researchers and policy makers who have focused attention and money on understanding the genetic components of autism. She said that the rise in cases of autism in California cannot be attributed to the state's increasingly diverse population because the disorder affects ethnic groups at fairly similar rates. "Right now, about 10 to 20 times more research dollars are spent on studies of the genetic causes of autism than on environmental ones. We need to even out the funding," Hertz-Picciotto said.

The study results are also a harbinger of things to come for public-health officials, who should prepare to offer services to the increasing number of children diagnosed with autism in the last decade who are now entering their late teen years, Hertz-Picciotto said.

"These children are now moving toward adulthood, and a sizeable percentage of them have not developed the life skills that would allow them to live independently," she said.

The question for the state of California, Hertz-Picciotto said, will become: 'What happens to them when their parents cannot take care of them?' "These questions are not going to go away and they are only going to loom larger in the future. Until we know the causes and can eliminate them, we as a society need to provide those treatments and interventions that do seem to help these children adapt. We as scientists need to improve available therapies and create new ones," Hertz-Picciotto said.

Hertz-Picciotto and her colleagues at the M.I.N.D Institute are currently conducting two large studies aimed at discovering the causes of autism. Hertz-Picciotto is the principal investigator on the CHARGE (Childhood Autism Risk from Genetics and the Environment) and MARBLES (Markers of Autism Risk in Babies-Learning Early Signs) studies.

CHARGE is the largest epidemiologic study of reliably confirmed cases of autism to date, and the first major investigation of environmental factors and gene-environment interactions in the disorder. MARBLES is a prospective investigation that follows women who already have had one child with autism, beginning early in or even before a subsequent pregnancy, to search for early markers that predict autism in the younger sibling.

"We're looking at the possible effects of metals, pesticides and infectious agents on neurodevelopment," Hertz-Picciotto said. "If we're going to stop the rise in autism in California, we need to keep these studies going and expand them to the extent possible."

The study was funded by grants from the National Institute of Environmental Health Sciences (NIEHS) and by the M.I.N.D. Institute.

New study by Rice University psychologist finds women's brains recognize, encode smell of male sexual sweat

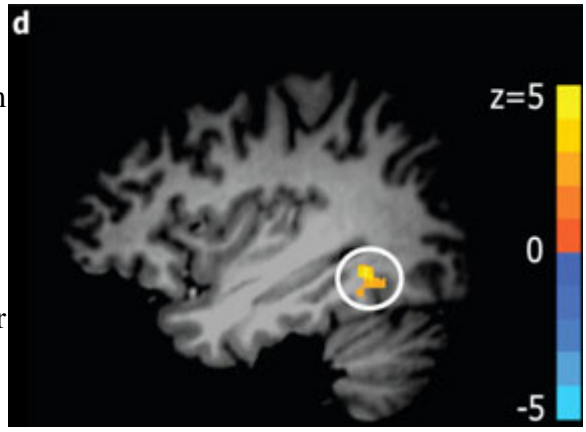
A new Rice University study published in the Journal of Neuroscience found that socioemotional meanings, including sexual ones, are conveyed in human sweat.

Denise Chen, assistant professor of psychology at Rice, looked at how the brains of female volunteers processed and encoded the smell of sexual sweat from men. The results of the experiment indicated the brain recognizes chemosensory communication, including human sexual sweat.

Scientists have long known that animals use scent to communicate. Chen's study represents an effort to expand knowledge of how humans' sense of smell complement their more powerful senses of sight and hearing.

The experiment directly studied natural human sexual sweat using functional magnetic resonance imaging (fMRI). Nineteen healthy female subjects inhaled olfactory stimuli from four sources, one of which was sweat

gathered from sexually aroused males. The research showed that several parts of the brain are involved in processing the emotional value of the olfactory information. These include the right fusiform region, the right orbitofrontal cortex and the right hypothalamus.



"With the exception of the hypothalamus, neither the orbitofrontal cortex nor the fusiform region is considered to be associated with sexual motivation and behavior," Chen said. "Our results imply that the chemosensory information from natural human sexual sweat is encoded more holistically in the brain rather than specifically for its sexual quality."

