http://www.sciencenews.org/view/generic/id/346636/title/Auditory_test_predicts_coma_awakening

Auditory test predicts coma awakening

Patients whose sound discrimination improved in 48 hours eventually awoke

By Tanya Lewis

A coma patient's chances of surviving and waking up could be predicted by changes in the brain's ability to discriminate sounds, new research suggests.

Recovery from coma has been linked to auditory function before, but it wasn't clear whether function depended on the time of assessment. Whereas previous studies tested patients several days or weeks after comas set in, a new study looks at the critical phase during the first 48 hours. At early stages, comatose brains can still distinguish between different sound patterns,. How this ability progresses over time can predict whether a coma patient will survive and ultimately awaken, researchers report.

"It's a very promising tool for prognosis," says neurologist Mélanie Boly of the Belgian National Fund for Scientific Research, who was not involved with the study. "For the family, it's very important to know if someone will recover or not."

A team led by neuroscientist Marzia De Lucia of the University of Lausanne in Switzerland studied 30 coma patients who had experienced heart attacks that deprived their brains of oxygen. All the patients underwent therapeutic hypothermia, a standard treatment to minimize brain damage, in which their bodies were cooled to 33° Celsius for 24 hours.

De Lucia and colleagues played sounds for the patients and recorded their brain activity using scalp electrodes - once in hypothermic conditions during the first 24 hours of coma, and again a day later at normal body temperature. The sounds were a series of pure tones interspersed with sounds of different pitch, duration or location. The brain signals revealed how well patients could discriminate the sounds, compared with five healthy subjects. After three months, the coma patients had either died or awoken. All the patients whose discrimination improved by the second day of testing survived and awoke from their comas. By contrast, many of those whose sound discrimination deteriorated by the second day did not survive. The results were reported online November 12 in Brain.

Psychophysiologist Geert van Boxtel of Tilburg University, in the Netherlands, found it surprising that "irrespective of outcome, at the first recording, all of the patients showed signs of auditory discrimination." This, De Lucia says, suggests that residual auditory function itself does not predict recovery; rather, it's the progression of function over time that is predictive.

The study couldn't distinguish whether auditory function initially was preserved due to the hypothermia treatment or was related merely to the early stage of coma. But the scientists speculate that distracting neural jabber may have been reduced during the hypothermia, making it easier for the patients' brains to separate sounds. De Lucia and her colleagues are now running a follow-up study with 120 coma patients, to see whether the results can be replicated in a bigger population. "This test could give information about patients who will survive during the first two days of coma, when doctors can still make decisions about treatment," De Lucia says.

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Using biomarkers from prehistoric human feces to track settlement and agriculture

Geoscientists have used a biomarker from human feces in a completely new way to establish the first human presence

For researchers who study Earth's past environment, disentangling the effects of climate change from those related to human activities is a major challenge, but now University of Massachusetts Amherst geoscientists have used a biomarker from human feces in a completely new way to establish the first human presence, the arrival of grazing animals and human population dynamics in a landscape.

Doctoral student Robert D'Anjou and his advisor Raymond Bradley, director of the Climate System Research Center at UMass Amherst, with UMass colleagues Nick Balascio and David Finkelstein, describe their findings in the current online edition of Proceedings of the National Academy of Sciences.

"We are really excited about how well this method worked," D'Anjou says. "Without even knowing it, early settlers were recording their history for us, and in the most unlikely of ways, in their poop. The prehistoric settlers and their livestock pooped and their feces washed into the lake, which over time left a record of trace amounts of specific molecules that are only produced in the intestines of higher mammals. When you find these molecules at certain concentrations and in specific ratios, it provides an unmistakable indicator that people were living in the area." Bradley adds, "This approach opens the door to other studies, where the presence of humans is uncertain; we believe it has great potential for much wider applications in archaeology."

D'Anjou carried out the work just north of the Arctic Circle, at Lake Liland in the Lofoten Islands in northern Norway, where humans were thought to have lived in prehistoric settlements from the early Iron Age through the Viking period. They extracted two sediment cores from the lake bottom and used radiocarbon measurements and the presence of volcanic ash from Iceland to establish their chronology. The sediments provided a continuous record extending back roughly 7,000 years.

Paleoclimatologists have long used markers in lakebed sediments, such as charcoal from humans' fires and pollen from cultivated plants, as a natural archive of environmental changes to estimate when humans first began having an impact. But these indirect indicators must be used with care when reconstructing the history of a place because it's not always clear that they indicate human activity in the same area.

By contrast, the presence of a molecular biomarker directly linked to humans, one transmitted through their bowel movements, offers "a strong human signal," as the authors put it, one that can be dated with "excellent chronological control." D'Anjou and colleagues extracted the compound coprostanol, a molecular marker formed from the digestion of cholesterol in the human gut, from the sediment, plus other sterols characteristic of other mammals to estimate the presence of sheep and cattle. From these, they were able to produce a long-term record of the presence and relative population size of humans extending back over thousands of years at the site.

