

Health-care providers are prescribing nontraditional medicine

Study shows use of mind-body therapies is on the rise

BOSTON – More than a third of Americans use some form of complementary and alternative medicine (CAM) and that number continues to rise attributed mostly to increases in the use of mind-body therapies (MBT) like yoga, meditation and deep breathing exercises.

Prior research suggests that MBT, while used by millions of patients, is still on the fringe of mainstream medical care in America. New research suggests that attitudes are changing.

In a study from Beth Israel Deaconess Medical Center (BIDMC) and Harvard Medical School, researchers found that one in 30 Americans using MBT has been referred by a medical provider.

"There's good evidence to support using mind-body therapies clinically," said lead author Aditi Nerurkar, MD, Integrative Medicine Fellow, Harvard Medical School and BIDMC. "Still, we didn't expect to see provider referral rates that were quite so high."

The results of the study appear in the May 9 issue of the Archives of Internal Medicine.

Nerurkar and her colleagues collected information from more than 23,000 U.S. households from the 2007 National Health Interview Survey. They found that nearly 3 percent (representing more than 6.3 million Americans) used MBT due to provider referral and that these Americans were sicker and used the health care system more than people who self-referred for MBT.

"What we learned suggests that providers are referring their patients for mind-body therapies as a last resort once conventional therapeutic options have failed. It makes us wonder whether referring patients for these therapies earlier in the treatment process could lead to less use of the health care system, and possibly, better outcomes for these patients," said Nerurkar.

"These data suggest that mind-body therapies have really become a mainstream approach to care," adds Russell Phillips, MD, Chief of Primary Care at BIDMC and the senior author on the study. "But more research is needed to guide physician and patient decision-making regarding their use."

This research was supported by grants from the National Institutes of Health.

http://www.eurekalert.org/pub_releases/2011-05/aha-stu050511.php

Short term use of painkillers could be dangerous to heart patients

Even short-term use of some painkillers could be dangerous for people who've had a heart attack, according to research published in Circulation: Journal of the American Heart Association.

Researchers analyzed the duration of prescription non-steroidal anti-inflammatory drugs (NSAIDs) treatment and cardiovascular risk in a nationwide Danish cohort of patients with prior heart attack. They found the use of NSAIDs was associated with a 45 percent increased risk of death or recurrent heart attack within as little as one week of treatment, and a 55 percent increased risk if treatment extended to three months.

The study was limited by its observational nature and the lack of clinical parameters, researchers said. NSAIDs are commonly used by the general population and are associated with increased cardiovascular risk in people with heart disease or those at high risk.

In a 2007 statement, the American Heart Association advised physicians about the risks of NSAID use among heart patients and provided a stepped care approach. In addition, the statement advised extra caution for when NSAIDs might be used, noting that they should "be limited to patients for whom there are not appropriate alternatives, and then, only in the lowest dose and for the shortest duration necessary."

In the current study, researchers undertook the first time-to-event analysis of a nationwide group and investigated if the duration of prescription NSAID treatment influenced the cardiovascular risk among heart patients. Among 83,697 heart attack survivors (average age 68; 63 percent men), 42.3 percent had a least one prescription for an NSAID.

The most common NSAIDs prescribed were ibuprofen (23 percent) and diclofenac (13.4 percent). Selective COX-2 inhibitors - rofecoxib (4.7 percent) and celecoxib (4.8 percent) - were also used.

The non-selective NSAID diclofenac was associated with early onset risk similar to the selective COX-2 inhibitor rofecoxib.

All NSAIDs were associated with an increased risk of death or recurrent heart attack, with diclofenac having the highest risk (nearly three times). "Overall, NSAID treatment was associated with a statistically significant increased risk of death," said Anne-Marie Schjerning Olsen, M.B., lead author of the study and research fellow at Copenhagen University in Hellerup, Denmark. "Our results indicate that there is no apparent safe therapeutic window for NSAIDs in patients with prior heart attack."

The NSAID naproxen was not associated with an increased risk of death or recurrent heart attack. However, previous studies found increased gastrointestinal bleeding with naproxen.

Olsen said "a very conservative approach to use NSAIDs in patients with prior heart attack is warranted.

"If NSAID therapy is necessary for patients with known heart attack, the doctors should choose an NSAID less selective for COX-2 and a minimum for the shortest period."

Low-dose ibuprofen was the only available over-the-counter NSAID available in Denmark and was only dispensed in limited quantities (100 tablets at a time). So over-the-counter use of NSAIDs was unlikely to have had a major effect on the study results, researchers said. In some countries, diclofenac is available as an over-the-counter drug without warnings about potential side effects. Recently, the U.S. Food and Drug Administration issued a warning that diclofenac should not be used by patients recovering from heart surgery.

But "the accumulating evidence suggests that we must limit NSAID use to the absolute minimum in patients with established cardiovascular disease," researchers said. Further study is warranted to establish the cardiovascular safety of NSAIDs, they said.

"The American Heart Association applauds this research that adds to our knowledge about the adverse effects of NSAID use in patients with coronary artery disease," said Elliott Antman, M.D., lead author 2007 NSAIDs advisory. "The authors further confirm our prior practical advice that NSAID use should be avoided and if unavoidable should be used at the smallest doses for the shortest time possible. Naproxen has not been shown to have an increased cardiovascular risk and may be safer than other NSAIDs."

Antman is a professor of medicine at Brigham and Women's Hospital and Harvard Medical School in Boston.

Co-authors are: Emil L. Fosbøl, M.D., Ph.D.; Jesper Lindhardsen, M.D.; Fredrik Folke, M.D., Ph.D.; Mette Charlot, M.D.; Christian Selmer, M.D.; Morten Lamberts, M.D.; Jonas Bjerring Olesen, M.B.; Lars Køber, M.D., D.MSc.; Peter R. Hansen, M.D., Ph.D., D.MSc.; Christian Torp-Pedersen, M.D., D.MSc.; and Gunnar H. Gislason, M.D., Ph.D. Author disclosures are on the manuscript.

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1 in 7 strokes occurs during sleep, many go without clot-busting treatment

ST. PAUL, Minn. – Approximately 14 percent of all strokes occur during sleep, preventing many from getting clot-busting treatment, according to a study published in the May 10, 2011, print issue of *Neurology*®, the medical journal of the American Academy of Neurology.

"Because the only treatment for ischemic stroke must be given within a few hours after the first symptoms begin, people who wake up with stroke symptoms often can't receive the treatment since we can't determine when the symptoms started," said study author Jason Mackey, MD, of the University of Cincinnati and a member of the American Academy of Neurology. "Imaging studies are being conducted now to help us develop better methods to identify which people are most likely to benefit from the treatment, even if symptoms started during the night."

The study examined all cases of ischemic stroke in people age 18 and older seen in hospital emergency departments in the Greater Cincinnati/Northern Kentucky region over one year. The majority of strokes are ischemic strokes caused by blocked blood flow in the brain. Of the 1,854 ischemic strokes in the study, 273, or 14 percent, were "wake-up strokes," where the person woke up with stroke symptoms. By extrapolating that number to the general U.S. population, the researchers estimate that approximately 58,000 people in the United States go to the emergency department with a wake-up stroke in a year.

The researchers compared those with wake-up strokes to those who were awake when their stroke symptoms started. There were no differences between the two groups in terms of sex, whether they were married or were living with someone, and their stroke risk factors such as high blood pressure, diabetes, smoking or high cholesterol.

There were minor statistically significant differences in age and the severity of the stroke. People with wake-up strokes were an average of 72 years old, compared to 70 for non-wake-up strokes. Those with wake-up strokes had an average score of four on a test of stroke severity, compared to a three for those with non-wake-up strokes. Scores ranging from one to four indicate mild strokes.

The researchers also analyzed whether those with wake-up strokes would have been eligible for the clot-busting drug tissue plasminogen activator, or tPA, if the time of stroke onset had been available. Of the 273 wake-up strokes, at least 98 would have been eligible for treatment.

"This is a group of patients that should be a focus for future studies," Mackey said. "It's likely that some of these strokes occurred immediately prior to awakening, and people would benefit from treatment."

The American Academy of Neurology, an association of 24,000 neurologists and neuroscience professionals, is dedicated to promoting the highest quality patient-centered neurologic care.

A neurologist is a doctor with specialized training in diagnosing, treating and managing disorders of the brain and nervous system such as Alzheimer's disease, stroke, migraine, multiple sclerosis, brain injury, Parkinson's disease and epilepsy.

How to tell when someone's lying

UCLA psychologist helps law enforcement agencies tell truth from deception

When someone is acting suspiciously at an airport, subway station or other public space, how can law enforcement officers determine whether he's up to no good?

The ability to effectively detect deception is crucial to public safety, particularly in the wake of renewed threats against the U.S. following the killing of Osama bin Laden.

UCLA professor of psychology R. Edward Geiselman has been studying these questions for years and has taught investigative interviewing techniques to detectives and intelligence officers from the FBI, the Department of Homeland Security, the Marines, the Los Angeles police and sheriff's departments, and numerous international agencies.

He and three former UCLA undergraduates - Sandra Elmgren, Chris Green and Ida Rystad - analyzed some 60 studies on detecting deception and have conducted original research on the subject. They present their findings and their guidance for how to conduct effective training programs for detecting deception in the current (April) issue of the *American Journal of Forensic Psychiatry*, which is published this week.

Geiselman and his colleagues have identified several indicators that a person is being deceptive. The more reliable red flags that indicate deceit, Geiselman said, include:

- When questioned, deceptive people generally want to say as little as possible. Geiselman initially thought they would tell an elaborate story, but the vast majority give only the bare-bones. Studies with college students, as well as prisoners, show this. Geiselman's investigative interviewing techniques are designed to get people to talk.
- Although deceptive people do not say much, they tend to spontaneously give a justification for what little they are saying, without being prompted.
- They tend to repeat questions before answering them, perhaps to give themselves time to concoct an answer.
- They often monitor the listener's reaction to what they are saying. "They try to read you to see if you are buying their story," Geiselman said.
- They often initially slow down their speech because they have to create their story and monitor your reaction, and when they have it straight "will spew it out faster," Geiselman said. Truthful people are not bothered if they speak slowly, but deceptive people often think slowing their speech down may look suspicious. "Truthful people will not dramatically alter their speech rate within a single sentence," he said.
- They tend to use sentence fragments more frequently than truthful people; often, they will start an answer, back up and not complete the sentence.
- They are more likely to press their lips when asked a sensitive question and are more likely to play with their hair or engage in other "grooming" behaviors. Gesturing toward one's self with the hands tends to be a sign of deception; gesturing outwardly is not.
- Truthful people, if challenged about details, will often deny that they are lying and explain even more, while deceptive people generally will not provide more specifics.
- When asked a difficult question, truthful people will often look away because the question requires concentration, while dishonest people will look away only briefly, if at all, unless it is a question that should require intense concentration.

If dishonest people try to mask these normal reactions to lying, they would be even more obvious, Geiselman said. Among the techniques he teaches to enable detectives to tell the truth from lies are:

- Have people tell their story backwards, starting at the end and systematically working their way back. Instruct them to be as complete and detailed as they can. This technique, part of a "cognitive interview" Geiselman co-developed with Ronald Fisher, a former UCLA psychologist now at Florida International University, "increases the cognitive load to push them over the edge." A deceptive person, even a "professional liar," is "under a heavy cognitive load" as he tries to stick to his story while monitoring your reaction.
- Ask open-ended questions to get them to provide as many details and as much complete information as possible ("Can you tell me more about...?" "Tell me exactly..."). First ask general questions, and only then get more specific.
- Don't interrupt, let them talk and use silent pauses to encourage them to talk.

If someone in an airport or other public space is behaving suspiciously and when approached exhibits a majority of the more reliable red flags, Geiselman recommends pulling him or her aside for more questioning. If there are only one or two red flags, he would probably let them go.

Geiselman tested techniques for telling the truth from deception with hundreds of UCLA students, and the studies he and his co-authors analyzed involved thousands of people.

Detecting deception is difficult, Geiselman said, but training programs can be effective. Programs must be extensive, with an education phase followed by numerous video examples, and a phase in which those being trained judge video clips and simulate real-world interviewing. Training should be conducted on multiple days over a period of a week or two.

"People can learn to perform better at detecting deception," Geiselman said. "However, police departments usually do not provide more than a day of training for their detectives, if that, and the available research shows that you can't improve much in just a day."

When Geiselman conducted training with Marine intelligence officers, he found that they were impressively accurate in detecting deception even before the training began. In contrast, the average college student is only 53 percent accurate without training, and with abbreviated training, "we often make them worse," he said.

"Without training, many people think they can detect deception, but their perceptions are unrelated to their actual ability. Quick, inadequate training sessions lead people to over-analyze and to do worse than if they go with their gut reactions."

Geiselman is currently developing a training program that he hopes will effectively compress the learning curve and thus will serve to replicate years of experience.

The cognitive interview that Geiselman and Fisher developed works well with both criminal suspects and eyewitnesses of crimes. Geiselman thinks these techniques are likely to work in non-crime settings as well, but said additional research should be done in this area. In the next year, Geiselman plans to teach police detectives techniques for investigative interviewing and spotting deception through the U.S. Department of Homeland Security's Rural Policing Institute for underserved police departments. He says this will be a perfect fit for him because he comes from Culver, Ind., a small town that has fewer residents than UCLA has psychology majors.

Later this month, Geiselman will travel to Hong Kong to provide training in investigative interviewing to the Independent Commission Against Corruption.

An instructional course Geiselman taught on investigative interviewing before the second Iraq war resulted in cognitive interviewing techniques that were used to interdict some insurgent activity in Iraq, perhaps saving many lives, he was later informed.

Geiselman also has worked with the Los Angeles County Sheriff's Department on effective techniques for interviewing children who may have been molested and has interviewed crime victims for police departments around the country in murder cases gone cold. His research has been funded by the U.S. Department of Justice and the U.S. Department of Homeland Security.

http://www.eurekalert.org/pub_releases/2011-05/jhmi-jhs050911.php

Johns Hopkins scientists reveal nerve cells' navigation system *Work in flies and mice has implications for regeneration therapies*

Johns Hopkins scientists have discovered how two closely related proteins guide projections from nerve cells with exquisite accuracy, alternately attracting and repelling these axons as they navigate the most minuscule and frenetic niches of the nervous system to make remarkably precise connections.

The discovery, reported April 28 in the journal *Neuron*, reveals that proteins belonging to the "semaphorin" family of guidance cues are crucial for getting neuronal projections exactly where they need to be not only across long distances, but also in the short-range wiring of tiny areas fraught with complex circuitry, such as the central nervous system of the fruit fly.

Because signaling that affects the growth and steering of neuronal processes is critical for repairing and regenerating damaged or diseased nerve cells, this research suggests that a more refined understanding of how semaphorin proteins work could contribute to treatment strategies, according to Alex Kolodkin, Ph.D., a professor in the neuroscience department at Johns Hopkins and a Howard Hughes Medical Institute investigator.

Using embryonic flies, some native (normal) and others genetically altered to lack a member of the semaphorin gene family or the receptor that binds to the semaphorin and signals within the responding neuron, the team labeled particular classes of neurons and then observed them at high resolution using various microscopy strategies to compare their axon projections.

In the native developing flies, the team saw how certain related semaphorins, proteins that nerve cells secrete into the intracellular space, work through binding their plexin receptor. First, a semaphorin-plexin pair attracts a

certain class of extending neurons in the embryonic fly central nervous system assemble a specific set of target projections. Then, a related semaphorin that binds to that same plexin receptor repels these same neurons so as to position them correctly within the central nervous system. Finally, the attractive semaphorin/plexin interaction assures the establishment of precise connections between these central nervous system axons and sensory neurons that convey messages about the external environment by extending their axons into the CNS from the periphery and contacting the assembled CNS pathways. Flies lacking this semaphorin/plexin signaling showed defects in these connections, which the researchers were able to reverse when these cues and receptors were re-introduced into flies lacking them.

To investigate whether the absence of semaphorin in flies had behavioral consequences, the team collaborated with investigators at Janelia Farm laboratories of the Howard Hughes Medical Institute and used specialized computer software to follow the movements of hundreds of fly larvae crawling on a small dish. The plate was perched on a large speaker that vibrated with pulses of sound, letting the team compare the movements of normal larvae to mutants missing semaphorin.

The "tracking" software measures differences in normal foraging behavior (mostly crawling straight and occasionally making turns) when a sound is activated. The larvae with intact semaphorin/plexin responded to sound stimulation by stopping, contracting and turning their heads from side to side. The semaphorin mutants failed to respond to the same stimuli. The researchers repeated the experiment using mutant larvae missing the protein to which semaphorin binds – its plexin receptor—and these larvae also showed no reaction to sound-vibration.

"The fly larvae sensory neurons, located on the larval body wall, send axon projections that do not make contact with their appropriate targets in the central nervous system when semaphorin/plexin signaling is absent," Kolodkin says. "This tells us that semaphorin cues guide not only neuronal processes assembly in the central nervous system, but also incoming projections from sensory neurons to the CNS targets."