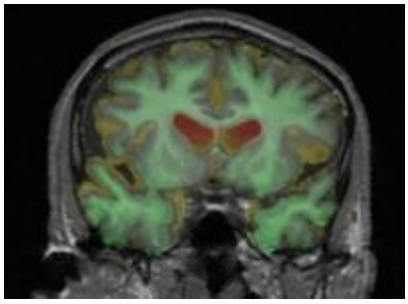
Humans are evolved to respond to salient socioemotional information. Distinctive neural mechanisms underlie the processing of emotions in facial and vocal expressions. The findings help explain the neural mechanism for human social chemosignals.

The understanding of human smell at the neural level is still at the beginning stage. The present work is the first fMRI study of human social chemosignals.

The research, co-authored by Chen and Wen Zhou, graduate student in the Psychology Department, appeared in the December 31 issue of Journal of Neuroscience.

The research was supported in part by the National Institutes of Health.

Antipsychotic drugs double risk of death among Alzheimer's patients



The brain of someone with Alzheimer's New research into the effects of antipsychotic drugs commonly prescribed to Alzheimer's patients concludes that the medication nearly doubles risk of death over three years. The study, funded by the Alzheimer's Research Trust, was led by Prof Clive Ballard's King's College London team and is published in Lancet Neurology on 9 January.

The study involved 165 Alzheimer's patients in care homes who were being prescribed antipsychotics. 83 continued treatment and the remaining 82 had it withdrawn and were instead given oral placebos.

Findings showed a significant increase in risk of death for patients who continued taking antipsychotic medication. The difference between the two groups became more pronounced over time, with 24-month survival rates for antipsychotic-treated patients falling to 46% versus 71% on the placebo and at 36 months it was 30% versus 59%. It means that after three years, less than a third of people on antipsychotics were alive compared to nearly two thirds using the dummy drug.

Antipsychotics are used to treat symptoms of agitation, delusions and aggressive behaviour. NICE guidelines recommend that the drugs should only be used for short periods of time and where symptoms are severe, and should be very carefully monitored, although in clinical practice the average length of prescription is 1-2 years. While there is evidence of modest short-term (6-12 weeks) benefits of antipsychotic treatment for the serious behavioural symptoms of Alzheimer's, a previous Alzheimer's Research Trust study showed that these benefits were not evident over longer periods of treatment.

As many as 100,000 people with dementia are routinely prescribed antipsychotics in UK care homes. It could mean 23,500 people dying prematurely, according to a 2008 report by Paul Burstow MP.

Prof Clive Ballard of King's College London said: "The results further highlight the need to seek less harmful alternatives for the long-term treatment of behavioural symptoms in Alzheimer's patients. At the moment, there is still a limited place for antipsychotics in the treatment of Alzheimer's, particularly severe aggression, but the serious concerns of the drugs shown by our research emphasise the urgent need to put an end to unnecessary and prolonged prescribing".

Rebecca Wood, Chief Executive of the Alzheimer's Research Trust, said: "The findings of this research are a real wake-up call and underline the danger of prescribing antipsychotics long-term for anything other than exceptional circumstances. We must avoid the use of these drugs as a potentially dangerous 'chemical cosh' to patients who would be better off without it. The study also highlights the urgent need to develop better treatments as Alzheimer's patients have few options available to them.

"700,000 people in the UK have dementia; we urgently need to fund more research to develop the new treatments we so desperately need".

Dr Mark Baxter of the University of Oxford added: "Antipsychotic drugs can be effective in controlling unpleasant and disturbing behavioural symptoms of Alzheimer's disease, including severe aggression, delusions,

and agitation. But this study shows, conclusively, that these drugs have a severe and serious cost in terms of increased mortality. The study follows the gold-standard double-blind, placebo-controlled method for clinical trials, and is unique in examining long-term effects of antipsychotic treatment on mortality in patients with Alzheimer's disease.