In addition, the geoscientists used two other molecular markers to reconstruct the vegetation history: relative length of carbon molecules found in leaf waxes (different in forest and grassland), and pyrolytic polycyclic aromatic hydrocarbons (PAH) as evidence of fire in the Lake Liland area. They say that taken together, the sediment cores, vegetation changes and fire records clearly define a pre-settlement period with no detectable human activity in the lake's water catchment area from about 7,300 to 2,250 years ago.

At that point, however, changes in the background state appear in the record, marking an "abrupt shift" to significantly increased levels of pyrolytic PAH first, followed by increased human fecal material. This likely indicates that as people moved in, they first cleared the land by burning before establishing a permanent settlement, the researchers say. "This interpretation is bolstered," they add, by the leaf wax record that shows a "marked transition to a more grassland-dominated landscape beginning at this time."

After the initial influx of people to the region, D'Anjou and colleagues say the record shows a lull in human activity from about 2,040 to 1,900 years ago, reflected in all markers. After this, the human and livestock populations steadily increased to a local maximum around the year 500, based on the fecal record, then fell again to a second minimum around the year 850.

The climate scientists note a further decline in human activity and population to another minimum at about AD 1750 that coincided with the highest relative grassland cover for the entire 7,300-year history. Findings related to human activity over the past 7,300 years in northern Norway correlate well with other climate reconstructions, in particular summer temperature patterns indicating poor vs. fruitful growing seasons. This shows that the early settlers were vulnerable to small changes in summer temperature at this far northern location. Overall, the authors say, the new fecal markers are likely to prove valuable in many other places, to distinguish natural from human factors that influenced the environment in the past.

This work was funded by the U.S. National Oceanographic and Atmospheric Administration.

http://www.eurekalert.org/pub_releases/2012-11/msu-hod112612.php

Hearty organisms discovered in bitter-cold Antarctic brine

Where there's water there's life – even in brine beneath 60 feet of Antarctic ice, in permanent darkness and subzero temperatures.

EAST LANSING, Mich. - While Lake Vida, located in the northernmost of the McMurdo Dry Valleys of East Antarctica, will never be a vacation destination, it is home to some newly discovered hearty microbes. In the current issue of the Proceedings of the National Academy of Sciences, Nathaniel Ostrom, Michigan State University zoologist, has co-authored "Microbial Life at -13ºC in the Brine of an Ice-Sealed Antarctic Lake." Ostrom was part of a team that discovered an ancient thriving colony, which is estimated to have been isolated for more than 2,800 years. They live in a brine of more than 20 percent salinity that has high concentrations of

ammonia, nitrogen, sulfur and supersaturated nitrous oxide – the highest ever measured in a natural aquatic environment.
"It's an extreme environment – the thickest lake ice on the planet, and the coldest, most stable cryo-environment on Earth," Ostrom said. "The discovery of this ecosystem gives us insight into other isolated, frozen environments on Earth, but it also gives us a potential model for life on other icy planets that harbor saline deposits and subsurface oceans, such as Jupiter's moon Europa."
On the Earth's surface, water fuels life. Plants use photosynthesis to derive energy. In contrast, at thermal vents at the ocean bottom, out of reach of the sun's rays, chemical energy released by hydrothermal processes supports life.
Life in Lake Vida lacks sunlight and oxygen. Its high concentrations of hydrogen gas, nitrate, nitrite and nitrous oxide likely provide the chemical energy used to support this novel and isolated microbial ecosystem. The high concentrations of hydrogen and nitrous oxide gases are likely derived from chemical reactions with the surrounding iron-rich rocks.
Consequently, it is likely that the chemical reactions between the anoxic brine and rock provide a source of energy to fuel microbial metabolism. These processes provide new insights into how life may have developed on Earth and function on other planetary bodies, Ostrom said.
The research team comprised scientists from the Desert Research Institute (Reno, Nev.), the University of Illinois-Chicago, NASA, the University of Colorado, the Jet Propulsion Laboratory, Montana State University, the University of Georgia, the University of Tasmania and Indiana University.

http://www.eurekalert.org/pub_releases/2012-11/cmaj-qii112012.php

Grapefruit–medication interactions increasing

The number of prescription drugs that can have serious adverse effects from interactions with grapefruit are markedly increasing