The Kolodkin lab's experiments in the invertebrate fruit fly central nervous system mirror related findings in the mouse reported Feb. 10, 2011 in *Nature*. Then, they showed that a different semaphorin cue is important for certain neurons to make precise connections within the developing inner plexiform layer of the retina, an elaborately laminated club-sandwich-like structure that must be precisely wired for accurate visual perception in mammals.

To demonstrate that semaphorins are necessary for neuronal projections from distinct classes of neurons to make their way to correct layers in this retinal "sandwich," the scientists examined the retinas of 3-, 7- and 10-day-old mice that were genetically modified to lack either a member of the semaphorin gene family or its appropriate plexin receptor. These mutants showed severe connectivity defects in one specific inner plexiform layer, revealing faulty neuronal targeting.

"In two distinct neural systems in flies and mammals, the same family of molecular guidance cues – semaphorins and their receptors – mediate targeting events that require exquisite short-range precision to generate complex neuronal connectivity," says Kolodkin who, as a postdoctoral fellow in the mid-1990s, first discovered the large family of semaphorin guidance cues working with the grasshopper nervous system.

"This work begins to tell us how, in a very small but highly ordered region of the nervous system, select target innervation and specific synaptic contacts between different classes of neurons can be established in the context of evolving circuit complexity" Kolodkin says.

The fly research appearing in Neuron was supported by the National Institutes of Health and the Howard Hughes Medical Institute. The mouse retina research appearing in Nature was supported by the National Institutes of Health and the Howard Hughes Medical Institute.

Authors of the fly nervous system study published in Neuron, in addition to Kolodkin, are, Zhuhao Wu, Joseph C. Ayoob, Kayam Chak, and Benjamin J. Andreone, all of Johns Hopkins; Lora B. Sweeney and Liqun Luo, both of Stanford University; and Rex Kerr and Marta Zlatic, both of Janelia Farm Research Campus.

Authors of the mammalian retina study published in Nature, in addition to Kolodkin, are Ryota L. Matsuoka and Tudor C. Badea, both of Johns Hopkins; and Kim T. Nguyen-Ba-Charvet, Aijaz Parray, and Alain Chévalier, all of the Institut de la Vision, Paris.

http://www.eurekalert.org/pub_releases/2011-05/uog-hmb050611.php

Heart medication best at bedtime, study reveals

When doctors give heart drugs to patients, the time of day can make a big difference, according to new research by University of Guelph scientists.

Many doctors prefer to give heart drugs to patients in the morning. But the study revealed that angiotensin-converting enzyme (ACE) inhibitors – commonly given to patients with high blood pressure or after a heart attack or during heart failure – improve heart structure and function when given at sleep time. In fact, when administered during wake time, ACE inhibitors are no more effective than a placebo, the study found.

The research was conducted on mice with high blood pressure. Guelph professors Tami Martino, Department of Biomedical Sciences, Jeremy Simpson, Department of Human Health and Nutritional Sciences and Nazneen Tata conducted the study in the laboratory of Dr. Michael Sole at the Peter Munk Cardiac Centre and the Heart and Stroke Richard Lewar Centre of Excellence in Toronto.

The study will appear May 17 in the Journal of the American College of Cardiology.

"Heart drugs are often given to patients in the morning for convenience without considering biological rhythms or time-related risks of adverse effects," said Martino. "But if they're given at bedtime, it's better."

That is because the drug affects a natural hormone involved in heart remodeling. Hormone levels increase at night and cause the heart to enlarge, which damages the organ in cardiac patients, said Martino.

"The sleep-time benefit of giving the ACE inhibitor correlates with the biological rhythm of this hormone," she said. "By targeting those hormones when they're highest during sleep, you're dropping their levels so they're not doing so much damage."

It's known that heart attacks and sudden cardiac death peak in early morning and night-shift workers with disturbed circadian rhythms have higher risk of heart disease and worse outcomes, said Sole, who is a cardiologist at the Toronto General Hospital. "Earlier studies our group has worked on suggest that the heart repairs and renews itself during sleeping hours," he added.

These findings led the researchers to explore whether the effectiveness of ACE inhibitors is impacted by the time of day it's administered. The team used a short-acting version of the drug and studied the effects during wake and sleep time in a mouse model designed with high blood pressure.

Besides administering the drug to patients before bed, study results also suggest doctors should consider using a short-acting version of the drug, said Martino.

"Since the drug is most effective during sleep hours, it's not necessary to have its effects last throughout the span of an entire day. Using a short-acting version of the drug may help to reduce side effects."

Other researchers have also looked at using biological rhythms for drug treatment of other diseases, such as insulin release in diabetes and chemotherapy for cancer patients, she added. "We are now starting to learn that biological and physiological rhythms play an important role in health and disease."

http://www.eurekalert.org/pub_releases/2011-05/vu-vbd050611.php

Vanderbilt biologists discover a new class of insect repellent

NASHVILLE, Tenn. – *Imagine an insect repellent that not only is thousands of times more effective than DEET – the active ingredient in most commercial mosquito repellents – but also works against all types of insects, including flies, moths and ants.*

That possibility has been created by the discovery of a new class of insect repellent made in the laboratory of Vanderbilt Professor of Biological Sciences and Pharmacology Laurence Zwiebel and reported this week in the online Early Edition of the Proceedings of the National Academy of Sciences.

"It wasn't something we set out to find," said David Rinker, a graduate student who performed the study in collaboration with graduate student Gregory Pask and post-doctoral fellow Patrick Jones. "It was an anomaly that we noticed in our tests."

The tests were conducted as part of a major interdisciplinary research project to develop new ways to control the spread of malaria by disrupting a mosquito's sense of smell supported by the Grand Challenges in Global Health Initiative funded by the Foundation for the NIH through a grant from the Bill & Melinda Gates Foundation.

"It's too soon to determine whether this specific compound can act as the basis of a commercial product," Zwiebel cautioned. "But it is the first of its kind and, as such, can be used to develop other similar compounds that have characteristics appropriate for commercialization."

The discovery of this new class of repellent is based on insights that scientists have gained about the basic nature of the insect's sense of smell in the last few years. Although the mosquito's olfactory system is housed in its antennae, 10 years ago biologists thought that it worked in the same way at the molecular level as it does in mammals. A family of special proteins called odorant receptors, or ORs, sits on the surface of nerve cells in the nose of mammals and in the antennae of mosquitoes. When these receptors come into contact with smelly molecules, they trigger the nerves signaling the detection of specific odors.

In the last few years, however, scientists have been surprised to learn that the olfactory system of mosquitoes and other insects is fundamentally different. In the insect system, conventional ORs do not act autonomously. Instead, they form a complex with a unique co-receptor (called Orco) that is also required to detect odorant molecules. ORs are spread all over the antennae and each responds to a different odor. To function, however, each OR must be connected to an Orco.

"Think of an OR as a microphone that can detect a single frequency," Zwiebel said. "On her antenna the mosquito has dozens of types of these microphones, each tuned to a specific frequency. Orco acts as the switch in each microphone that tells the brain when there is a signal. When a mosquito smells an odor, the microphone tuned to that smell will turn "on" its Orco switch. The other microphones remain off. However, by stimulating Orco directly we can turn them all on at once. This would effectively overload the mosquito's sense of smell and shut down her ability to find blood."

Because the researchers couldn't predict what chemicals might modulate OR-Orco complexes, they decided to "throw the kitchen sink" at the problem. Through their affiliation with Vanderbilt's Institute of Chemical Biology, they gained access to Vanderbilt's high throughput screening facility, a technology intended for the drug discovery process, not for the screening of insect ORs.

Jones used genetic engineering techniques to insert mosquito odorant receptors into the human embryonic kidney cells used in the screening process. Rinker tested these cells against a commercial library of 118,000 small molecules normally used in drug development. They expected to find, and did find, a number of compounds that triggered a response in the conventional mosquito ORs they were screening, but they were surprised to find one compound that consistently triggered OR-Orco complexes, leading them to conclude that they had discovered the first molecule that directly stimulates the Orco co-receptor. They have named the compound VUAA1.

Although it is not an odorant molecule, the researchers determined that VUAA1 activates insect OR-Orco complexes in a manner similar to a typical odorant molecule. Jones also verified that mosquitoes respond to exposure to VUAA1, a crucial step in demonstrating that VUAA1 can affect a mosquito's behavior.

"If a compound like VUAA1 can activate every mosquito OR at once, then it could overwhelm the insect's sense of smell, creating a repellent effect akin to stepping onto an elevator with someone wearing too much perfume, except this would be far worse for the mosquito," Jones said.

The researchers have just begun behavioral studies with the compound. In preliminary tests with mosquitoes, they have found that VUAA1 is thousands of times more effective than DEET.

They have also established that the compound stimulates the OR-Orco complexes of flies, moths and ants. As a result, "VUAA1 opens the door for the development of an entirely new class of agents, which could be used not only to disrupt disease vectors, but also the nuisance insects in your backyard or the agricultural pests in your crops," Jones said.

Many questions must be answered before VUAA1 can be considered for commercial applications. Zwiebel's team is currently working with researchers in Vanderbilt's Drug Discovery Program to pare away the parts of VUAA1 that don't contribute to its activity. Once that is done, they will begin testing its toxicity.

Vanderbilt University has filed for a patent on this class of compounds and is talking with potential corporate licensees interested in incorporating them into commercial products, with special focus on development of products to reduce the spread of malaria in the developing world.

<http://www.physorg.com/news/2011-05-gliese-581d-habitability.html>

Update on Gliese 581d's habitability

When last we checked in on Gliese 581d, a team from the University of Paris had suggested that the popular exoplanet, Gliese 581d may be habitable.

This super-Earth found itself just on the edge of the Goldilocks zone which could make liquid water present on the surface under the right atmospheric conditions. However, the team's work was based on one dimensional simulations of a column of hypothetical atmospheres on the day side of the planet. To have a better understanding of what Gliese 581d might be like, a three dimensional simulation was in order. Fortunately, a new study from the same team has investigated the possibility with just such an investigation.

The new investigation was called for because Gliese 581d is suspected to be tidally locked, much like Mercury is in our own solar system. If so, this would create a permanent night side on the planet. On this side, the temperatures would be significantly lower and gasses such as CO₂ and H₂O may find themselves in a region where they could no longer remain gaseous, freezing into ice crystals on the surface. Since that surface would never see the light of day, they could not be heated and released back into the atmosphere, thereby depleting the planet of greenhouse gasses necessary to warm the planet, causing what astronomers call an "atmospheric collapse."

To conduct their simulation the team assumed that the climate was dominated by the greenhouse effects of CO₂ and H₂O since this is true for all rocky planets with significant atmospheres in our solar system. As with their previous study, they performed several iterations, each with varying atmospheric pressures and compositions. For atmospheres less than 10 bars, the simulations suggested that the atmosphere would collapse, either on the dark side of the planet, or near the poles. Past this, the effects of greenhouse gasses prevented the

freezing of the atmosphere and it became stable. Some ice formation still occurred in the stable models where some of the CO₂ would freeze in the upper atmosphere, forming clouds in much the same way it does on Mars. However, this had a net warming effect of ~12°C.

In other simulations, the team added in oceans of liquid water which would help to moderate the climate. Another effect of this was that the vaporization of water from these oceans also produced warming as it can serve as a greenhouse gas, but the formation of clouds could decrease the global temperature since water clouds increase the albedo of the planet, especially in the red region of the spectra which is the most prevalent form of light from the parent star, a red dwarf. However, as with models without oceans, the tipping point for stable atmospheres tended to be around 10 bars of pressure. Under that, "cooling effects dominated and runaway glaciation occurred, followed by atmospheric collapse." Above 20 bars, the additional trapping of heat from the water vapor significantly increased temperatures compared to an entirely rocky planet.

The conclusion is that Gliese 581d is potentially habitable. The potential for surface water exists for a "wide range of plausible cases". Ultimately, they all depend on the precise thickness and composition of any atmosphere. Since the planet does not transit the star, spectral analysis through transmission of starlight through the atmosphere will not be possible. Yet the team suggests that, since the Gliese 581 system is relatively close to Earth (only 20 lightyears), it may be possible to observe the spectra directly in the infrared portion of the spectra using future generations of instruments. Should the observations match the synthetic spectra predicted for the various habitable planets, this would be taken as strong evidence for the habitability of the planet.

Source: *Universe Today*

<http://www.physorg.com/news/2011-05-skinny-skin-indoor-air-pollution.html>

The skinny on how shed skin reduces indoor air pollution

Flakes of skin that people shed at the rate of 500 million cells every day are not just a nuisance - the source of dandruff, for instance, and a major contributor to house dust. They actually can be beneficial.

A new study, published in the American Chemical Society's journal, *Environmental Science & Technology*, concludes that oil in those skin cells makes a small contribution to reducing indoor air pollution.

Charles Weschler and colleagues explain that humans shed their entire outer layer of skin every 2-4 weeks at the rate of 0.001 – 0.003 ounces of skin flakes every hour. Those flakes contain skin oils, including cholesterol and "squalene," and are a major constituent of the dust that accumulates on tables and other surfaces in homes and offices. Past research suggested that squalene from passengers' skin had a role in reducing levels of ozone - a pollutant that can irritate the eyes, nose and throat and worsen asthma symptoms - from the air in airplane cabins.

"It is only within the last five years that we've grown to appreciate the central role that squalene (from human skin oil) plays in oxidation chemistry within indoor environments," the report notes. "More than half of the ozone removal measured in a simulated aircraft cabin was found to be a consequence of ozone reacting with exposed, skin, hair, and clothing of passengers."

In the new study, the scientists set out to make the first extensive determinations of cholesterol and squalene in dust in homes and daycare centers and to figure out how these substances affect indoor air pollution. The scientists analyzed dust samples collected from 500 bedrooms of children aged 3-5 and the 151 daycare centers the children attended in the city of Odense, Denmark and its surroundings as part of the Danish Indoor Environment and Children's Health Study.

Among their findings: "Squalene in settled dust ... contributes, in a small way, to the indoor removal of ozone," reducing indoor ozone levels roughly 2 to 15 percent.

Provided by *American Chemical Society*

<http://www.physorg.com/news/2011-05-full-transplant-recipient-publicly.html>

Full face transplant patient makes 1st appearance

(AP) -- *The nation's first full face transplant recipient said the first thing his young daughter told him when she saw him after the operation was "Daddy, you're so handsome."*

Dallas Wiens, sporting a goatee and dark sunglasses, joined surgeons Monday at Brigham and Women's Hospital in Boston in his first public appearance since the 15-hour procedure in March.

"It feels natural," said the 25-year-old Fort Worth, Texas, man, who received a new nose, lips, skin, muscle and nerves from an anonymous donor. The operation was paid for by the U.S. military, which hopes to use findings from the procedure to help soldiers with severe facial wounds.

Wiens' features were all but burned away and he was left blind after hitting a power line while painting a church in November 2008.

On Monday, Wiens appeared before a packed room of reporters and photographers with a new, somewhat swollen face and a new head of hair. "I adapted to it very quickly," Wiens told reporters. "As time went on ... I was able to smell again and breathe through my nose. Every step of the way was amazing."

The first thing Wiens' nose was able to detect after months of having no smell? Hospital lasagna.

"You wouldn't imagine it, but it smelled delicious," Wiens said.

Surgeons said the transplant was not able to restore his sight, and some nerves were so badly damaged from his injury that he will probably have only partial sensation on his left cheek and the left side of his forehead.



In this Oct. 13, 2010 file photo, Dallas Wiens, 25, describes his injuries during an interview in Fort Worth, Texas. Wiens was critically burned in a 2008 high-voltage power line accident and received a full face transplant at Brigham and Women's Hospital in Boston, during the week of March 14, 2011. Wiens made his first public appearance in Boston Monday, May 9, 2011, since his operation. (AP Photo/LM Otero, File)

Plastic surgeon Bohdan Pomahac, who performed the operation on Wiens, said the transplant's results were better than he expected.

"The most fun part is to see the next six to nine months when the function will start to come back and when Dallas will start to feel a light touch on his face," Pomahac said. "To me, that's really exciting."

In an Associated Press story and a YouTube video last fall, Wiens spoke poignantly about why he wanted a transplant and how he wanted to smile again and feel kisses from his 4-year-old daughter, Scarlett. Face transplants give horribly disfigured people hope of an option other than "looking in the mirror and hating what they see," he said.



He told the AP that his daughter and his faith have kept him motivated. He repeated that Monday. "Even though I'm in amazing hands here," Wiens said, "I'm also in God's hands."

The surgery was paid for by the Department of Defense, which gave the hospital a \$3.4 million research grant for five transplants.

About a dozen face transplants have been done worldwide, in the U.S., France, Spain and China.

<http://medicalxpress.com/news/2011-05-oncolytic-viruses-effectively-pancreatic-cancer.html>

Oncolytic viruses effectively target and kill pancreatic cancer stem cells

Oncolytic viruses quickly infect and kill cancer stem cells, which may provide a treatment for tumors that are resistant to conventional chemotherapy and radiation, particularly pancreatic cancer, according to new research from Memorial Sloan-Kettering Cancer Center in New York.

The findings are especially important since pancreatic cancer has a poor prognosis and is difficult to detect and treat at early stages.