"Antipsychotics do not have any effects on the underlying disease processes of Alzheimer's disease. What is needed is not only an increased application of non-drug methods to improve behavioural health in patients with dementia -- including cognitive-behavioural therapy and environmental design -- as well as a better understanding of how Alzheimer's neuropathology causes behavioural disturbances in addition to its effects on memory, so that rational drug therapies can be developed that do not have the liabilities of currently-available antipsychotics." *Click here to visit the Lancet Neurology's website summary of the research*

For fats, longer may not be better

Appearing in the January issue of JLR

Researchers have uncovered why some dietary fats, specifically long-chain fats, such as oleic acid (found in olive oil), are more prone to induce inflammation. Long-chain fats, it turns out, promote increased intestinal absorption of pro-inflammatory bacterial molecules called lipopolysaccharides (LPS). This study appears in the January issue of JLR.

While dietary fats that have short chains (such as those found in milk and cheese products) can be absorbed directly into the bloodstream from the intestines, long-chain fats need to be first packaged by the intestinal cells into particles known as chylomicrons (large complexes similar to HDL and LDL particles). Erik Eckhardt and colleagues at the University of Kentucky wondered whether some unwanted LPS particles, routinely shed by the bacteria that inhabit the human gut, might also be sneaking in the chylomicrons.

Their hypothesis turned out to be correct; when they treated cultured human intestinal cells with oleic acid they observed significant secretion of LPS together with the chylomicron particles, a phenomenon that was not observed when the cells were treated with short-chain butyric acid. Similar findings were found in mouse studies; high amounts of dietary oleic acid, but not butyric acid, promoted significant absorption of LPS into the blood and lymph nodes and subsequent expression of inflammatory genes.

Eckhardt and colleagues believe these findings may pave the way for future therapies for Crohn's disease and other inflammatory bowel disorders. In addition, they note that this study once again highlights the importance of the diverse bacteria that call our intestines home.

From the article: "Chylomicrons promote intestinal absorption of lipopolysaccharides" by Sarbani Ghoshal, Jassir Witta, Jian Zhong, Willem de Villiers and Erik Eckhardt Article link: http://www.jlr.org/cgi/content/full/50/1/90
*Corresponding Author: Erik Eckhardt, Department of Internal Medicine, University of Kentucky, Lexington. Tel: 859 323 4933 * 81741; email: eeckh2@uky.edu Note: This article also features a commentary available at http://www.jlr.org/cgi/content/full/50/1/1*

'Climate fix' ship sets sail with plan to dump iron

* 18:08 09 January 2009 **by Catherine Brahic**

The largest and to date the most comprehensive experiment to soak up greenhouse-gas emissions by artificially fertilising the oceans set sail from South Africa earlier this week. The ambitious geoengineering expedition has caused a stir among some campaigning groups, but has the scientific backing of the UK, German, and Indian governments, as well as the International Maritime Organisation.

Within weeks, the ship's crew hope to dump 20 tonnes of ferrous sulphate into the Southern Ocean. Plankton need iron to grow, and the aim of the expedition is to trigger a plankton bloom and boost the amount of carbon that is sucked out of the air and locked up at the bottom of the ocean.

The team, led by Victor Smetacek of the Alfred Wegner Institute, Bremerhaven, Germany, will also monitor the population of krill to see if their populations also increase. These small crustaceans feed on plankton and are an important food source for many marine species. So, if the population grows, this could give fisheries a boost.

'Anti-offset crusaders'

Ocean fertilisation experiments have been carried out on a few occasions in the past, but became controversial in 2007 when a company called Planktos announced it would dump iron fillings off the coast of the Galapagos islands.

Some environmental organisations, including the ETC group, expressed concerns that this was tantamount to pollution and, by affecting plankton at the bottom of the food chain could have unforeseen consequences.

Planktos eventually cancelled the expedition and the company folded due to lack of funds. It blamed a "highly effective disinformation campaign waged by anti-offset crusaders".

Following on the Planktos affair, both the International Maritime Organisation (IMO) and the Convention on Biological Diversity recommended that governments restrict ocean fertilisation activities.

So the fact that Smetacek's expedition - backed by the German government, which hosted the CBD's meeting last year - has been allowed to proceed has raised eyebrows.

"If this iron dump goes ahead it will be in clear defiance of the UN Convention on Biological Diversity," warns Jim Thomas of ETC Group. The CBD resolution makes an exception only for small coastal experiments, but Smetacek says his expedition has been approved by the German environment ministry.

'Slippery slope'

Regardless of the CBD's recommendations, which are not legally binding, Smetacek's experiment is not in contravention of the IMO's London Convention on ocean pollution.

Its statement on ocean fertilisation (pdf) says "ocean fertilization activities other than legitimate scientific research should not be allowed" and adds that scientific experiments should be assessed on a case-by-case basis. Smetacek insists his experiments have been approved by all necessary parties. "Twenty tonnes of iron particles in the vast ocean is very much drop in the bucket and is unlikely to have a lasting effect," says Ken Caldeira of Stanford University. "The rational concern is that experiments will lead down some slippery slope - that small experiments could be scaled up without any regulation."

Planktos was a commercial organisation. It intended to sell carbon credits to companies that would pay the company to dump iron in the oceans, which would in theory suck CO2 out of the atmosphere and counter their own polluting activities.

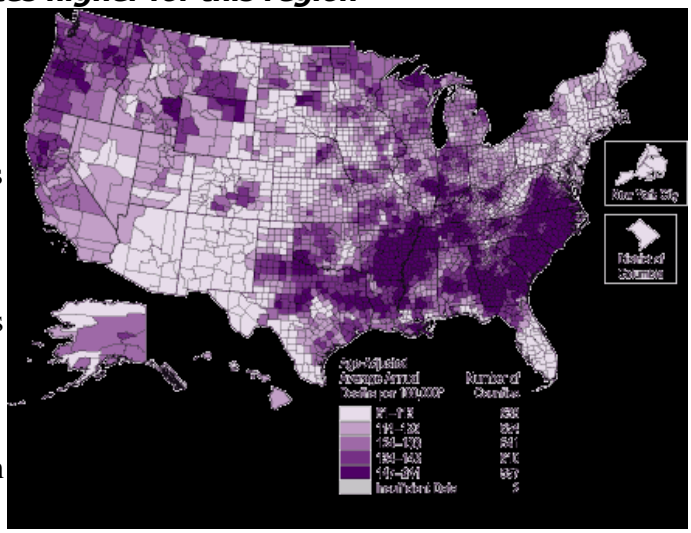
For now, the CBD and the IMO agree there is not enough evidence that this would work and so are firmly against commercial activities. Smetacek's experiments could reveal whether or not ocean fertilisation will work.

Even if it does, however, Caldeira does not believe companies should be allowed to sell carbon credits in return for fertilising the oceans. He says this would simply encourage companies to continue emitting greenhouse gases. Ocean fertilisation and other geoengineering schemes, says Caldeira, should be seen as potential short-term solutions that could cool temperatures while humans switch to non-fossil sources of energy.

'Stroke Belt' Deaths Tied to Non-Traditional Risk Factors

Stroke risks go beyond geographic and racial differences

Diabetes and hypertension rates higher for this region



BIRMINGHAM, Ala. - Southerners die from stroke more than in any other U.S. region, but exactly why that happens is unknown. A new report by researchers at the University of Alabama at Birmingham (UAB) and the University of Vermont underscores that geographic and racial differences are not the sole reasons behind the South's higher stroke death rate.

The data is from UAB's Reasons for Geographic and Racial Differences in Stroke (REGARDS) study, which has enrolled more than 30,200 U.S. participants. The study confirms a greater-than 40 percent higher stroke death rate in eight southeastern states known as the Stroke Belt - Alabama, Arkansas, Georgia, Louisiana, Mississippi, North and South Carolina and Tennessee.

After factoring in age, race and sex-related factors, the predicted stroke risk was only slightly higher in Stoke Belt states compared to other regions (10.7 percent versus 10.1 percent), said George Howard, Dr.PH., professor of biostatistics in UAB's School of Public Health and a REGARDS principal. That risk was calculated using nine known risk factors common to stroke screening.

Something Else Happening

"We found geographic and racial differences are useful in predicting stroke risk, but they only explain less than half the picture. Something else is happening," Howard said. "It could be exposure to allergens in the home, it could be micronutrients in drinking water or it could be other factors considered 'non-traditional' because they don't fall into the list of nine factors commonly used to predict stroke risk."