Investigators led by Joyce Wong, MD, surgical researcher with Memorial Sloan-Kettering Cancer Center, investigated whether they could use oncolytic viruses, which are naturally occurring viruses that have been genetically engineered to be safe and express tracking genes, as a possible therapy against pancreatic cancer stem cells. These stem cells are thought to cause disease recurrence and metastasis, even after therapy, and oncolytic viruses may offer a new treatment strategy.

"What we learned is that oncolytic viruses have been engineered to selectively target cancer cells and have a low toxicity profile in animal studies," said Dr. Wong. "Targeting the cancer stem cell may enhance our ability to eradicate tumors and prevent future recurrence of disease."

While much research has been performed on isolating the cancer stem cell from various hematologic cancers, this research was based on the presence or absence of certain cell surface markers. Numerous mechanisms of how these cancer stem cells resist chemotherapy and radiation have also been examined. But to date, there have not been any studies evaluating whether genetically engineered viruses can target and kill pancreatic cancer stem cells.

Investigators sought to determine whether the viruses containing a marker gene that expresses green fluorescent protein could infect pancreatic cancer stem cells and ultimately kill the cancer stem cell. Their findings were promising and documented that viral activity was correlated with green fluorescent protein expression.

Dr. Wong added that future studies are warranted to determine whether oncolytic virus administration in vivo will help eradicate tumors and prevent future disease recurrence, and that while these initial findings are encouraging, further study is necessary to see whether oncolytic viruses will be clinically useful as a therapy.

<http://www.nytimes.com/2011/05/10/health/10global.html>

Infant Deaths Drop After Midwives Undergo Inexpensive Training

By DONALD G. McNEIL Jr.

Giving midwives simple training has already been shown to save newborns' lives, and a new study in Zambia has found that it can be remarkably cost-effective as well.

Even a small pilot project costing only \$20,244 saved the lives of 97 infants, the authors estimated, meaning that it cost just \$208 per life saved.

The study, published online in April in the journal *Pediatrics*, was paid for by the National Institutes of Health and the Bill and Melinda Gates Foundation, and conducted by American and Zambian university and government doctors.

Midwives from 18 Zambian clinics were taught a basic course in newborn care and encouraged to teach their colleagues as well. The course covers simple interventions like cleaning and warming a newborn, resuscitation, breast-feeding and diagnosing common illnesses. (Above, a birth attendant listened for a baby's heartbeat with a clay stethoscope.)

The midwives normally handled births that were expected to be uncomplicated, with women typically going home with their babies after one night in the clinic.

The researchers compared survival rates among 20,000 babies born before the teaching and 20,000 afterward. The first-week death rate among babies had dropped by almost half, they found, to 6.8 deaths per 1,000 live births from 11.5 deaths.

Past studies have suggested that the single most important aspect of training, in terms of saving lives, is to teach midwives that an infant who is not breathing at birth can be revived with quick action - by massaging to prompt it to inhale, or using a simple resuscitator.

http://www.eurekalert.org/pub_releases/2011-05/bu-spo051011.php

Study: Pace of brain development still strong in late teens

PROVIDENCE, R.I. [Brown University] - *Boys and girls have put many of the trappings of teenagerhood behind them by the age of 18 or 19, but at least some of the brain resculpting that characterizes the decade of adolescence may still be going as strong as ever, according to findings in a new study that measured brainwaves of subjects in their midteens and again in their late teens.*

One of the kinds of neurological changes underway in a teen brain is a pruning of unneeded connections forged earlier in life - the brain invests in developing some connections but sheds a higher volume of others. One way these changes can be measured, many researchers believe, is a drop in the power, or amplitude, of brainwaves over time.

What researchers found in their study of sleeping teens, said Mary Carskadon, professor of psychiatry and human behavior at the Warren Alpert Medical School of Brown University and director of the Sleep Research Center at Emma Pendleton Bradley Hospital, is that this amplitude reduction continues at about the same pace in the late teen years as in earlier years.

"There was a sense that the bulk of the change is happening in the younger adolescents," said Carskadon, the paper's senior author. "To see a continuation of this rapid and large change in the older adolescents was a surprise." Their results appear in advance online in the journal *Sleep*.

Numbers from slumber

To conduct the study, the researchers asked five boys and nine girls aged 15 and 16 to sleep to certain preparatory specifications for a week at home and then to spend two nights in the lab while the team took all-night measurements. Then they brought the teens back two or three years later, between the ages of 17 and 19, for another week of preparatory sleep and then two more nights of monitored sleep. Previously, researchers in Carskadon's lab had done a similar study with younger teens.

Over the course of the study, the researchers also noted some other changes in the children over time. For example, they found that late teens continue an earlier teen trend of spending less and less time in so-called "slow-wave" sleep in favor of "stage 2" sleep. Meanwhile, they found that the reduction in electroencephalography (EEG) power seems to shift from the left side early in the teen years to the right side later in adolescence. That shift means that by the end of the teen years, the developmental process has occurred equally on both sides.

Lead author Leila Tarokh, a researcher at the University of Zurich and adjunct assistant professor of psychiatry and human behavior at Brown, said that although many previous studies using EEG, magnetic resonance imaging, or postmortem examination have yielded similar measurements of adolescent brain

changes, this study added insight because of how it was structured. "The unique feature of this study is that it puts together these EEG measures of power and looks at these sleep stages longitudinally (in the same people over time) and across several regions around the brain," she said.

Carskadon said that sleep is a convenient time to take long-term, well controlled measurements of neural activity, but that the study does not show the role sleep may play in neural renovation among older teenagers.

"For us, sleep is a window onto the brain," Carskadon said.

In addition to Carskadon and Tarokh, other Brown and Bradley Hospital researchers include Eliza Van Reen, Ronald Seifer, and Monique LeBourgeois, who also is affiliated with the University of Colorado–Boulder.

The National Institute on Alcohol Abuse and Alcoholism funded the research.

http://www.eurekalert.org/pub_releases/2011-05/bc-crb050911.php

Coffee reduces breast cancer risk

Recently published research shows that coffee drinkers enjoy not only the taste of their coffee but also a reduced risk of cancer with their cuppa.

More detailed research published today in BioMed Central's open access journal Breast Cancer Research shows that drinking coffee specifically reduces the risk of antiestrogen-resistant estrogen-receptor (ER)-negative breast cancer.

Researchers from Sweden compared lifestyle factors and coffee consumption between women with breast cancer and age-matched women without. They found that coffee drinkers had a lower incidence of breast cancer than women who rarely drank coffee. However they also found that several lifestyle factors affected breast cancer rates, such as age at menopause, exercise, weight, education, and a family history of breast cancer. Once they had adjusted their data to account for these other factors they found that the protective effect of coffee on breast cancer was only measurable for ER-negative breast cancer.

The group from Karolinska Institutet explained that, "There is often conflicting information about the beneficial effects of coffee – when we compared our results to that of a German study we discovered that their data showed the same trend, but the relationship was much weaker. We suggest that this may have something to do with the way the coffee was prepared, or the type of bean preferred. It is unlikely that the protective effect is due to phytoestrogens present in coffee since there was no reduction in the incidence of ER-positive cancer in this study."

So while it is evident that coffee may have beneficial effects in protecting women from ER negative breast cancer the exact mechanism and compounds involved are not yet clear and not all types of coffee are the same.

Notes to Editors 1. Coffee consumption modifies risk of estrogen-receptor negative breast cancer

Jingmei Li, Petra Seibold, Jenny Chang-Claude, Dieter Flesch-Janys, Jianjun Liu, Kamila Czene, Keith Humphreys and Per Hall Breast Cancer Research (in press)

http://www.eurekalert.org/pub_releases/2011-05/uou-tiw050311.php

Twinning is winning: Moms of twins live longer

It's not that double birth is healthy, but healthier women do it

SALT LAKE CITY - Compared with other mothers, women who deliver twins live longer, have more children than expected, bear babies at shorter intervals over a longer time, and are older at their last birth, according to a University of Utah study.

The findings do not mean having twins is healthy for women, but instead that healthier women have an increased chance of delivering twins, says demographer Ken. R. Smith, senior author of the study and a professor of family and consumer studies.

"Having twins will not make you stronger or healthier, but stronger, healthier women are more likely to have twins naturally," says Shannen Robson, the study's first author and a recent Ph.D. graduate in anthropology at the University of Utah.

Smith adds: "The prevailing view is that the burden of childbearing on women is heavier when bearing twins. But we found the opposite: women who naturally bear twins in fact live longer and are actually more fertile."

The study, funded by the National Institute on Aging, was scheduled for online publication Wednesday, May 11 in the journal Proceedings of the Royal Society B.

The research was based on data for 58,786 non-polygamous Utah women who were born between 1807 and 1899, lived to age 50 and married once after 1850 to husbands who were alive when their wives were 50. Of those, 4,603 were the mothers of twins and 54,183 gave birth only to one baby at a time.

The records came from the Utah Population Database, which is among the world's most comprehensive computerized genealogies and includes vital records of largely Mormon migrants to Utah and their Utah descendants. The database includes information on 6.4 million people from the early 1800s to present.

The sample of 4,603 mothers of twins is "the largest historic natural fertility data set of twin mothers yet published, at least 18 times larger than any previously analyzed historical sample," Robson says.

The Implications of Twinning as an Indicator of Health

"People are always interested in what affects how long we are going to live," says Smith, who directs the University of Utah's Pedigree and Population Resource, which maintains and manages the Utah Population Database. "It's complicated. There are so many factors that contribute to longevity, health and aging."

"This study has been able to identify – and it's a fairly novel result – another important factor that contributes to health and longevity in later years, namely, that women bearing twins appear to be healthier," Smith says. "That innate healthiness is contributing to their ability to have twins, and it is also contributing to their longevity."

However, he emphasizes that the study looked at women who lived past menopause, not those who died earlier, perhaps in childbirth. "We do know women who have twins, triplets and so on do have medical complications and their health is sometimes compromised," Smith says. "But we are talking about the long view."

"Women having children are fundamentally young and healthy," he adds. "So the risk of dying in childbirth is quite low. The women who have twins have a somewhat elevated risk of mortality over those [child-bearing] years, but the vast majority of those women reach age 50, and we're able to observe that they have healthier lives."

While twinning sometime runs in families, previous studies have shown environmental factors are more important – factors such as greater health in the mother or childbearing at later ages, which are more likely to produce twins.

Smith says that many people today correctly "do things to make themselves have healthier, longer lives. But there's a certain aspect of how long you're going to live and how healthy you're going to be that is innate – basically affected by your biological makeup." The study's twin moms "didn't choose to have this capacity. They just did."

The study was designed to look at the effects of natural births of twins, thus the study population lived before birth control and treatments for infertility were available.

"We're saying that women who twin naturally have something that makes them healthier," says Smith. "We are able to see that in these ancestral women because they had many children and had no fertility treatments. They have left a legacy through their descendants who may all share this desirable trait of being healthier."

For women today "who have access to infertility treatment and who have twins – which isn't uncommon – we simply don't know how that will affect their health," he adds. "We're not encouraging women to actively seek having twins so they can live longer. It's not a conclusion we can draw."

The Findings

The study also distinguished women who were born between 1870 and 1899 from those born before 1870, when the start of modern urbanization in Utah eased pressures for farm wives to start bearing children at a young age to help with chores. Twin moms were more physically fit in both groups than singleton-only moms.

The researchers didn't study triplets or other multiple births because there were too few to analyze, even in such a large population sample. The study didn't distinguish fraternal from identical twins because the database didn't either. Identical twins are rare.

The researchers also adjusted the data to statistically control for various factors, including the fact twinning increases at older maternal ages and religious affiliation, since Mormons in Utah historically have more children than non-Mormons. They found that compared with mothers of singleton births:

Mothers of twins lived longer after menopause. For women born before 1870, their annual risk of dying after age 50 was a statistically significant 7.6 percent lower than for moms of singletons. For twinning women born between 1870 and 1899, the annual risk of dying after age 50 was 3.3 percent lower than for moms who didn't have twins, but wasn't statistically significant.

A woman's innate robustness – the factor that made twins more likely – was more important before 1870 during pioneer times. "When you're a tougher woman, that toughness is more readily apparent when you are tested by adversity," Smith says.

Women who delivered twins had more children than expected due to simply the birth of twins. Mothers in the pre-1870 group averaged 8.39 children while women in the 1870-1899 group averaged 5.72 kids. Mothers of twins averaged 1.9 and 2.3 more children, respectively, than average after controlling for various factors.

"By having twins, you are having one more child by definition, but they exceed the definition and thus had more single births as well," even after controlling for twin moms who had more single births to replace twins who died, Robson says.

Mothers of twins went a shorter time between births. For all moms in the study, the average interval between births was 2.62 years for women born before 1870 and 3.24 years for women born 1870-1899. For both groups, moms of twins averaged two weeks less between births – a time that seems short but is nonetheless important. "Shorter birth interval is an indication of the physical health of the mother," Smith said.

The reproductive span – age at last birth minus age at first birth – was longer for mothers of twins, even when controlling for age of marriage. For women born before 1870, moms of twins had average reproductive spans of 18 years and four months versus 18 years for singleton-only moms. For women born 1870-1899, moms of twins averaged reproductive spans of 14 years 11 months versus 14 years for singleton moms. Both results were statistically significant.

Moms of twins also were older at the time of their last birth. The age at last birth averaged 39.7 years for women born before 1870, and 36.2 years for women born during 1870-1899. Moms of twins had their last births 4.8 months later and 14 months later, respectively.

http://www.eurekalert.org/pub_releases/2011-05/apa-gaw051011.php

Getting along with co-workers may prolong life, researchers find But support from the boss has no effect on mortality

WASHINGTON -- People who have a good peer support system at work may live longer than people who don't have such a support system, according research published by the American Psychological Association.

This effect of peer social support on the risk of mortality was most pronounced among those between the ages of 38 and 43. Yet similar support from workers' supervisors had no effect on mortality, the researchers found.

In addition, men who felt like they had control and decision authority at work also experienced this "protective effect," according to the study, published in the May issue of the APA journal *Health Psychology*. However, control and decision authority increased the risk of mortality among women in the sample.

"[P]eer social support, which could represent how well a participant is socially integrated in his or her employment context, is a potent predictor of the risk of all causes of mortality," the researchers wrote. "An additional (unexpected) finding ... is that the effect of control on mortality risk was positive for the men but negative for the women."

The researchers rated peer social support as being high if participants reported that their co-workers were helpful in solving problems and that they were friendly. Control and decision authority were rated high if participants said they were able to use their initiative and had opportunities to decide how best to use their skills, and were free to make decisions on how to accomplish the tasks assigned to them and what to do in their jobs.

The researchers, at Tel Aviv University, looked at the medical records of 820 adults who were followed for 20 years, from 1988 to 2008. The workers were drawn from people who had been referred to an HMO's screening center in Israel for routine examinations. (People who were referred because of suspected physical or mental health problems were excluded from the sample). The workers came from some of Israel's largest firms in finance, insurance, public utilities, health care and manufacturing. They reported working on average 8.8 hours a day. One-third of them were women; 80 percent were married with children; and 45 percent had at least 12 years of formal education.

The researchers controlled for the physiological, behavioral and psychological risk factors of total cholesterol, triglycerides, glucose levels, blood pressure, body mass index, alcohol consumption, smoking, depressive symptoms, anxiety and past hospitalizations. They obtained the data on the control variables from each person's periodic health examinations, including tests of physiological risk factors and a questionnaire completed during the examinations by all participants.

In addition, participants were administered another questionnaire that measured job demands, control at work and peer and supervisor support. During the 20-year follow-up period, 53 participants died.

Asked why workplace control was positive for men but not women, the lead researcher, Arie Shirom, PhD, said that for employees in blue-collar type of jobs (and most respondents belonged to this category), high levels of control were found in jobs typically held by men, rather than jobs typically held by women. "Providing partial support to our finding, a past study found that for women in blue-collar jobs, having low levels of control does not increase their risk of becoming ill with stress-related disorders," Shirom said.

One limitation of the study was that the researchers did not have data on changes in workload, control or support during the 20-year period. "Still, we argue that other researchers have consistently found that the job characteristics of workload, control and support tend to be stable across time," Shirom said.

The American Psychological Association, in Washington, D.C., is the largest scientific and professional organization representing psychology in the United States and is the world's largest association of psychologists. APA's membership

includes more than 154,000 researchers, educators, clinicians, consultants and students. Through its divisions in 54 subfields of psychology and affiliations with 60 state, territorial and Canadian provincial associations, APA works to advance psychology as a science, as a profession and as a means of promoting health, education and human welfare.

Article: "Work-Based Predictors of Mortality: A 20-Year Follow-Up of Healthy Employees," Arie Shirom, PhD; Sharon Toker, PhD; Yasmin Akkaly, MA; Orit Jacobson, PhD, MA, RN; and Ran Balicer, PhD, MD; Tel Aviv University, Health Psychology, Vol. 30, No. 3. <http://www.apa.org/pubs/journals/releases/hea-30-3-268.pdf>

<http://www.scientificamerican.com/article.cfm?id=looming-deadlines>

Deadline Pressure Distorts Our Sense of Time

The difficulty of a task stretches out our perception of time

By Wray Herbert | Tuesday, May 10, 2011 | 2

This time of year is deadline season for many people. It seems that wherever we look, there is a clock or a calendar pressuring us to move faster and stop dawdling. For some it is the end-of-semester crush, with papers to write and books to digest and comprehend, whereas others are rushing to tidy up a hundred loose ends before that big family vacation. Whatever the precise reason, the lament is the same: so much to do, so little time!