The findings are reported in the Annals of Neurology.

All minority groups, including Native Americans, Hispanics and African-Americans, face a significantly higher risk for stroke and death from stroke compared to whites, and research is focused on exactly why that is, said Mary Cushman, M.D., of the University of Vermont, the study's lead author. Continued analysis of REGARDS data and follow-up study will determine other stroke risk factors and their significance.

One detail that emerged in the Annals of Neurology study is that the prevalence of diabetes and hypertension was up to five percentage points higher in the Southeast. That means interventions to reduce geographic

disparities in diabetes and hypertension - including boosting diabetes screening rates and follow-up care - could also reduce geographic disparities in stroke death, Howard said.

REGARDS already has spawned more than 50 accompanying research reports. The study is a research partnership that includes UAB's Departments of Epidemiology, Biostatistics and Preventive Medicine, UAB's Center for Aging and the Center for the Study of Community Health, the University of Vermont in Burlington, the University of Arkansas for Medical Sciences in Little Rock, the University of Cincinnati, Indiana University in Indianapolis, the Alabama Neurological Institute in Birmingham, the Medical University of South Carolina in Charleston and Wake Forest University School of Medicine in Winston-Salem, N.C.

Medicinal plants on verge of extinction

* 10 January 2009 **by Rob Edwards**

THE health of millions could be at risk because medicinal plants used to make traditional remedies, including drugs to combat cancer and malaria, are being overexploited. "The loss of medicinal plant diversity is a quiet disaster," says Sara Oldfield, secretary general of the NGO Botanic Gardens Conservation International.

Most people worldwide, including 80 per cent of all Africans, rely on herbal medicines obtained mostly from wild plants. But some 15,000 of 50,000 medicinal species are under threat of extinction, according to a report this week from international conservation group Plantlife. Shortages have been reported in China, India, Kenya, Nepal, Tanzania and Uganda.

The hands of a herbalist gathers dried herbs from an old text in Cuzco, Peru (Image: Lynn Johnson/ Aurora/Getty)

Commercial over-harvesting does the most harm, though pollution, competition from invasive species and habitat destruction all contribute. "Commercial collectors generally harvest medicinal plants with little care for sustainability," the Plantlife report says. "This can be partly through ignorance, but [happens] mainly because such collection is unorganised and competitive."

Medicinal trees at risk include the Himalayan yew (Taxus wallichiana), a source of the anti-cancer drug, paclitaxel; the pepper-bark tree (Warburgia), which yields an antimalarial; and the African cherry (Prunus africana), an extract from which is used to treat a prostate condition.

The solution, says the report's author, Alan Hamilton, is to provide local communities with incentives to protect these plants. Ten grass-roots projects studied by Plantlife in India, Pakistan, China, Nepal, Uganda and Kenya showed this approach can succeed. In Uganda, the project has ensured the sustainable supply of low-cost malaria treatments, and in China a community-run medicinal plant reserve has been created for the first time.

"Improving health, earning an income and maintaining cultural traditions are important in motivating people to conserve medicinal plants, and thus the habitats," says Hamilton. "In conservation you've got to go with what people are interested in."

Ghillean Prance, the former director of the Royal Botanic Gardens at Kew in London, agrees that medicinal plants are in dire need of protection. "Not nearly enough is being done," he told New Scientist. "We tend to destroy the very plants that are of most use to us."

Europe 'exporting' measles to poor countries

EUROPE may become a significant source of "exported" measles in poor countries that have done a better job eliminating the virus.

A study in The Lancet this week finds that the World Health Organization is unlikely to meet its goal of eliminating measles in the European region by 2010 because vaccination rates in many countries, including Germany, the UK and Italy, are too low to stop the spread of the virus (DOI: 10.1016/S0140-6736(08)61849-8).

In contrast, Latin America eliminated measles in 2002, but has since suffered outbreaks "imported" from Europe. While measles rarely kills in Europe, in poorer countries malnutrition and limited healthcare make the virus far more lethal, warns Jacques Kremer of Luxembourg's National Health Institute in an accompanying editorial (DOI: 10.1016/S0140-6736(08)61850-4).