But do we really have too little time? Are these deadlines really looming, or do we in fact have more leisure than we imagine? It is always tricky to think about time, and new research now suggests that deadline pressure might contribute to our distorted view of how much time we really need to get everything done.

Psychological scientist Gabriela M. Jiga-Boy of Swansea University in Wales studies the complex relation between effort and time perception. She and her colleagues - Anna E. Clark of the international research institute INSEAD and Gün R. Semin of Utrecht University in the Netherlands - wanted to see if the perceived difficulty and deadline pressure of a task might distort our perception of time. They were inspired by another line of research, which has shown that spatial perception is shaped by how effortful a task is: for example, we will perceive a hill as steeper than it really is if we are tired, old or burdened by a heavy weight. Jiga-Boy and her colleagues wondered if the same perceptual bias might skew the way we think about the near future, and they ran a series of experiments to explore this idea.

The experiments are fairly straightforward. In one, for instance, they asked a group of student volunteers to imagine that 28 events would occur at certain points in the future, without pinning the events to any exact dates. Some of these events were fairly effortless, such as getting tickets for a concert, whereas others were complex and effortful, such as planning a wedding. The volunteers were then asked to estimate how much work each of these activities would require of them. They were also asked: How far away does the day of the event feel to you?

The idea was to see if the difficulty of the task affected perception of time, either stretching or compressing it. And it did, clearly. The tasks that the students judged complex and difficult - planning a wedding or an elaborate vacation - seemed more distant than did less demanding activities. In other words, our minds translate complexity and effort into time: a demanding task requires more time to complete, so its completion must be farther off.

The Clock Is Ticking

This logic is not sound, of course. It is the primitive mind simplistically equating effort and time. Just as anticipated exertion makes us see hills as steeper than they really are, so, too, do we perceive demanding tasks as stretching out farther into the future. But the mind learned to make these basic connections long before the modern world came up with things such as clocks and calendars - and final exams and vacation schedules and other deadlines. Jiga-Boy and her colleagues thought the imposition of such modern deadlines might alter this kind of time perception, a notion that they tested in a different set of experiments.

These experiments were similar to the ones described earlier, this time with deadlines added. For example, volunteers again visualized tasks of varying complexity, but some were given a deadline two months away, and others were given one eight months down the road. And again, all the volunteers were asked how far away the event felt to them.

The results, described in the December 2010 issue of the journal *Psychological Science*, were intriguing. In contrast to the earlier findings, now the more effortful events felt closer in time - not farther away. Simply imposing a deadline - whether it was two or eight months away - reversed the mind's relation between work and time. Faced with a deadline, volunteers saw difficult and complex tasks as looming all too close.

Finally, to check that the results indeed apply to real-world scenarios, Jiga-Boy and her colleagues recruited a new group of volunteers for one last test. The volunteers were told they were part of a health study and would be monitoring their food intake and reporting back to the researchers in a month. Some of the subjects were instructed to record what they ate on any two days and submit a half-page report, whereas others were asked to record their meals for two weeks and submit a 10-page report. When asked how far away the deadline seemed,

those who had the more effortful task reported that the end of the month felt much closer than the other subjects reported.

Now imagine several deadlines all at once - final exams, graduation ceremonies, perhaps a wedding or a European vacation - not to mention all of your regular commitments, which do not go away. No wonder you are feeling quite overwhelmed. But Jiga-Boy and her co-workers believe there may be a silver lining in these findings. These distorted perceptions of deadline pressure may serve a good purpose. That is, rigid deadlines for complex and effortful tasks may loom frighteningly close for a reason - so we will pay enough attention to them.

So back to all those looming spring deadlines. Simply knowing just how hard it will be to get everything done is itself the cognitive cue that helps us to prepare and plan and keeps us conscientious so we can respond to the challenges that lie ahead. Thanks to the mind's tricks, all those term papers will get written and the vacation will get planned - just as they do every year.

<http://www.scientificamerican.com/article.cfm?id=real-sexual-revolution-in-biology-could-spring-from-asexual-creatures>

Sex and the Single Cell: Biologists Take a Fresh Look at "Asexual" Amoebas
Studying blobby, asexual amoebas could absolve biology of its animal bias when it comes to uncovering the mysteries of sex

By Dave Mosher | Tuesday, May 10, 2011 | 9

Much of what we know about sex, or think we know, stems from the animal kingdom. No surprise there - we're animals and the nuances of the genetic tango are easier to study in organisms larger than infinitesimal blobs.

Trouble is, animal sex is specialized to the point of distraction. Most researchers have learned to avoid seeking universal sexual truths by examining animals' twig on the tree of life, but some still rely heavily on single animal models whereas others hawk dated taxonomic ideas without realizing it, says protistologist Frederick Spiegel of the University of Arkansas in Fayetteville.

"Huge numbers of trees are killed over the origin and function of sex, but some people writing and teaching this material still have animal sex in the back of their minds. It's biased, and it's backwards," says Spiegel, author of a commentary on sex published online May 10 in Proceedings of the Royal Society B.

Enter the amoeba: a collection of blobby, typically asexual microorganisms that taxonomists have historically swept under the rug as evolutionary oddities. If biologists want to understand sex's universal features, especially its benefits and costs, Spiegel argues there's no better critter to start with.

"Sex is one of the most primitive characteristics of all eukaryotic life," he says. "There are only a few eukaryotic lineages where we've never seen sex, and they're all amoebae. With these asexual organisms, we can compare and ask some truly synthetic questions about sex."

Amoebas are single-celled blobs that house their DNA in nuclei, just like all of their eukaryotic relatives (humans included). Although some amoebas presumably cannot have sex and divide by mitosis, others are among the eukaryotes that can have sex - a process that can most simply be defined as ripping a genome in half and later recombining it. The practice fuels diversity by juggling genes and ultimately helps lineages weather catastrophic change over generations as natural selection acts on them.

The historic generalization of amoebas leans to the less sexy side, which is almost certainly wrong, concludes a study published online March 23 in Proceedings of the Royal Society B (for which Spiegel was a reviewer and on which he based his commentary). Although some amoebas haven't been caught having sex, the authors' taxonomic work suggests amoebic ancestors did do it - just like the common ancestor that led to all modern eukaryotes.

It's not certain what pushed some amoebas into celibacy, but they may have evolved in stable environments that didn't require the energy costs of, or genetic advantages conferred by sex. After dropping the ability to sexually shuffle their genes, perhaps they simply got by reproduction via mitosis. Whatever the case may be, it's fertile ground for more research.

"Sex is an expensive process associated with big changes in an environment," Spiegel says. "I like to tell my students, 'When the going gets tough, the tough get horny.'"

In addition to dealing with asexuality, early taxonomists had to sort amoebas that resembled plants, fungi and animals. When Robert Whittaker debuted his popular five-kingdom classification system 42 years ago, he plucked amoebas out of various kingdoms and deemed them all protists. Genomic research and the field of systematic biology have since refined this sorting, but Spiegel argues outdated ideas continue to distort evolutionary relationships among organisms.

He isn't alone in his desire to restore amoebas to their proper sexual place or to grumble about misconceptions of biological sex, including the notion that it's reproductive. (Sex is not reproductive, he says, but rather a reduction of two gamete cells into one - it's mitosis, the duplication of cells, that is reproductive.*)

"We don't completely understand the evolutionary processes behind sex, or even its benefits," says taxonomist David J. Patterson of the Marine Biological Laboratory, who was neither involved in Spiegel's piece nor the study of amoeba asexuality from which it stemmed. "What we need to do is run back down [the evolutionary] tree and study sex from the bottom up, looking for alternative options to sex."

As some biology textbooks and studies continue to sidestep the details of the amoeba and other microbes in favor of focusing on larger organisms, Spiegel sees a tragic irony: Amoebas and their ilk can best position budding researchers to explore the costs of sex, its evolution and alternatives to problems it may or may not solve.

"They are using the wrong organisms to ask the questions [about sex] they want to answer," Spiegel says.

Biologist John Bonner of Princeton University, who has studied amoebas for more than 70 years, says he has no reason to doubt Spiegel's concerns - even if they are not new.

"Sex is quite common among [amoebas], even though some are asexual. And I think there are probably a lot of people who still don't understand that," Bonner says. "It's definitely worth calling attention to. There are still some very important things to be learned by comparing the presence and absence of sex."

Meanwhile, Spiegel sees wasted funding, time, confusion and opportunities for groundbreaking research.

"You can't understand sex by examining one organism. Let's get people exposed to a lot of weird and very different life-forms," he says. "Let's have a real sexual revolution."

**Clarification (05/11/11): This sentence was changed after publication. The original did not clearly convey that the sentence refers to fertilization in organisms that use gametes for sex.*

http://www.eurekalert.org/pub_releases/2011-05/nsf-sda051111.php

Scientists discover animal-like urea cycle in tiny diatoms in the ocean

Cycle enables marine phytoplankton to use carbon and nitrogen from their environment

Scientists have discovered that marine diatoms, tiny phytoplankton abundant in the sea, have an animal-like urea cycle, and that this cycle enables the diatoms to efficiently use carbon and nitrogen from their environment.

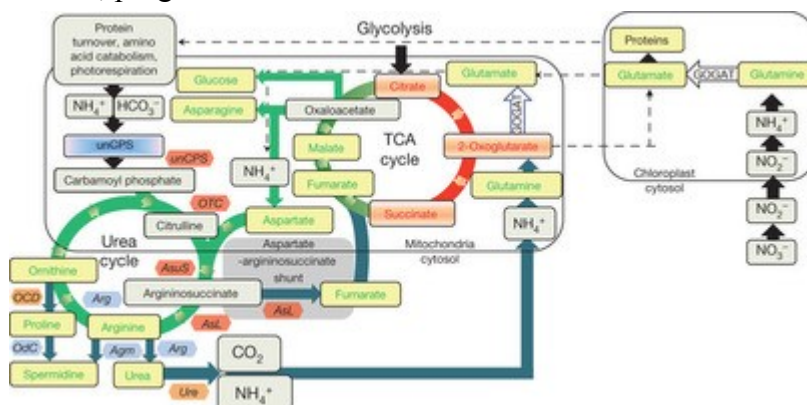
The researchers, from the J. Craig Venter Institute (JCVI) and other institutions, published their findings in this week's issue of the journal Nature.

The team, led by lead author Andrew Allen from JCVI and co-author Chris Bowler, Institute of Biology, Ecole Normale Supérieure, Paris, believes that the cycle could be a reason for the domination of diatoms in marine environments, especially after upwelling events--the upward movement of nutrient rich waters from the deep ocean to the surface. In response to ocean upwelling, diatoms are able to quickly recover from prolonged periods of nutrient deprivation and rapidly proliferate.

"This study provides fascinating insights into how diatoms have evolved to become the dominant primary producers in many ocean regions," says David Garrison, program director in the National Science Foundation's (NSF) Division of Ocean Sciences, which funded the research along with NSF's Division of Molecular and Cellular Biosciences.

Diatoms have unique cell walls made of silica. They are key organisms for understanding the environmental health of marine ecosystems, and are responsible for much of the carbon and oxygen production in the ocean.

Diatom photosynthesis in ocean environments is also responsible for about one fifth of the oxygen in the atmosphere.



Schematic of urea cycle in marine diatoms; the cycle helps in recovery from nutrient starvation. Credit: Andrew Allen, JCVI, et al.

In previous research, Allen, Bowler and colleagues sequenced the genome of the first pennate diatom, *Phaeodactylum tricorutum*. In that research, they developed new methods for determining the origin of diatom genes. They also looked at nutrient metabolism in diatoms, beginning with iron metabolism.

Building on that work, Allen and colleagues explored the evolutionary history of diatoms, specifically *P. tricornutum*, and cellular mechanisms for nutrient utilization in the environment, leading to the finding that diatoms have a functional urea cycle.

This was a stunning discovery, says Allen, because it was thought that the urea cycle originated with the metazoan (animal) branch of life.

There it has played an important role in facilitating a wide range of physiological innovations in vertebrates.

For example, urea synthesis enables rapid control of minerals and salts in the blood in animals such as sharks, skates, rays and bony fish, and ammonia detoxification associated with water retention in amphibians and mammals. The latter was likely a prerequisite for life on land, and subsequently enabled the biochemical pathways necessary for processing a high-protein diet.

Allen and others have now shown that the urea cycle originated hundreds of millions of years before the appearance of metazoans.

Paper co-author Alisdair Fernie of the Max-Planck Institute of Molecular Plant Physiology evaluated the metabolite profile of diatoms with and without an impaired urea cycle.

Then Allen analyzed the data and found that urea cycle metabolites are critical for cellular recycling of carbon and nitrogen. The metabolites are also important for facilitating the rapid onset of exponential growth characteristic of diatom recovery from nutrient starvation.

"It appears that the animal urea cycle, critical for cellular export of carbon and nitrogen wastes, was co-opted from an ancestral pathway that originally evolved as a nitrogen and carbon recycling and recovery mechanism," says Allen. "This is a very interesting finding we didn't expect to see, and essentially changes the way we view diatoms relative to animals and plants."

The work also suggests that diatoms have followed a fundamentally different evolutionary path from plants--the dominant oxygen producers in terrestrial environments, green algae, and other closely related organisms.

Rather, prior to evolutionary acquisition of photosynthetic machinery, the ancestors of diatoms were possibly more closely related to the ancestors of animals than to plants. This relatedness has resulted in diatoms and animals sharing some similar biochemical pathways such as the urea cycle.

Although it appears that animals and diatoms ultimately use the urea cycle for different purposes, they are evolutionarily linked in a way that animals and plants are not.

Along with Allen, Bowler, Fernie and other colleagues from JCVI, Ecole Normale Supérieure, and Max-Planck Institute, Germany, researchers from the Biology Centre ASCR, the Institute of Parasitology and University of South Bohemia, Czech Republic; the University Federal de Viçosa, Brazil; and the Institute of Hydrobiology, Chinese Academy of Sciences, China, contributed to this work.

The research was also funded by the JCVI, the European Commission on Diatomics Project, the Agence Nationale de la Recherche in France, and the Czech Science Foundation.

<http://www.dailymail.co.uk/news/article-1385290/North-America-populated-70-people-claims-stunning-new-DNA-research.html>

North America was populated by no more than 70 people 14,000 years ago, claims stunning new DNA research

By Daily Mail Reporter

The next time you're having a disagreement with a work colleague or annoying neighbour, bear this in mind: Chances are you're related.

A new study of DNA patterns throughout the world suggests that North America was originally populated by no more than 70 people.

Most experts agree that, around 14,000 years ago, a group of humans crossed the land bridge that connected what is now Siberia in Russia with Alaska. But new research has shown just how small that group was, venturing into a vast continent from Asia during the last Ice Age.

Up to now DNA analyses of the intrepid and original 'founding fathers' looked at a particular gene, using estimates and academic assumptions on constant population sizes over time.

The new study, by Professor Jody Hey, came at the subject from a different angle - looking at nine genomic regions to account for variations in single genes, and assuming that sizes of founding populations changed over time.

Professor Hey, of Rutgers University, was quoted in Live Science as saying his method favoured 'actual genetic data over estimates used in previous calculations'. He said: 'The estimated effective size of the founding population for the New World is about 70 individuals.' Archeological evidence supports his calculation that the initial settlement of North America occurred between 12,000 and 14,000 years ago.

He said: 'The beauty of the new methodology is that it uses actual DNA sequences collected from Asian peoples and Native Americans, an approach that can provide a detailed portrait of historical populations.'

Professor Hey said he focused on the genetics of people who spoke Amerind. It is one of three main language groups in North America and is indicative of the earliest migrants who went on to populate the Americas.

Professor Hey's study is among a series of new findings that are challenging long-held views about the history and growth of the Americas, as advances in technologies such as DNA testing open new doorways to the past.

In March, a team of archaeologists near Austin, Texas, found evidence of stone tools possibly dating back 15,000 years, smashing long-held theories about native settlement.

The treasure trove of 15,528 artifacts, including chipping debris from working stones and 56 tools - such as blades, scrapers and choppers - was found at Buttermilk Creek.

Lead archaeologist Michael Waters, of Texas A&M University, described it as like finding 'like finding the Holy Grail', adding: 'This is almost like a baseball bat to the side of the head of the archaeological community.'

The accepted wisdom among archaeologists is that the first people to colonise America were called the Clovis, Sometimes also referred to as the Llanos, the Clovis were a prehistoric race who first appeared in North America at the end of the last glacial period 13,500 to 13,000 years ago. They are so named because of the discovery of their distinctive 'Clovis point' hunting tools in the 1930s at Clovis, New Mexico.

Archaeologists came to the conclusion that the Clovis were the first to inhabit North America because no evidence of an earlier civilisation had been found.

Several theories exist about their eventual decline and disappearance. The most common-held belief is that the Clovis culture merely adapted across America and eventually morphed into other cultures (such as the Folsom culture).