Implant raises cellular army to attack cancer

* 18:00 11 January 2009 **by Colin Barras**

Implants that sit in the body and reprogram a person's immune cells could be used to treat a range of infectious diseases and even cancer. In a trial on mice with an aggressive melanoma that usually kills within 25 days, the new treatment saved 90% of the group.

Because cancer cells originate within the body, the immune system usually leaves them alone. Therapies exist that involve removing immune cells from the body before priming them to attack malignant tissue and injecting them back into a patient.

Results are not encouraging, though - more than 90% of re-injected cells die before they can have any effect, says David Mooney of Harvard University.

Mooney and colleagues have now developed a technique that directs the immune system from within the body - a method that is more efficient and potentially cheaper too.

Search and destroy

Their breakthrough involves implanting cylinders of an FDA-approved biodegradable polymer into the body. The implants release a particular variety of the cell-signalling molecules called cytokines - a sort of molecular perfume that is irresistible to a certain kind of immune-system messenger cell.

These dendritic cells are attracted into the pores of Mooney's implant, where they are exposed to antigens - the molecular signatures of the cancer, bacterium or virus being treated - and a danger-signal chemical derived from bacterial DNA.

This alert signal makes the dendritic cells flee to the nearest lymph node, where they meet up with the immune system's "killer" T-cells and program them to hunt down the invading cells.

Strength in numbers

In tests, the researchers implanted cylinders with a diameter of 8.5 millimetres into mice and two weeks later injected the animals with highly aggressive melanoma cells.

Mice implanted with 'blanks' - cylinders lacking any chemical additives - developed large tumours within 18 days and had to be euthanised. However, 90% of the mice given the full treatment were cured.

"There have not been any reports of the traditional [external] dendritic cell activation having survival rates at the levels we find with our materials for the cancer model we used," says Mooney.

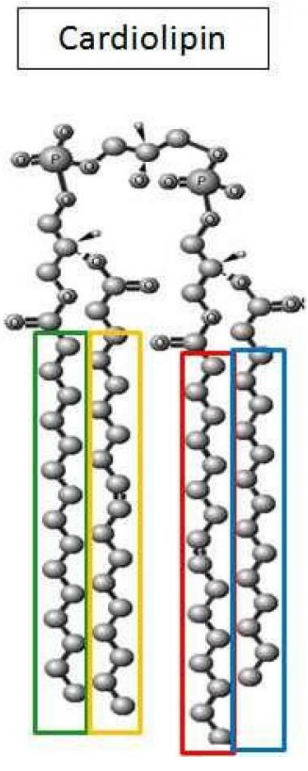
He suspects this is because the implants can recruit and activate very large numbers of dendritic cells. "It is a continuous process - dendritic cells are attracted to the device, take up the [cancer] antigen and [the warning signal] … and then they can leave," says Mooney. "New cells are continuously arriving while activated cells are leaving."

The team thinks modified versions of the material could be effective against a range of cancers and infectious diseases. These might also help reprogram the immune system to combat autoimmune diseases such as type 1 diabetes, caused by immune cells destroying insulin-producing cells in the pancreas.

Journal reference: Nature Materials (DOI: 10.1038/nmat2357)

Nearly a century later, new findings support Warburg theory of cancer

Bioinformatics and tumor research shed new light on cancer's origin



CHESTNUT HILL, MA (January 12, 2009) – German scientist Otto H. Warburg's theory on the origin of cancer earned him the Nobel Prize in 1931, but the biochemical basis for his theory remained elusive.

His theory that cancer starts from irreversible injury to cellular respiration eventually fell out of favor amid research pointing to genomic mutations as the cause of uncontrolled cell growth.