Another, more controversial theory, believes that their over-hunting of 'megafauna', like the mammoth, contributed to their extinction.

Another, known as the Clovis Comet event, suggests an extraterrestrial impact led to mass extinction and climate change that abruptly wiped out the Clovis.

http://www.eurekalert.org/pub_releases/2011-05/ohs-nps051011.php

Non-human primate studies reveal promising vaccine approach for HIV

HILLSBORO, Ore. - Research conducted at Oregon Health & Science University's Vaccine and Gene Therapy Institute (VGTI) has developed a vaccine candidate in non-human primates that may eventually lead to a vaccine against Human Immunodeficiency Virus (HIV).

Details of this advance are published in the advance online edition of the journal Nature. The paper will also be published in an upcoming print addition of the journal.

The research team, led by Louis Picker, M.D., associate director of the OHSU VGTI and director of the VGTI's vaccine program, produced a vaccine candidate that programs the immune system of non-human primates to respond more swiftly to the presence of a primate version of HIV than it normally would. The team also included researchers from the National Cancer Institute-Frederick and the International AIDS Vaccine Initiative.

The VGTI researchers tested their vaccine candidate in rhesus macaque monkeys at the Oregon National Primate Research Center using a monkey form of HIV called Simian Immunodeficiency Virus (SIV). Of the monkeys that received the vaccine candidate, just more than half controlled replication of the virus to the extent that even the most sensitive tests could not detect signs of SIV.

To date, the vast majority of these animals have maintained control over the virus for more than a year, gradually losing any signs that they had ever been infected. In contrast, the macaques in the unvaccinated control group developed the monkey form of AIDS.

The researchers say that their work suggests that the immune responses elicited by this new vaccine candidate might completely clear SIV from animals that were initially infected. In comparison, antiretroviral therapy is able to control the disease, but cannot clear the virus from its hiding place within the immune systems own cells.

The VGTI team has been working for over ten years on its vaccine candidate, which is unique in using Cytomegalovirus (CMV) as the transport system used to introduce the vaccine into the body. CMV was chosen because it is believed that most people are already infected with CMV, but for the majority, the virus causes little or no symptoms. In addition, once a person is infected with CMV, this virus remains in the body for life. Picker and his team hypothesized that if such a persistent virus were used as a vector it could create and maintain resistance against HIV by programming a portion of the body's immune system called effector memory T-cells to be constantly on the alert for the virus.

"The next step in vaccine development is to test the vaccine candidate in clinical trials in humans. For a human vaccine the CMV vector would be weakened sufficiently so that it does not cause illness, but will still protect against HIV," said Dr. Picker.

The National Institutes of Health and, the International AIDS Vaccine Initiative provided funding for this research.

http://www.eurekalert.org/pub_releases/2011-05/bawh-hls051011.php

Human lung stem cell discovered

The lung stem cell has a crucial role in tissue regeneration and may promote restoration of damaged lung cells

Boston, MA – For the first time, researchers at Brigham and Women's Hospital (BWH) have identified a human lung stem cell that is self-renewing and capable of forming and integrating multiple biological structures of the lung including bronchioles, alveoli and pulmonary vessels. This research is published in the May 12, 2011 issue of the New England Journal of Medicine.

"This research describes, for the first time, a true human lung stem cell. The discovery of this stem cell has the potential to offer those who suffer from chronic lung diseases a totally novel treatment option by regenerating or repairing damaged areas of the lung," said Piero Anversa, MD, director of the Center for Regenerative Medicine at Brigham and Women's Hospital and corresponding author.

Using lung tissue from surgical samples, researchers identified and isolated the human lung stem cell and tested the functionality of the stem cell both in vitro and in vivo. Once the stem cell was isolated, researchers demonstrated in vitro that the cell was capable of dividing both into new stem cells and also into cells that would grow into various types of lung tissue. Next, researchers injected the stem cell into mice with damaged lungs. The injected stem cells differentiated into new bronchioles, alveoli and pulmonary vessel cells which not only formed new lung tissue, but also integrated structurally to the existing lung tissue in the mice.

The researchers define this cell as truly "stem" because it fulfills the three categories necessary to fall under stem cell categorization: first, the cell renews itself; second, it forms into many different types of lung cells; and third, it is transmissible, meaning that after a mouse was injected with the stem cells and responded by generating new tissue, researchers were then able to isolate the stem cell in the treated mouse, and use that cell in a new mouse with the same results.

"These are the critical first steps in developing clinical treatments for those with lung disease for which no therapies exist. Further research is needed, but we are excited about the impact this discovery could have on our ability to regenerate or recreate new lung tissues to replace damaged areas of the lungs," said Joseph Loscalzo, MD, PhD, chair of the Department of Medicine at BWH and co-author.

This research was funded through grants from the National Institutes of Health (NIH).

http://www.eurekalert.org/pub_releases/2011-05/uoc-bop050911.php

Beware of predatory male black bears

Research regarding North American black bear fatal attacks on people shows lone males are most dangerous, attack rates are rising with human population growth

Fatal encounters with black bears have been exceedingly rare during the last century, but appear to be mainly the result of predatory male bears targeting humans in their wilderness home ranges, according to a new study led by the world's leading expert on bear attacks.

In an article published today in the Journal of Wildlife Management, University of Calgary professor emeritus Dr. Stephen Herrero, University of Calgary graduate Andrew Higgins, and colleagues from the Massachusetts Division of Fisheries and Wildlife and Brigham Young University analyzed the circumstances of all recorded deaths inflicted by non-captive black bears in North America between 1900 and 2009. The study found that 63 people were killed in 59 incidents in Canada, Alaska and the lower 48 states. The researchers determined that the majority (88%) of fatal attacks involved a bear exhibiting predatory behaviour, and 92% of the predatory bears were males. The authors suggest male black bears have evolved some different behaviours than females.

"Each year there are millions of interactions between people and black bears with no injuries to people. So while the risk is low, it does exist," said Herrero, an expert in bear behaviour and ecology in the U of C's Faculty of Environmental Design. "Our findings raise some important new insights that can be used to better understand the cause of attacks and how they can be avoided in both the front and backcountry."

In particular, the common belief that surprising a mother bear with cubs is the most dangerous kind of black bear encounter is inaccurate. Instead, lone male black bears hunting people as a potential source of food are a greater cause of deadly maulings and related predatory attempts. The study also found that fatal attacks do not typically involve bears that are familiar with humans, although some fatal attacks did.

"Most fatal black bear attacks were predatory and all fatal attacks were carried out by a single bear," Herrero said. "With training, people can learn to recognize the behaviour of a bear that is considering them as prey and deter an attack by taking aggressive action such as fighting back."

The paper confirms other current perceptions and bear management practices. It found that bears that have previously killed people are more likely to attack again; parties of more than two people are much less likely to be attacked; and human food and garbage tends to attract bears and may increase the likelihood of serious bear attacks.

Examining 110 years of data also allowed the researchers to identify historical and geographic trends of black bear attacks. They found that 86% of fatal attacks occurred since 1960; that fatalities are more common in Canada and Alaska despite lower human populations and less contact between humans and bears than in the lower 48 states; and that human population growth is accompanied by rising fatal bear attacks.

"We didn't demonstrate why population growth is correlated with more bear attacks but we suspect it is because there are more people pursuing recreational and commercial activities in black bear habitat," Herrero said. "Similarly, we don't know exactly why there have been more attacks in Canada and Alaska, but we speculate that it could be because bears in those areas are living in less productive habitat with periodic food stress, which may predispose some bears to consider people as prey."

The article "Fatal Attacks by American Black Bear on People: 1900-2009" by Stephen Herrero, Andrew Higgins, James E. Cardoza, Laura I. Hajduk & Tom S. Smith is published in the April, 2011 issue of the Journal of Wildlife Management.

http://www.eurekalert.org/pub_releases/2011-05/nu-fhj050911.php

Flipping hot Jupiters

Research on extrasolar planets helps us better understand our solar system

More than 500 extrasolar planets -- planets that orbit stars other than the sun -- have been discovered since 1995. But only in the last few years have astronomers observed that in some of these systems the star is spinning one way and the planet, a "hot Jupiter," is orbiting the star in the opposite direction.

"That's really weird, and it's even weirder because the planet is so close to the star," said Frederic A. Rasio, a theoretical astrophysicist at Northwestern University. "How can one be spinning one way and the other orbiting exactly the other way? It's crazy. It so obviously violates our most basic picture of planet and star formation."

Figuring out how these huge planets got so close to their stars led Rasio and his research team to also explain their flipped orbits. Using large-scale computer simulations, they are the first to model how a hot Jupiter's orbit can flip and go in the direction opposite to the star's spin. Gravitational perturbations by a much more distant planet result in the hot Jupiter having both a "wrong way" and a very close orbit. (A hot Jupiter is a huge Jupiter-like planet in very close proximity to the central star.)

"Once you get more than one planet, the planets perturb each other gravitationally," Rasio said. "This becomes interesting because that means whatever orbit they were formed on isn't necessarily the orbit they will stay on forever. These mutual perturbations can change the orbits, as we see in these extrasolar systems."

In explaining the peculiar configuration of an extrasolar system, the researchers also have added to our general understanding of planetary system formation and evolution and reflected on what their findings mean for the solar system.

"We had thought our solar system was typical in the universe, but from day one everything has looked weird in the extrasolar planetary systems," Rasio said. "That makes us the odd ball really. Learning about these other systems provides a context for how special our system is. We certainly seem to live in a special place."

Rasio, a professor of physics and astronomy in Northwestern's Weinberg College of Arts and Sciences is the senior author of the paper. The first author is Smadar Naoz, a postdoctoral fellow at Northwestern and a Gruber Fellow. Details of the study will be published May 12 by the journal Nature.

The physics the research team used to solve the problem is basically orbital mechanics, Rasio said, the same kind of physics NASA uses to send satellites around the solar system.

"It was a beautiful problem," said Naoz, "because the answer was there for us for so long. It's the same physics, but no one noticed it could explain hot Jupiters and flipped orbits."

"Doing the calculations was not obvious or easy," Rasio said, "Some of the approximations used by others in the past were really not quite right. We were doing it right for the first time in 50 years, thanks in large part to the persistence of Smadar."

"It takes a smart, young person who first can do the calculations on paper and develop a full mathematical model and then turn it into a computer program that solves the equations," Rasio added. "This is the only way we can produce real numbers to compare to the actual measurements taken by astronomers."

In their model, the researchers assume a star similar to the sun, and a system with two planets. The inner planet is a gas giant similar to Jupiter, and initially it is far from the star, where Jupiter-type planets are thought

to form. The outer planet is also fairly large and is farther from the star than the first planet. It interacts with the inner planet, perturbing it and shaking up the system.

The effects on the inner planet are weak but build up over a very long period of time, resulting in two significant changes in the system: the inner gas giant orbits very close to the star and its orbit is in the opposite direction of the central star's spin. The changes occur, according to the model, because the two orbits are exchanging angular momentum, and the inner one loses energy via strong tides.

The gravitational coupling between the two planets causes the inner planet to go into an eccentric, needle-shaped orbit. It has to lose a lot of angular momentum, which it does by dumping it onto the outer planet. The inner planet's orbit gradually shrinks because energy is dissipated through tides, pulling in close to the star and producing a hot Jupiter. In the process, the orbit of the planet can flip.

Only about a quarter of astronomers' observations of these hot Jupiter systems show flipped orbits. The Northwestern model needs to be able to produce both flipped and non-flipped orbits, and it does, Rasio said. *The title of the paper is "Hot Jupiters From Secular Planet-Planet Interactions." In addition to Rasio and Naoz, other authors of the paper are Will M. Farr, a CIERA postdoctoral fellow; Yoram Lithwick, an assistant professor of physics and astronomy; and Jean Teyssandier, a visiting pre-doctoral fellow, all from Northwestern.*

http://www.eurekalert.org/pub_releases/2011-05/bcom-map051011.php

Potential new predictor of male reproductive potential identified

HOUSTON – The distance between a man's scrotum and anus may indicate his ability to reproduce, said researchers from Baylor College of Medicine (www.bcm.edu/urology) in the journal PLoS ONE.

"We have observed in animal studies that anogenital distance (the distance between the scrotum and anus) is an important measure for genital development and may be shorter in males with abnormal testicular development and function," said Dr. Michael Eisenberg, a male reproductive medicine and surgery fellow in the Scott Department of Urology at BCM and lead author on the study. "We initiated a clinical study to determine if the distance varied between infertile men and fertile adult men. If so, this could help us develop a novel method to evaluate patients with impaired reproductive potential."

Eisenberg and his research team measured the anogenital distance and penile length of 117 infertile men and 56 fertile men from an andrology clinic.

They found that the infertile men possessed a significantly shorter anogenital distance and penile length when compared with the fertile men, though they also note the need for further studies to compare anogenital distance measurement techniques and assess their accuracy and reproducibility.

"There are two main implications of this study – first, this could represent a non-invasive way to test testicular function and reproductive potential in adult men and second, it suggests that gestational exposures and development may impact adult testicular function."

Others who contributed to the study include Dr. Larry Lipshultz, chief of male reproductive medicine and surgery and professor of urology; Dr. Rustin Chanc Walters, a clinical postdoctoral fellow of urology; and Dr. Ross Krasnow, a urology resident, all of BCM and Dr. Michael Hsieh, an assistant professor of urology from the Stanford University School of Medicine in Palo Alto, Calif.

http://www.eurekalert.org/pub_releases/2011-05/jhmi-asc051011.php

Adult stem cells take root in livers and repair damage

Johns Hopkins researchers have demonstrated that human liver cells derived from adult cells coaxed into an embryonic state can engraft and begin regenerating liver tissue in mice with chronic liver damage.

The work, published in the May 11 issue of the journal Science Translational Medicine, suggests that liver cells derived from so-called "induced-pluripotent stem cells (iPSCs)" could one day be used as an alternative to liver transplant in patients with serious liver diseases, bypassing long waiting lists for organs and concerns about immune system rejection of donated tissue.

"Our findings provide a foundation for producing functional liver cells for patients who suffer liver diseases and are in need of transplantation," says Yoon-Young Jang, M.D., Ph.D., assistant professor of oncology at the Johns Hopkins Kimmel Cancer Center. "iPSC-derived liver cells not only can be generated in large amounts, but also can be tailored to each patient, preventing immune-rejection problems associated with liver transplants from unmatched donors or embryonic stem cells."

iPSCs are made from adult cells that have been genetically reprogrammed to revert to an embryonic stem cell-like state, with the ability to transform into different cell types. Human iPSCs can be generated from various tissues, including skin, blood and liver cells.

Although the liver can regenerate in the body, end-stage liver failure caused by diseases like cirrhosis and cancers eventually destroy the liver's regenerative ability, Jang says. Currently, the only option for those

patients is to receive a liver organ or liver cell transplant, a supply problem given the severe shortage of donor liver tissue for transplantation. In addition, mature liver cells and adult liver stem cells are difficult to isolate or grow in the laboratory, she says. By contrast, iPSCs can be made from a tiny amount of many kinds of tissue; and the embryonic stem-like iPSCs can grow in laboratory cultures indefinitely.

For the study, Jang and colleagues generated human iPSCs from a variety of adult human cells, including liver cells, fibroblasts (connective tissue cells), bone marrow stem cells and skin cells. They found that though the iPSCs overall were molecularly similar to each other and to embryonic stem cells, they retained a distinct molecular "signature" inherited from the cell of origin.

Next, they chemically induced the iPSCs to differentiate first into immature and then more mature liver cell types. Regardless of their origin, the different iPSC lines all showed the same ability to develop into liver cells.

Using mice with humanlike liver cirrhosis, the researchers then injected the animals with either 2 million human iPSC-derived liver cells or with normal human liver cells. They discovered that the iPSC-derived liver cells engrafted to the mouse liver with an efficiency of eight to 15 percent, a rate similar to the engraftment rate for adult human liver cells at 11 percent.

Researchers also found the engrafted iPSCs worked well. The scientists detected proteins normally secreted by adult human liver cells, including albumin, alpha-1-antitrypsin, transferrin and fibrinogen, in the blood of mice transplanted with human iPSC-derived liver cells.

Additional studies will need to be completed before clinical trials can begin, Jang says. One concern has been the potential for embryonic stem cells or iPSCs to cause tumors, though no tumors formed in any of the transplanted mice during the seven months they were studied (equating to more than 30 years in a human life). The scientists also plan to evaluate the impact of molecular memory that may linger in iPSCs for other type of cellular fate changes.

Other scientists involved in the research were Hua Liu, Yonghak Kim, Saul Sharkis and Luigi Marchionni from Johns Hopkins. The study was supported by the National Institutes of Health and by the Maryland Stem Cell Research Fund. Drs. Jang and Sharkis have filed a patent for the development of iPSCs from human hepatocytes.

http://www.eurekalert.org/pub_releases/2011-05/uog-usd050611.php

UGA scientists discover missing links in the biology of cloud formation over the oceans **Athens, Ga. – Scientists have known for two decades that sulfur compounds that are produced by bacterioplankton as they consume decaying algae in the ocean cycle through two paths.**

In one, a sulfur compound dimethylsulfide, or DMS, goes into the atmosphere, where it leads to water droplet formation – the basis of clouds that cool the Earth. In the other, a sulfur compound goes into the ocean's food web, where it is eaten and returned to seawater.

What they haven't known is how sulfur is routed one way or the other or why.

They also have wondered what if – in a time of growing concern about global warming – it was possible to divert the sulfur compound that goes into the oceans into the atmosphere, helping to mitigate global warming?

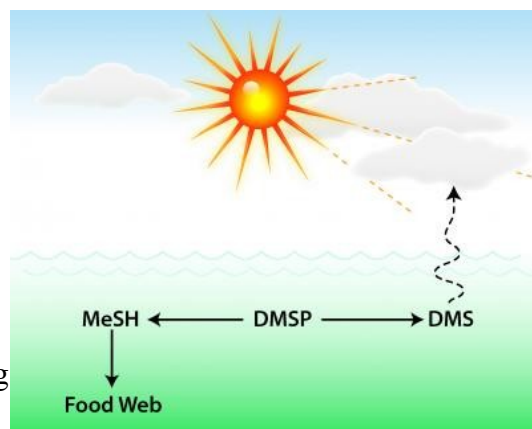
A study by researchers at the University of Georgia just published in Nature brings the possibility of using the sulfur cycle to mitigate global warming closer with the identification of the steps in the biochemical pathway that controls how bacteria release the sulfur compound methanethiol, or MeSH, into the microbial food web in the oceans and the genes responsible for that process.

"With our increased understanding of the sulfur cycle in the ocean," said study co-author William (Barney) Whitman, "we are now better able to evaluate the impacts of climate change on the process and the potential for its manipulation, which has been proposed as a way to mitigate global warming.

"It's wonderful to have this much understanding of a major biogeochemical process," noted Whitman, distinguished research professor and head of the department of microbiology in the Franklin College of Arts and Sciences.

In addition to elucidating the steps in the pathway and identifying the responsible genes, the team of UGA microbiologists, marine scientists and chemists discovered that the pathway is found widely, not only among bacterioplankton in the ocean but also in non-marine environments.

A simplified graphic shows the process by which bacterioplankton send sulfur found in decaying algae into the food web or into the atmosphere, where it leads to water droplet formation -- the basis of clouds that cool the Earth. Chris Reisch, University of Georgia



"The big mystery about bacteria is what they are doing in nature," Whitman said. "The organisms metabolize compounds for their own needs. We need to understand what they are getting out of it to understand what it means for the ocean, and now it will be possible to look at the environmental importance of this process and how it's regulated." That will help to answer the "why" of the two sulfur fates.

Co-authors of the Nature paper were UGA graduate students Chris Reisch and Vanessa Varaljay, department of microbiology; graduate student Melissa Stoudemayer and Jon Amster, professor and head, department of chemistry; and distinguished research professor Mary Ann Moran, department of marine sciences – all in the Franklin College of Arts and Sciences.

The collaborators in this study built on a line of research begun at UGA over a decade ago. Moran's early research showed that an abundant group of bacteria known as marine roseobacters play a role in moving dimethylsulfoniopropionate (DMSP), the chemical made by marine algae and released into the water upon their death, into the atmosphere as the compound dimethylsulfide (DMS). In 2006, Moran's research group discovered in marine bacteria the first step in the process of turning DMSP into MeSH, instead of sending sulfur into the atmosphere. And in 2008, Moran's doctoral student Erinn Howard, in collaboration with Whitman's lab, discovered the gene that allows marine roseobacters to keep sulfur in the ocean.

With funding from the National Science Foundation and the Gordon and Betty Moore Foundation, the UGA researchers have now identified the rest of the pathway, including identifying two previously unknown but related chemical compounds that serve as intermediates between MMPA, the first product of degraded DMSP, and MeSH, the final product.

The collaboration with UGA chemists using high-resolution mass spectrometry made it possible for the researchers to identify the compounds. A major surprise was the presence of Coenzyme A (CoA), a large molecule important in metabolism, in the intermediate compounds. "We weren't really expecting CoA to be involved," said Reisch, who was part of the UGA group that five years ago identified the first step in the pathway that produces MeSH. "We thought they would be smaller fatty acids."

With the discovery of the intermediates, it was possible to find the enzymes that catalyzed the reaction and then the genes. And once the genes were discovered, the researchers were able to analyze databases of marine bacteria to determine which bacteria possess the genes capable of carrying out the MeSH process.

The group discovered that the MeSH pathway is widespread among bacterioplankton in the ocean. "The genes may be in up to 61 percent of surface ocean bacterioplankton," said Reisch, "while the DMS pathway is present in less than 5 percent of cells." However, he said, "There could be a lot more that we don't yet know about. Some bacteria, including the model bacteria used in the study, have both pathways." But the researchers also found the genes for the MeSH pathway in bacteria from a variety of non-marine habitats, including bacteria commonly found in soils, plants, extreme environments and humans. They note in their Nature paper that the presence of the newly discovered pathway in diverse bacteria further emphasizes its importance.

http://www.eurekalert.org/pub_releases/2011-05/uog-bii051111.php

Botox injected in head 'trigger point' is proven to reduce migraine crises

Scientists at the University of Granada have confirmed that injecting a local anesthetic or botulinum toxin (botox) into certain points named "trigger points" of the pericranial and neck muscles reduce migraine frequency among migraine sufferers.

University of Granada researchers have identified the location of these trigger points –which activation results in migraine– and their relationship with the duration and severity of this condition.

Headache is a universal experience. At present, there are more than 100 different types of headache and one of the most recurring ones is migraine, which affects approximately 10-12% of the population, being three times more common in women than in men. When migraine becomes chronic –occurring more than 15 days a month–, it can disrupt patients' daily life in a great degree.

This research study is one of the three studies that have been conducted by Juan Miguel García Leiva –a researcher at the University of Granada Institute for Neuroscience "Federico Oloriz" – and coordinated by professor Elena Pita Calandre.

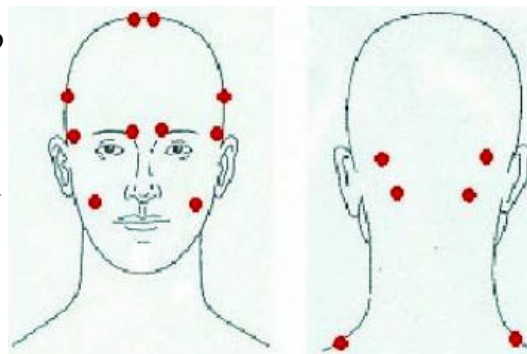
Trigger points in migraine sufferers

In the first study, researchers examined a sample of healthy subjects and patients with a diagnosis of migraine –any frequency–, and analysed the presence of trigger points and their location, many of the explorations resulting in a migraine crisis. The most interesting findings of this study were: 95% of migraine sufferers have trigger points, while only 25% of healthy subjects have them. The most common locations of trigger points are the anterior temporal and the suboccipital region, both bilateral, of the head. Furthermore,

researchers found a positive correlation among the number of trigger points in a patient, the number of monthly crises and the duration in years of the condition.

Subsequently, researchers conducted another study with 52 migraine sufferers (with migraine refractory to common pharmacological treatments). During three months, patients received a weekly subcutaneous injection of 1mL of a local anesthetic into their trigger points.

After the injection of the anesthetic, 18% of patients experienced a 50% or higher reduction in the frequency of migraine crises, as compared with the basal period. Additionally, an 11-49% reduction of frequency was observed in 38% of patients. Two thirds of the patients treated reported to feel "better or much better".



Few side effects

In the third study, 25 patients with chronic migraine were injected with 12.5 doses of botox into each trigger point twice, during a period of 3 months. Frequency (main variable), intensity and scales of migraine crises were recorded one month before and one month after the treatment to compare the changes experienced. In addition, side effects were also recorded during the experiment, and they were found to be mild and temporary.

This diagram shows the most common locations of trigger points in migraine sufferers. University of Granada

After the injections, the most significant decrease in crisis frequency was observed at week 20. Similar results were obtained in those crises labelled as "moderate" and in the frequency of analgesic use by patients.

García Leiva specified that this treatment "is not a first-choice treatment for migraine sufferers, but it can only be applied in patients with chronic migraine who have tried several treatments with poor results, and who show peripheral sensitization of muscles. Recently, the Foods and Drugs Administration (USA) has approved botulinum toxin as a therapeutical drug for the treatment of chronic migraine.

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http://www.eurekalert.org/pub_releases/2011-05/mgh-moa051111.php

Mild obesity appears to improve survival in ALS patients

Mass. General study finds survival predicted by body mass index, not lipid levels

Patients with amyotrophic lateral sclerosis (ALS), also known as Lou Gehrig's disease, may be an exception to the rule that being overweight is a health hazard. In a retrospective study of over 400 ALS patients, Massachusetts General Hospital (MGH) researchers found that those who were mildly obese survived longer than patients who were normal weight, underweight or even overweight. The study will appear in the journal *Muscle & Nerve* and has been published online.

"We have long known that being underweight shortens survival for ALS patients, and several studies in an animal model have shown that weight gain is associated with increased survival," says Anne-Marie Wills, MD, MPH, of the MGH Neurology Clinical Trials Unit, senior author of the report. "Our study was designed to investigate how cholesterol levels affect survival. We were surprised to find that body mass index or BMI – a measure of weight adjusted for height – made a large difference in survival. Patients with a BMI of 30 to 35, who would be considered mildly clinically obese, lived the longest; and patients who were overweight, with a BMI of 25 to 30, lived the second longest."

ALS is a progressive neurodegenerative disease affecting motor neurons in the brain and spinal cord. Death of these nerve cells stops the transmission of neural impulses to muscle fibers, leading to weakness, paralysis and usually death from respiratory failure. During the course of their disease ALS patients usually lose even more weight than can be attributed to the loss of muscle mass caused by nerve destruction and the related muscle inactivity. Studies have shown that ALS patients burn more calories than would be expected from their limited physical activity, but the mechanism for this metabolic change is currently unknown.

A previous smaller study suggested that ALS patients with higher levels of low-density lipoprotein (LDL) relative to high-density lipoprotein (HDL) might live longer. In order to test that association in a larger group of patients, the MGH team analyzed data on more than 400 patients who had participated in three clinical trials of potential ALS drugs. Along with the results of initial blood tests taken when participants entered the trials, the

researchers had access to follow-up blood tests for almost 200 participants and information on how long each patient survived without needing mechanical ventilation assistance. Depending on the particular clinical trial, survival data was available for one to two years after study initiation. While higher baseline cholesterol levels were associated with longer survival, that association disappeared when the results were controlled for BMI. As expected, the shortest survival was seen in malnourished or morbidly obese patients, but patients in the mildly obese range had the longest survival of any BMI group.

"While this finding needs further investigation, we hypothesize that it is due to increased energy reserves available to these patients," says Wills, an instructor of Neurology at Harvard Medical School. "We don't know whether actively putting on weight would be helpful, but right now I'm telling my patients with ALS they can eat anything they want."

The MGH team is leading a clinical trial to test the safety and tolerability of a high-fat, high-calorie diet for ALS patient. In order to precisely control participants' caloric intake, the study is limited to ALS patients who already have a feeding tube in place. Sponsored by the Muscular Dystrophy Association, the trial takes place at 12 sites around the country. More information is available at <http://www.alsconsortium.org> or at <http://clinicaltrials.gov>. At either site, search for "High-fat + ALS."

The lead author of the Muscle & Nerve study is Sabrina Paganoni, MD, PhD, of Spaulding Rehabilitation Hospital. Additional co-authors are Jing Deng, Matthew Jaffa and Merit Cudkowicz, MD, MSc, all of MGH Neurology. The study was supported by the Muscular Dystrophy Association and the Digiovanni ALS Research Fund.

<http://www.bbc.co.uk/news/health-13359281>

Dengue fever cases 'double in UK'

The number of people bringing dengue fever back to the UK from tropical countries has doubled, according to the Health Protection Agency (HPA).

In 2009 there were 166 cases; a year later there were 406.

The illness, which can be fatal, results in fever, muscle pain, headache and a rash. It is transmitted by mosquitoes so the HPA recommends travellers take more precautions to prevent themselves being bitten.

Dengue fever is common in tropical and sub-tropical countries. The World Health Organization believes there are 50 million cases each year. In the UK, HPA figures show 21% of cases were linked to visits to India and 15% with Thailand.

Dr Jane Jones, head of the HPA's travel and migrant health section, said there was no drug treatment for dengue fever. "To minimise the risk of being bitten it is advisable to wear appropriate clothing to cover up - such as long sleeve tops and trousers - and use insect repellents," she said.

Insects which carry malaria tend to be active at night, while those carrying dengue are active in the day.

Dr Jones said that in areas where both illnesses are present "protection against mosquito bites should be used around the clock, including the use of mosquito nets at night".

<http://news.discovery.com/human/music-helps-guard-against-auditory-signs-of-aging-110511.html>

Music Guards Against Auditory Signs of Aging

By Marianne English

Strumming that guitar or rehearsing your favorite piano piece may pay off later in life, according to a new study focusing on the auditory benefits of being a lifelong musician.

Older musicians who had continued to play an instrument since childhood performed better than their non-musician counterparts in a set of auditory tasks, suggesting that music guards against some of the negative effects of aging. Researchers already know that music fine-tunes one's auditory capabilities earlier in adulthood, but they did not know how musical involvement affected age-related events such as hearing loss and decline in auditory acuity, or the ability to distinguish sounds.

In the study, featured in the journal PLoS ONE, 37 participants between the ages of 45 and 65 underwent tests to measure their auditory memory and ability to recognize speech among noise. Eighteen people in the group were active musicians. Most had played the piano for more than 40 years, while the remaining people in the group considered themselves non-musicians.

As people age, they may experience hearing loss. But hearing loss is only half the equation. Auditory acuity and memory decline with age and play significant roles in communication as well. Overall, people's ability to tease out background noise worsens over time, which makes communicating with other people increasingly hard. For musicians, however, it's easier to parse out a specific sound from competing noise. They performed better during a task in the study that asked them to recall the contents of sentences pronounced by a male voice while three female voices played in the background.

Neither the age at which musicians began playing an instrument nor years of experience with an instrument affected the results of this particular study. But the research team suspects these factors are worth looking into more. And although singers weren't included in the analysis, one can guess the results might be similar.

According to a 2003 Gallup Poll, 37 percent of respondents in the United States said they play a musical instrument. Most began playing between 5 and 14 years of age.

http://www.eurekalert.org/pub_releases/2011-05/uoc--ngr051011.php

NASA's Galileo reveals magma 'ocean' beneath surface of Jupiter's moon

A new analysis of data from NASA's Galileo spacecraft has revealed that beneath the surface of Jupiter's volcanic moon Io is an "ocean" of molten or partially molten magma.

The finding, from a study published May 13 in the journal *Science*, is the first direct confirmation of such a magma layer on Io and explains why the moon is the most volcanic object known in the solar system. The research was conducted by scientists from UCLA, UC Santa Cruz and the University of Michigan–Ann Arbor.

"The hot magma in Io's ocean is millions of times better at conducting electricity than rocks typically found on the Earth's surface" said the study's lead author, Krishan Khurana, a former co-investigator on Galileo's magnetometer team and a research geophysicist with UCLA's Institute of Geophysics and Planetary Physics. "Just like the waves beamed from an airport metal detector bounce off metallic coins in your pocket, betraying their presence to the detector, Jupiter's rotating magnetic field continually bounces off the molten rocks in Io's interior. The bounced signal can be detected by a magnetometer on a passing spacecraft.

"Scientists are excited that we finally understand where Io's magma is coming from and have an explanation for some of the mysterious signatures we saw in some of Galileo's magnetic field data," Khurana added. "It turns out Io was continually giving off a 'sounding signal' in Jupiter's rotating magnetic field that matched what would be expected from molten or partially molten rocks deep beneath the surface."

Io's volcanoes are the only known active magma volcanoes in the solar system other than those on Earth; Io produces about 100 times more lava each year than all of Earth's volcanoes. While those on Earth occur in localized hotspots like the "Ring of Fire" around the Pacific Ocean, Io's volcanoes are distributed all over its surface. A global magma ocean lying beneath about 20 to 30 miles (30 to 50 km) of Io's crust helps explain the moon's activity.

"It has been suggested that both the Earth and moon may have had similar magma oceans billions of years ago, at the time of their formation, but they have long since cooled," said Torrence Johnson, who was Galileo's project scientist, based at NASA's Jet Propulsion Laboratory in Pasadena, Calif., and who was not directly involved in the study. "Io's volcanism informs us how volcanoes work and provides a window in time to styles of volcanic activity that may have occurred on the Earth and moon during their earliest history."

Io's volcanoes were discovered by NASA's Voyager spacecraft in 1979. The energy for the volcanic activity comes from the squeezing and stretching of the moon by Jupiter's gravity as Io orbits the immense planet, the largest in the solar system.

Galileo was launched in 1989 and began orbiting Jupiter in 1995. After a successful mission, the spacecraft was intentionally sent into Jupiter's atmosphere in 2003. The unexplained signatures appeared in the magnetic-field data taken from Galileo fly-bys of Io in October 1999 and February 2000, during the final phase of the mission.