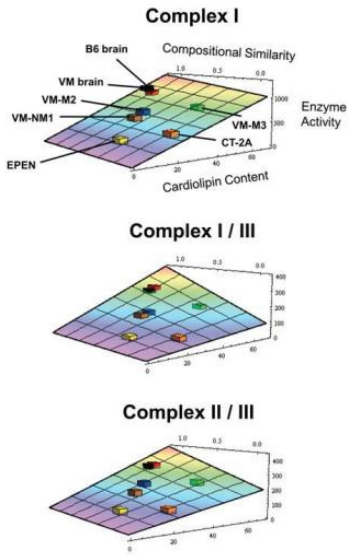
Seventy-eight years after Warburg received science's highest honor, researchers from Boston College and Washington University School of Medicine report new evidence in support of the original Warburg Theory of Cancer.

A descendant of German aristocrats, World War I cavalry officer and pioneering biochemist, Warburg first proposed in 1924 that the prime cause of cancer was injury to a cell caused by impairment to a cell's power plant – or energy metabolism – found in its mitochondria.

In contrast to healthy cells, which generate energy by the oxidative breakdown of a simple acid within the mitochondria, tumors and cancer cells generate energy through the non-oxidative breakdown of glucose, a process called glycolysis. Indeed glycolysis is the biochemical hallmark of most, if not all, types of cancers. Because of this difference between healthy cells and cancer cells, Warburg argued, cancer should be interpreted as a type of mitochondrial disease.

Researchers from Boston College and Washington University School of Medicine examined mitochondrial lipids in a diverse group of mouse brain tumors, specifically the complex lipid known as cardiolipin. Their new research, published in the Journal of Lipid Research, contends that cancer could arise from genomic mutations, environmental insults, or from epigenetic (gene-environmental) abnormalities, any of which could damage cardiolipin and ultimately produce irreversible injury to cellular respiration. **Boston College**

In the years that followed, Warburg's theory inspired controversy and debate as researchers instead found that genetic mutations within cells caused malignant transformation and uncontrolled cell growth. Many researchers argued Warburg's findings really identified the effects, and not the causes, of cancer since no mitochondrial defects could be found that were consistently associated with malignant transformation in cancers.



Boston College biologists and colleagues at Washington University School of Medicine found new evidence to support Warburg's theory by examining mitochondrial lipids in a diverse group of mouse brain tumors, specifically a complex lipid known as cardiolipin (CL). They reported their findings in the December edition of the Journal of Lipid Research.

Abnormalities in cardiolipin can impair mitochondrial function and energy production. Boston College doctoral student Michael Kiebish and Professors Thomas N. Seyfried and Jeffrey Chuang compared the cardiolipin content in normal mouse brain mitochondria with CL content in several types of brain tumors taken from mice. Bioinformatic models were used to compare the lipid characteristics of the normal and the tumor mitochondria samples. Major abnormalities in cardiolipin content or composition were present in all types of tumors and closely associated with significant reductions in energy-generating activities.

These three-dimensional illustrations show the relationship of cardiolipin abnormalities to electron transport chain activities in the cells of mouse brain tumors studied by researchers from Boston College and Washington University School of Medicine. The graphs show the position of the tumors in relation to their host strain in three enzyme complexes. The team reported in the Journal of Lipid Research new findings that support the Warburg Theory of Cancer. The new research contends that cancer could arise from genomic mutations, environmental insults, or from epigenetic (gene-environmental) abnormalities, any of which could damage cardiolipin and ultimately produce irreversible injury to cellular respiration. **The Journal of Lipid Research**

The findings were consistent with the pivotal role of cardiolipin in maintaining the structural integrity of a cell's inner mitochondrial membrane, responsible for energy production. The results suggest that cardiolipin abnormalities "can underlie the irreversible respiratory injury in tumors and link mitochondrial lipid defects to the Warburg theory of cancer," according to the co-authors.

These findings can provide insight into new cancer therapies that could exploit the bioenergetic defects of tumor cells without harming normal body cells.

Seyfried, Chuang and Kiebish were joined by co-authors Xianlin Han and Hua Cheng from the Washington University School of Medicine, Department of Internal Medicine, in St. Louis.

The paper, "Cardiolipin and Electron Transport Chain Abnormalities in Mouse Brain Tumor Mitochondria: Lipidomic Evidence Supporting the Warburg Theory of Cancer," can be viewed at: http://www.jlr.org/cgi/content/full/49/12/2545