"But at the time, models of the interaction between Io and Jupiter's immense magnetic field, which bathes the moon in charged particles, were not yet sophisticated enough for us to understand what was going on in Io's interior," said study co-author Xianzhe Jia of the University of Michigan.

Recent work in mineral physics showed that a group of what are known as "ultramafic" rocks become capable of carrying substantial electrical current when melted. These rocks are igneous in origin - that is, they are formed through the cooling of magma. On Earth, ultramafic rocks are believed to derive from the mantle. The finding led Khurana and colleagues to test the hypothesis that the strange signature was produced by an electrical current flowing in a molten or partially molten layer of this kind of rock.

Tests showed that the signatures detected by Galileo were consistent with a rock like lherzolite, an igneous rock rich in silicates of magnesium and iron found, for example, in Spitzbergen, Sweden. The magma ocean layer on Io appears to be more than 30 miles (50 km) thick, making up at least 10 percent of the moon's mantle by volume. The blistering temperature of the magma ocean probably exceeds 2,200 degrees Fahrenheit (1,200 degrees Celsius).

Additional co-authors on the paper are Christopher T. Russell, professor of geophysics and space physics in UCLA's Department of Earth and Space Sciences; Margaret Kivelson, professor emeritus of space physics in UCLA's Department of Earth and Space Sciences; Gerald Schubert, professor of geophysics and planetary physics in UCLA's Department of Earth and Space Sciences; and Francis Nimmo, associate professor of Earth and planetary sciences at UC Santa Cruz. Additional information about the Galileo mission and its discoveries is available online at <http://solarsystem.nasa.gov/galileo> and www.jpl.nasa.gov/galileo-legacy.

Disruption of nerve cell supply chain may contribute to Parkinson's

New data offer hints to why Parkinson's disease so selectively harms brain cells that produce the chemical dopamine, say researchers at Washington University School of Medicine in St. Louis.

Dopamine is involved in brain cell communications including the signals that control movement. As Parkinson's kills the dopamine-producing cells, patients begin to develop tremors, problems moving and other symptoms.

The new research shows that a drug known to damage dopamine-producing nerve cells and mimic Parkinson's disease does so by rapidly damaging cellular energy generators called mitochondria. This damage impairs the ability of mitochondria to circulate around the cell as they normally would. As a result, axons, the extended arms nerve cells use to send messages, wither; a few days later, the body or main portion of the cell also dies.

"Much of the research into Parkinson's disease treatments is focused on saving the bodies of these cells, but our results suggest that keeping axons healthy also is essential," says Karen O'Malley, PhD, of Washington University School of Medicine in St. Louis. "When axons die back, dopamine is no longer delivered to the neurons that need it. The cell body also has fewer connections to other cells, and it needs those connections to survive." The results were published May 11 in *The Journal of Neuroscience*.

Many processes and facilities for cellular maintenance are in the body of the nerve cell, and their products sometimes have to travel a significant distance to reach the axon's end.

"If you think, for example, about one of your peripheral nerves, the cell body is located in the spinal column, but some of the axons extend as far as your big toe," says O'Malley, professor of neurobiology. "That's like the cell body sits in an office in St. Louis and the end of the axon is in Chicago."

O'Malley compares the axon's system for transporting supplies to a railroad. Mitochondria are part of the railroad's cargo. They supply the energy that allows the axon to do its work.

For the study, O'Malley gave cultured mouse nerve cells a toxin called MPP+ that causes Parkinson's-like symptoms. "MPP+ is a derivative of a synthetic form of heroin developed in California in the early 1980s," O'Malley says. "It came to scientists' attention when teenage abusers of the drug went to the hospital with Parkinson's disease symptoms."

O'Malley found that the toxin stopped the movement of mitochondria in the axon in 30 minutes. The railroad still functioned, shipping other cargo to the end of the axon. But most mitochondria either stopped moving or were headed for the cell body instead of the axon.

O'Malley suspected that this meant the mitochondria were damaged by the changes caused by the toxin and being shipped back to the cell body for repair. Additional tests supported this theory, showing that the mitochondria had lost their ability to maintain their membrane potential, a measure of mitochondrial fitness.

The specificity of this toxin for dopamine-producing cells is reinforced by the finding that other types of nerve cells did not have problems transporting mitochondria after toxin exposure. In a comparison between different nerve cell types, O'Malley found mitochondria in dopamine-producing nerve cells are smaller in size and travel three times slower. But she can't yet definitively say that these distinctions play a role in the problems caused by the toxin.

Scientists screened several compounds to see if they could block the toxin's effects. Only two antioxidants worked, glutathione and N-acetyl cysteine. The latter compound has already been shown to be effective in animal models of Parkinson's disease and is used as a treatment for other disorders in patients.

O'Malley is currently studying whether two genes linked to Parkinson's disease affect mitochondria damaged by the toxin. "We're going to continue to look for specific differences in these cells that might help scientists develop better treatments," O'Malley says.

Kim-Han JS, Antenor-Dorsey JA, O'Malley KL. The Parkinsonian mimetic, MPP+, specifically impairs mitochondrial transport in dopamine axons. The Journal of Neuroscience, May 11, 2011.

<http://www.bbc.co.uk/news/health-13208989>

Donkey milk can help children with milk allergies

By Stephanie Hegarty BBC World Service

In the hills outside Bologna in northern Italy a slightly peculiar farm has become the centre of a health experiment that harks back to the practices of ancient Greece and Rome.

The farm is home to 700 donkeys and produces donkey milk, a product that is creating a lot of interest among health professionals. Donkey milk is proving to be a viable alternative for young children and infants in Italy who suffer from allergies to cows' milk. More than 50% of what the farm produces is sold directly to paediatric units in the region.

Dr Giovanna Monti, a paediatrician at the head of the allergy unit at Turin's St Anna hospital, has been studying the effects of donkey milk on babies and children since 2004.

"We use this milk mostly for children who are allergic to certain proteins in cows' milk," she told the BBC World Service's Health Check programme. "These proteins are often also present in formulated milk too."

Better than soy

"This milk is very similar to human milk" Dr Monti explains, and it has many benefits.

With a low saturated fat content and high levels of omega three and six - the nutrients found in oily fish - it can help lower cholesterol. It also has high levels of calcium - especially important for young children - and contains the enzyme Lysozyme, which is anti-bacterial and can protect against intestinal infections. Though it doesn't have enough calories to feed a newborn baby alone, Dr Monti expects it will be easily made into a formula substitute in the near future.

Allergies are currently on the rise in industrialised countries and lactose intolerance is especially high in southern Europe and Italy in particular. While goat and sheep's milk have been traditional alternatives, they cannot be used in about 90% of cases of cows' milk allergies because the allergens are the same.

Soya milk has also been a common alternative but soy allergies are also rising among the children, so Dr Monti and her colleagues have naturally veered towards donkeys.



Children with allergies in Italy have shown they prefer the taste of donkeys milk to other alternatives

Ancient alternative

The use of donkey milk is far from a modern fad. As long ago as 460BC "the father of medicine", Hippocrates, proscribed the nectar of the beast of burden for anything from snake bites to nosebleeds. Ancient Greeks were said to feed it to their children, while stories from the time of the Romans tell of donkey milk being used as a cosmetic to soften the skin. Legend has it that Cleopatra also bathed in asses milk to enhance her beauty.

Up until the 19th century in the UK, donkey milk was widely sold as an alternative to breast milk.

However, donkey milk is not that easy to produce, as Davide Borghi, who runs the donkey farm on the hills of Montebaducco, explains. "Cows have been bred to be milk producing machines" he says, "but donkeys have never been bred that way so it's much more difficult for them to produce lots of milk."

A donkey only has two teats, rather than a cow's four, and milking only produces about a litre a day per animal - a cow can produce more than 10 times that. What's more, a donkey can only be milked for about six months after producing a foal, and even then only when the foal is close by.

Borghi acknowledges that these limitations mean donkey milk is likely to remain a niche health product.

"We're not trying to substitute cows' milk, it's just an alternative for children who are allergic."

<http://www.newscientist.com/article/mg21028124.800-alien-life-may-huddle-under-hydrogen-blankets.html>

Alien life may huddle under hydrogen blankets

12 May 2011 by Ken Crosswell

Swaddled in a hydrogen atmosphere a few dozen times thicker than our nitrogen-oxygen one, a planet could keep warm at up to 15 times Earth's distance from the sun

OUR planet seems to be in just the right spot to sport a mild climate. Not too near the sun's heat, not too far from its warmth, in a narrow habitable zone in which water is liquid and life can thrive. But Earth could still support life even if it were as far from the sun as Saturn, claim two scientists in the US, as long as the air abounded with hydrogen. If they are right, then billions of life-bearing planets may exist much further from their host stars than astronomers had thought possible.

Earth owes much of its warmth to carbon dioxide and water vapour in its atmosphere trapping solar heat, but these greenhouse gases freeze at the low temperatures far from the sun. In contrast, hydrogen stays gaseous, and at high pressure it is also an effective greenhouse gas.

Raymond Pierrehumbert at the University of Chicago and Eric Gaidos at the University of Hawaii in Honolulu calculated the warming effect of a hydrogen blanket on Earth-sized planets, as well as on worlds a few times more massive than our own, known as super-Earths. They found that, swaddled in a hydrogen atmosphere a few dozen times thicker than our nitrogen-oxygen one, such a planet could keep warm at up to 15 times Earth's distance from the sun. And despite the thickness of this alien atmosphere, Pierrehumbert and Gaidos calculate that enough sunlight would reach the planet's surface to foster photosynthesis.

"It's a clever idea," says James Kasting of Pennsylvania State University in University Park, "but I'm sceptical as to whether you can form these planets." He doubts that an Earth-like planet or super-Earth would pull in so much hydrogen from the cloud of gas surrounding a young star.

Kasting adds that far-out planets will be fainter and harder to see than close-in planets, so finding these distant worlds will be more difficult, as will studying their atmospheres.

Nevertheless, Pierrehumbert and Gaidos point to one known planet that may fit the bill. Named OGLE-05-390Lb, it is about six times as massive as Earth. It orbits a red dwarf - a small, cool, faint star - at 2.6 times Earth's distance from the sun. A naked planet so far from such a dim star would be a frigid world. But with a thick hydrogen atmosphere it could potentially sustain liquid water at its surface, say the researchers in a study to appear in *The Astrophysical Journal Letters*.

Yet if a far-out planet did spawn life, that life could sign its own death warrant. Some types of microbe consume hydrogen and carbon dioxide. By depleting these greenhouse gases, the microbes might turn their warm world into a giant snowball, killing them all.

<http://medicalxpress.com/news/2011-05-viagra-condom-std.html>

New 'Viagra condom' to join the fight in STD prevention

Medical Xpress - *The biggest complaint from men and women when it comes to condom use is the decrease in sensitivity and erectile performance during intercourse.*

It is this reason that condoms are not used as often as they should be. It is because of this that Futura Medical in the UK has developed a new condom, the CSD500, which will address those issues and hopefully increase the use of condoms and prevention of STDs.

The new condom, dubbed the 'Viagra condom,' is not designed for those with medical erectile dysfunction, but rather for those who may experience erectile dysfunction when using a condom. It is also designed to address the common issue of condoms which slip off during sexual intercourse.

The condom is lined with a vasodilating gel commonly used to treat angina. The gel works to increase blood flow to the penis, creating firmer and stronger erections and aids in maintaining erections longer. The trick was creating a gel that did not degrade the latex condom in any way, and Futura Medical has been able to do that.

A double blind study was performed with the condoms and both men and women reported improved erection firmness when using the new CSD500 condom. They also reported an increase in penis size and a longer sexual experience.

The CSD500 is close to regulatory approval in the UK and hopes to be on the market by next year. Futura Medical plans to evaluate the commercial viability in Europe before expanding clinical trials in order to seek FDA approval in the United States.

<http://www.scientificamerican.com/blog/post.cfm?id=twitter-helped-doctors-tell-patient-2011-05-12>

Twitter Helped Doctors Tell Patients Where to Get Meds After Japan Earthquake

By Katherine Harmon

In the hours after the magnitude 9.0 earthquake and massive tsunami hit Japan in March, essential infrastructure and communication were cut off, leaving many of the disasters' survivors without access to phones, electricity or water.

And those who were on essential medications were on the cusp of losing their lifelines, too.

"The secondary disaster is just in its infancy - that is, how to supply and manage stable medical resources for patients with chronic diseases," Keio University School of Medicine cardiologists Yuichi Tamura and Keiichi Fukuda wrote in a letter in the May 14 issue of *The Lancet*.

As Katsutoshi Furukawa and Hiroyuki Arai, of Tohoku University in Sendai's Department of Geriatrics and Gerontology and Division of Brain Sciences, wrote in a letter in the same issue: "Many, even those who did not have a major acute injury or illness, could not source enough medicine for their chronic diseases, such as hypertension, diabetes, thrombosis, Parkinson's disease, etc."

Tamura and Fukuda were in charge of patients with pulmonary hypertension that required continuous infusions of the drug prostacyclin. But with so many key supply chain links severed - or at least uncertain - and when "telephone networks were unreliable even in the metropolitan areas," the situation looked dicey.

But, as Tamura and Fukuda wrote, "We were able to notify displaced patients via Twitter on where to acquire medications. These 'tweets' immediately spread through patients' networks, and consequently most could attend to their essential treatments." Twitter is widely used in Japan, with some 17.6 million users reported in the country in March.

Crowd-sourcing, social networks and tweeting information, especially in situations where verifiable reports are scant - such as in places or war, repression or emergency - can have its pitfalls, experts noted in a panel earlier this year in New York City.

And for life-threatening medical needs, trained personnel are usually necessary, too. As Tamura and Fukuda explained: "Our experience has shown that social networking services, run concurrently with physical support, were significant in triumphing over many difficulties in the recent catastrophe."

Japan's medical infrastructure, however, was not perfect to start with, as University of Iowa's Jay Starkey and Keio University's Shoichi Maeda, pointed out. "The weak primary-care system has left hospitals overwhelmed," they wrote in the same issue of *The Lancet*. As is increasingly becoming the case in other countries in the developed world, including the U.S., people in Japan are turning to specialists and hospitals - rather than general practitioners - for basic medical care.

But with the massive influx of patients after the earthquake and tsunami, Starkey and Maeda wrote, "hospitals were unable to tend to patients with non-urgent but important needs such as treatment of hypertension, diabetes, gastroenteritis and so forth. Japan needs to strengthen its primary care system."

http://www.eurekalert.org/pub_releases/2011-05/uoc--sft051211.php

Study finds therapies using induced pluripotent stem cells could encounter immune rejection problems

Biologists at UC San Diego have discovered that an important class of stem cells known as "induced pluripotent stem cells," or iPSCs, derived from an individual's own cells, could face immune rejection problems if they are used in future stem cell therapies.

In today's advance online issue of the journal *Nature*, the researchers report the first clear evidence of immune system rejection of cells derived from autologous iPSCs that can be differentiated into a wide variety of cell types.

Because iPSCs are not derived from embryonic tissue and are not subject to the federal restrictions that limit the use of embryonic stem cells, researchers regard them as a promising means to develop stem cell therapies. And because iPSCs are derived from an individual's own cells, many scientists had assumed that these stem cells would not be recognized by the immune system. As a consequence, the immune system would not try to mount an attack to purge them from the body.

In fact, scientists regarded iPSCs as particularly attractive candidates for clinical use because cells derived from embryonic stem cells will induce immune system rejection that requires physicians to administer immune suppressant medications that can compromise a person's overall health.

But the UCSD biologists, funded by NIH and an early translational grant from the California Institute for Regenerative Medicine, the state's stem-cell funding agency, found that iPSCs are subject to some of the same problems of immune system rejection as embryonic stem cells.

"The assumption that cells derived from iPSCs are totally immune tolerant has to be reevaluated before considering human trials," says Yang Xu, a professor of biology at UCSD who headed the team that published the study. His team of biologists - which included postdoctoral researchers Tongbiao Zhao, Zhen-Ning Zhang and Zhili Rong - reached that conclusion after testing the immune response of an inbred strain of mice to embryonic stem cells and several types of iPSCs derived from the same strain of inbred mice.

The scientists found, not surprisingly, that the immune system of one mouse could not recognize the cells derived from embryonic stem cells of the same strain of mice. But the experiments also showed that the immune system rejected cells derived from iPSCs reprogrammed from fibroblasts of the same strain of mice, mimicking the situation whereby a patient would be treated with cells derived from iPSCs reprogrammed from the patient's own cells. The scientists also found that the abnormal gene expression during the differentiation of iPSCs causes the immune responses.

"This result doesn't suggest that iPSCs cannot be used clinically," says Xu. "It is important now to look at exactly what types of cells derived from iPSCs - and there probably are not that many based on our findings - are likely to generate immune system rejection." "Our immune response assay is a robust method for checking the immune tolerance, and therefore, the safety of iPSC that may be developed," he added.

With grants from the California Institute for Regenerative Medicine, Xu's team is also developing strategies to minimize the formation of tumors that result from the use of human embryonic stem cells and to increase the immune tolerance of human embryonic stem cells.

<http://www.bbc.co.uk/news/health-13378119>

Measles outbreak warning as cases rise in Europe and UK

By Philippa Roxby Health reporter, BBC News

In the 1990s, experts thought they were close to eliminating measles for good.

But now the World Health Organization (WHO) has put back its target date for getting rid of the disease to 2015. But even that seems unlikely. The reason? A measles outbreak which is spreading across Europe, affecting France, Belgium, Germany and Romania - and now the UK. Other significant outbreaks are taking place in Serbia, Spain, Macedonia and Turkey, the WHO says.

Over the last few months, the Health Protection Agency has seen an increase in measles cases in children and young adults in England and Wales. Their figures show that between January and April, 275 laboratory-

confirmed cases of measles were reported, compared to 33 cases for the same period the previous year. The HPA says these cases are, "associated with either recent travel abroad or small clusters in mainly unvaccinated children and young adults between the ages of 10-24."

Health protection units across England and Wales are warning parents to make sure their children have received two doses of the MMR vaccine before travelling to mainland Europe in the next few months.

They are particularly concerned that as families plan summer holidays on the continent, and schools organise trips and exchanges abroad, unvaccinated children and young adults will be at risk.

Dr Mary Ramsay, head of immunisation at the Health Protection Agency, said: "Measles is a highly infectious and dangerous illness which spreads very easily particularly in schools and universities. It is crucial that children and young adults are fully immunised with two doses of MMR."

Letters have been sent to some primary schools and further education colleges in London, where confirmed measles cases have reached 86 so far this year.

Dr David Elliman, consultant community paediatrician at Great Ormond Street Hospital in London, has noticed a rise in cases and says it is never too late to be vaccinated. "Anybody can get measles at any time, but it's particularly dangerous in very young children and young adults. Any opportunity people have to visit their GP and ask for the vaccine should be taken." He says one in 15 people have complications with measles and one in 1,000 will die of it, but that the two doses of MMR will protect people against the disease. "Figures show 84% of children had received their second dose of the MMR vaccine by the age of five but we need 95% uptake to stop it going around - and we are still not there," Dr Elliman says.

The situation in France, however, is considerably worse. A measles epidemic has officially been declared there, with nearly 5,000 cases reported between January and March this year. The is almost equal to the total number of cases reported in France (5,090) during the whole of 2010. The WHO says France is taking immediate steps to control the outbreaks by vaccinating infants at nine months of age and offering the vaccine to all unimmunised or under-immunised people over that age.

Dr Rebecca Martin, the WHO's programme manager for vaccination and preventable diseases in Europe, believes the reason numbers of measles cases in France are so high is down to complacency. "In France they didn't see the disease any more so people thought there was no need to get their children immunised. Rather than put them through two injections and, possibly, a fever afterwards... Their perception of the risk changed."

The organisation which oversees public health in France, Institut de Veille Sanitaire (INVS), is worried.

In a newspaper article, Françoise Weber, the director of INVS, estimated that the cases already confirmed by health professionals in France are only "the tip of the iceberg".

But measles can be eliminated in Europe, the WHO's Dr Martin says. "In the Americas, measles was eliminated in 2002. There are no indigenous cases there now because everyone has been immunised, so it can be done. But it's a slow process and we need to accelerate our efforts."

http://www.eurekalert.org/pub_releases/2011-05/aha-ap_1051111.php

Educating heart patients, families cut one hospital's falls by 64 percent

Researchers at Vanderbilt University Medical Center had noticed that, despite a hospital-wide program to prevent patient falls, the cardiovascular progressive care unit experienced an increase in the rate of patient falls.

To address the problem, investigators reviewed current literature about fall prevention and designed an education program. Using some basic guidelines from Ryu, Roche, and Brunton (2009), the program incorporated education for patients as well as families and included a booklet and a poster for each patient room. In the two months before the program began, the fall rate was 12.73 per 1,000 patient days in the cardiovascular unit. In the two months after the patient/family education program began, the fall rate declined to 4.59 per 1,000 - a 64 percent reduction.

The patient information urges people to "Please call, don't fall." Patients were educated about factors putting them at risk for falling: experiencing a fall in the past three months, being older than 70 and having vision problems. Further study will be needed to determine the long-term effect of the program, researchers said.

http://www.eurekalert.org/pub_releases/2011-05/uom-pst051111.php

Persuasive speech: The way we, um, talk sways our listeners

ANN ARBOR, Mich. Want to convince someone to do something? A new University of Michigan study has some intriguing insights drawn from how we speak.

The study, presented May 14 at the annual meeting of the American Association for Public Opinion Research, examines how various speech characteristics influence people's decisions to participate in telephone surveys. But its findings have implications for many other situations, from closing sales to swaying voters and getting stubborn spouses to see things your way.

"Interviewers who spoke moderately fast, at a rate of about 3.5 words per second, were much more successful at getting people to agree than either interviewers who talked very fast or very slowly," said Jose Benki, a research investigator at the U-M Institute for Social Research (ISR).

For the study, Benki and colleagues used recordings of 1,380 introductory calls made by 100 male and female telephone interviewers at the U-M ISR. They analyzed the interviewers' speech rates, fluency, and pitch, and correlated those variables with their success in convincing people to participate in the survey.

Since people who talk really fast are seen as, well, fast-talkers out to pull the wool over our eyes, and people who talk really slow are seen as not too bright or overly pedantic, the finding about speech rates makes sense. But another finding from the study, which was funded by the National Science Foundation, was counterintuitive.

"We assumed that interviewers who sounded animated and lively, with a lot of variation in the pitch of their voices, would be more successful," said Benki, a speech scientist with a special interest in psycholinguistics, the psychology of language. "But in fact we found only a marginal effect of variation in pitch by interviewers on success rates. It could be that variation in pitch could be helpful for some interviewers but for others, too much pitch variation sounds artificial, like people are trying too hard. So it backfires and puts people off."

Pitch, the highness or lowness of a voice, is a highly gendered quality of speech, influenced largely by body size and the corresponding size of the larynx, or voice box, Benki says. Typically, males have low-pitched voices and females high-pitched voices. Stereotypically, think James Earl Jones and Julia Child.

Benki and colleagues Jessica Broome, Frederick Conrad, Robert Groves and Frauke Kreuter also examined whether pitch influenced survey participation decisions differently for male compared to female interviewers.

They found that males with higher-pitched voices had worse success than their deep-voiced colleagues. But they did not find any clear-cut evidence that pitch mattered for female interviewers.

The last speech characteristic the researchers examined for the study was the use of pauses. Here they found that interviewers who engaged in frequent short pauses were more successful than those who were perfectly fluent. "When people are speaking, they naturally pause about 4 or 5 times a minute," Benki said. "These pauses might be silent, or filled, but that rate seems to sound the most natural in this context. If interviewers made no pauses at all, they had the lowest success rates getting people to agree to do the survey. We think that's because they sound too scripted. "People who pause too much are seen as disfluent. But it was interesting that even the most disfluent interviewers had higher success rates than those who were perfectly fluent."

Benki and colleagues plan to continue their analyses, comparing the speech of the most and least successful interviewers to see how the content of conversations, as well as measures of speech quality, is related to their success rates.

<http://www.physorg.com/news/2011-05-nasa-earth-nearest-neighbor-moon.html>

NASA Puts Earth's Nearest Neighbor, 'The Moon', Within Reach

NASA has created a new interactive web-based tool that incorporates observations from past and current lunar missions creating one of the most comprehensive lunar research websites to date.

The Lunar Mapping and Modeling Project at NASA's Marshall Space Flight Center in Huntsville, Ala. has created an online set of capabilities and tools that will allow anyone with an Internet connection to search through, view, and analyze a vast number of lunar images and other digital products. The data and tools available through the project website will allow researchers to perform in-depth analyses to support mission planning and system design for lunar exploration and science missions. It will permit detailed scientific analysis and discovery and open additional educational and outreach opportunities.

The project website is a one-stop location for finding, retrieving, and analyzing data about the moon, including the most recent lunar surface imagery, altimetry, temperature, lighting and other data, as provided by the Lunar Reconnaissance Orbiter (LRO) and its seven onboard instruments.

The orbiter, launched by NASA in 2009, continues to gather information about the moon from its orbit some 31 miles (50 kilometers) above the lunar surface. LRO has provided a treasure trove of data -- more than all previous lunar and planetary missions combined. The Lunar Mapping and Modeling Project website will also include data obtained from past lunar programs and missions including Apollo, Lunar Orbiter, Lunar Prospector, Clementine, Kaguya (Japan) and Chandrayaan-1 (India).

"By making these data widely available to the general public, NASA seeks to provide engineers, scientists, mission planners, educators and students with a new resource that will allow them to view and analyze a wide array of lunar images and other data products in a way not previously available to such a diverse group," said Raymond French, integration lead for the Lunar Mapping and Modeling Project Office at Marshall.

Information provided through the project website can be easily used for many purposes, including planning and analysis tasks in the areas of potential landing site evaluation and selection; design and positioning of landers or other stationary assets; design of rovers or other mobile assets; development of terrain-relative capabilities; assessment and planning of scientific surface expeditions; scientific analysis and discovery; and integration of lunar science and exploration into the development of classroom activities and education curricula.

The website provides access to rich and highly complex products from previous missions such as images; digital elevation models; gravity models; local hazard assessment maps assessing slope, surface roughness, crater and boulder distribution; and resource maps detailing such information as soil maturity and the presence and abundance of hydrogen and other elements.

The Lunar Mapping and Modeling Project website features an easy-to-use browsing tool, and provides access to two additional visualization and analysis tools: Lunar Mapper, a lightweight, web-based geographic analysis client; and the Integrated Lunar Information Architecture for Decision Support application, known as ILIADS, a downloadable desktop geospatial information system client. Both tools offer advanced data manipulation and analysis.

The Advanced Capabilities Division of the Exploration Mission Systems Directorate at NASA Headquarters in Washington sponsored the Lunar Mapping and Modeling Project to support the agency's efforts to make lunar data easier to use and readily available to mission planners and system designers, while continuing to support science, education and public outreach efforts tied to study of Earth's sole natural satellite.

Provided by JPL/NASA

<http://www.physorg.com/news/2011-05-astronomers-alien-life-planets.html>

US astronomers launch search for alien life on 86 planets

A massive radio telescope in rural West Virginia has begun listening for signs of alien life on 86 possible Earth-like planets, US astronomers said Friday.

The giant dish began this week pointing toward each of the 86 planets -- culled from a list of 1,235 possible planets identified by NASA's Kepler space telescope -- and will gather 24 hours of data on each one.

"It's not absolutely certain that all of these stars have habitable planetary systems, but they're very good places to look for ET," said University of California at Berkeley graduate student Andrew Siemion.

The mission is part of the SETI project, which stands for Search for Extra Terrestrial Intelligence, launched in the mid 1980s. Last month the SETI Institute announced it was shuttering a major part of its efforts -- a 50 million dollar project with 42 telescope dishes known as the Allen Telescope Array (ATA) -- due to a five million dollar budget shortfall.

ATA began in 2007 and was operated in partnership by the UC Berkeley Radio Astronomy Lab, which has hosted several generations of such experiments. It was funded by the SETI Institute and the National Science Foundation (NSF). With ATA's dishes in hibernation for now, astronomers hope the powerful Green Bank Telescope, a previous incarnation of which was felled in a windstorm in 1988, will provide targeted information about potential life-supporting planets.

"Our search employs the largest fully steerable radio telescope on the planet, and the most sensitive radio telescope in the world capable of undertaking a SETI search of this kind," Siemion told AFP. "We will be looking at a much wider range of frequencies and signal types than has ever been possible before," he added, describing the instrumentation as "at the very cutting edge of radio astronomy technology."

The surface of the telescope is 100 by 110 meters and it can record nearly one gigabyte of data per second, Siemion said. The 17 million pound (7.7 million kilogram) telescope became operational in 2000 and is a project of the NSF's National Radio Astronomy Observatory.

"We've picked out the planets with nice temperatures -- between zero and 100 degrees Celsius -- because they are a lot more likely to harbor life," said physicist Dan Werthimer. Werthimer heads a three-decade long SETI project in Puerto Rico, home of the world's largest radio telescope, Arecibo. However that project could not observe the same area of the northern sky as the Green Bank telescope, he said. "With Arecibo, we focus on stars like our Sun, hoping that they have planets around them that emit intelligent signals," Werthimer said in a statement. "But we've never had a list of planets like this before."

The Green Bank Telescope can scan 300 times the range of frequencies that Arecibo could, meaning that it can collect the same amount of data in one day that Arecibo could in one year.

The project will likely take about a year to complete, and will be helped by a team of one million at-home astronomers, known as SETI@home users, who will help process the data on personal computers. (c) 2011 AFP

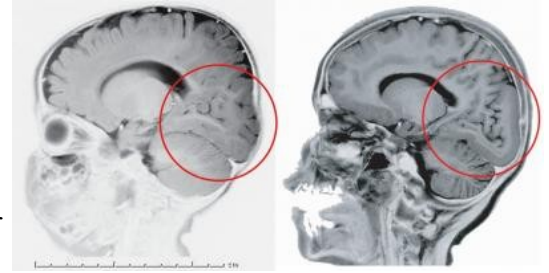
http://www.eurekalert.org/pub_releases/2011-05/yu-tvi051311.php

Tiny variation in 1 gene may have led to crucial changes in human brain

The human brain has yet to explain the origin of one its defining features – the deep fissures and convolutions that increase its surface area and allow for rational and abstract thoughts.

An international collaboration of scientists from the Yale School of Medicine and Turkey may have discovered humanity's beneficiary – a tiny variation within a single gene that determines the formation of brain convolutions – they report online May 15 in the journal Nature Genetics.

A genetic analysis of a Turkish patient whose brain lacks the characteristic convolutions in part of his cerebral cortex revealed that the deformity was caused by the deletion of two genetic letters from 3 billion in the human genetic alphabet. Similar variations of the same gene, called laminin gamma3 (LAMC3), were discovered in two other patients with similar abnormalities.



On the left, the occipital region of a normal human brain is circled. On the right, the same area of the brain of a subject with mutation of LAMC3 gene is smooth, and lacks normal folds and convolutions. Yale University

"The demonstration of the fundamental role of this gene in human brain development affords us a step closer to solve the mystery of the crown jewel of creation, the cerebral cortex," said Murat Gunel, senior author of the paper and the Nixdorff-German Professor of Neurosurgery, co-director of the Neurogenetics Program and professor of genetics and neurobiology at Yale.

The folding of the brain is seen only in mammals with larger brains, such as dolphins and apes, and is most pronounced in humans. These fissures expand the surface area of the cerebral cortex and allow for complex thought and reasoning without taking up more space in the skull. Such foldings aren't seen in mammals such as rodents or other animals. Despite the importance of these foldings, no one has been able to explain how the brain manages to create them. The LAMC3 gene – involved in cell adhesion that plays a key role in embryonic development – may be crucial to the process.

An analysis of the gene shows that it is expressed during the embryonic period that is vital to the formation of dendrites, which form synapses or connections between brain cells. "Although the same gene is present in lower organisms with smooth brains such as mice, somehow over time, it has evolved to gain novel functions that are fundamental for human occipital cortex formation and its mutation leads to the loss of surface convolutions, a hallmark of the human brain," Gunel said.

Major funding for the study was provided by National Institute of Neurological Disorders and Stroke through the Recovery Act. Several institutions from Turkey contributed to the paper. Co-lead authors of the paper were Tanyeri Barak and Kenneth Y Kwan of Yale. Other Yale authors include Angeliki Louvi, Murim Choi, Ying Zhu Saliha Yilma, Mehmet Bakircioğlu, Ahmet Okay Çağlayan, Ali Kemal Öztürk, Katsuhito Yasuno, Richard A Bronen, Shrikant Mane, Richard P Lifton, Nenad Šestan and Kaya Bilgiçvar.

<http://www.physorg.com/news/2011-05-ebola-virus-case-uganda-capital.html>

Ebola virus case reported near Uganda's capital: officials

Initial test results indicate that a 12-year-old girl died of the deadly Ebola virus in a town about 35 kilometres (22 miles) north of Kampala, health officials told AFP on Saturday.

Preliminary testing carried out at the Uganda Virus Research Institute showed on Friday that the girl died from the virus on May 6 at Bombo hospital, said Dr Miriam Nanyunja, disease prevention and control officer for the World Health Organisation in Uganda.

"She came into the hospital and died a few hours later," Nanyunja said. "They tested for Ebola and the confirmatory result came out yesterday."

Nanyunja said that health officials were currently looking for more cases in the area and planned to set up an isolation unit at Bombo hospital in anticipation of new patients.

Ugandan director general of health services Dr Nathan Mugisha confirmed the preliminary results and said that a taskforce was meeting on Saturday to work out how to deal with any potential outbreak.

"So far it is only preliminary test results and there is a meeting in progress," Mugisha told AFP.

The rare haemorrhagic disease, named after a small river in neighbouring Democratic Republic of Congo, killed 37 people in western Uganda in 2007 and claimed the lives of at least 170 people in the north of the country in 2000. (c) 2011 AFP