The number of prescription drugs that can have serious adverse effects from interactions with grapefruit are markedly increasing, yet many physicians may be unaware of these effects, states an article published in CMAJ (Canadian Medical Association Journal). The article, a review by the researchers who discovered the interactions more than 20 years ago, summarizes evidence to help clinicians better understand the serious effects this common food can have when consumed with certain prescription drugs.
"Many of the drugs that interact with grapefruit are highly prescribed and are essential for the treatment of important or common medical conditions," writes Dr. David Bailey, Lawson Health Research Institute, London, Ont., with coauthors. "Recently, however, a disturbing trend has been seen. Between 2008 and 2012, the number of medications with the potential to interact with grapefruit and cause serious adverse effects…has increased from 17 to 43, representing an average rate of increase exceeding 6 drugs per year. This increase is a result of the introduction of new chemical entities and formulations."
Adverse effects include sudden death, acute kidney failure, respiratory failure, gastrointestinal bleeding, bone marrow suppression in immunocompromised people, renal toxicity and other serious side effects.
"Unless health care professionals are aware of the possibility that the adverse event they are seeing might have an origin in the recent addition of grapefruit to the patient's diet, it is very unlikely that they will investigate it," write the authors. "In addition, the patient may not volunteer this information. Thus, we contend that there remains a lack of knowledge about this interaction in the general healthcare community."
There are more than 85 drugs that may interact with grapefruit, and 43 can have serious side effects. Other citrus fruits such as Seville oranges, often used in marmalade, limes and pomelos also contain the active ingredients (furanocoumarins). These chemicals are innate to the fruit and cause the interaction by irreversible inhibition of the drug metabolizing CYP3A4 enzyme that normally inactivates the effects of an estimated 50% of all medication. Drugs that interact with these chemicals have three characteristics: they are administered orally, they have very low to intermediate bioavailability (percentage of the oral dose of drug absorbed into the blood circulation unchanged) and they undergo drug metabolism in the gastrointestinal tract by CYP3A4. For drugs with very low bioavailability, ingestion of a single normal amount of grapefruit can be analogous to consuming multiple doses of the drug alone.
This interaction can occur even if grapefruit is consumed many hours before taking the medication. Thus, a modest solitary quantity of grapefruit can affect interacting drugs that are taken once a day at any time during the dosing interval. Frequent daily consumption of a regular amount can further augment the effect. For example, simvastatin, a commonly used statin, combined with a 200-mL glass of grapefruit juice once a day for 3 days, produced a 330% systemic concentration of the drug compared with water.

People older than 45 years are the prime purchasers of grapefruit and receive the most prescriptions for drugs. Because of the size of this population, substantial exposure to this interaction is likely. As well, older adults can have decreased ability to tolerate excessive systemic drug concentrations. Consequently, older people are especially vulnerable to these interactions.
"The current trend of increasing numbers of newly marketed grapefruit-affected drugs possessing substantial adverse clinical effects necessitates an understanding of this interaction and the application of this knowledge for the safe and effective use of drugs in general practice," conclude the authors.

http://www.eurekalert.org/pub_releases/2012-11/nsf-ml112612.php

Microbial 'missing link' discovered after man impales hand on tree branch

Scientists uncover how insects domesticate bacteria

It all started with a crab apple tree.
Two years ago, a 71-year-old Indiana man impaled his hand on a branch after cutting down a dead tree. The wound caused an infection that led scientists to discover a new bacterium and solve a mystery about how bacteria came to live inside insects.
On Oct. 15, 2010, Thomas Fritz, a retired inventor, engineer and volunteer firefighter, cut down a dead, 10-foot-tall crab apple tree outside his home near Evansville, Ind. As he dragged away the debris, he got tangled in it and fell. A small branch impaled his right hand in the fleshy web between the thumb and index finger.
A former emergency medical technician, Fritz dressed the wound, which became swollen. Then he waited for a scheduled visit with his doctor a few days later. By then, a cyst formed at the wound site. The doctor put Fritz on an antibiotic after sending a sample of the cyst to a lab.
The pain and swelling persisted and the wound became abscessed. About five weeks after the accident, an orthopedic surgeon removed several pieces of bark from the wound, which finally healed without further incident. Only later did Fritz find out that his infected wound contained a previously unknown bacterium that scientists say could be used to block disease transmission by insects and prevent crop damage.
Scientists call the new strain human Sodalis or HS; it's related to Sodalis, a genus of bacteria that lives symbiotically inside insects' guts. The journal PLOS Genetics published a paper detailing the discovery today.
"Symbiotic interactions between microorganisms and insects are common, and biologists suspect that they're an important driver of biological diversification," says Matt Kane, program director in the National Science Foundation's Division of Environmental Biology, which funded the research.
"But how such symbioses came to be is often a mystery," Kane says. "This particular story has a happy ending, but also an interesting one, because researchers used it to gain insight into how insects and microbes can form symbiotic partnerships in the first place."
As in the case of the crab apple tree, "there are bacteria in the environment that form symbiotic relationships with insects," says University of Utah biologist Kelly Oakeson, the study's lead co-author. "This is the first time such a bacterium has been found and studied."

Identifying a New Strain of Bacteria

The lab that first received the sample from Fritz's infected wound couldn't identify the bacterium once it was isolated. So the organism was shipped to ARUP Laboratories, a national pathology reference library operated by the University of Utah. An automated analysis at ARUP found that the bacterium from Fritz was E. coli, but scientists doubted the results. "We had close matches for it, but none were validly described species," says Mark Fisher of the ARUP Institute for Clinical and Experimental Pathology and a co-author of the paper. "It caught my eye because I knew Colin Dale worked on Sodalis."
Dale is the researcher who discovered and named Sodalis in 1999. He is a biologist at the University of Utah and is the study's senior author. He says that genetic sequencing showed that the HS bacterium is related to bacteria that live symbiotically in 17 insect species, including tsetse flies, weevils, bird lice and stinkbugs, and is most closely related to bacteria in the chestnut weevil and a stinkbug species.
The study compared HS with genomes of the strain Sodalis glossinidius that lives in tsetse flies and another Sodalis-like bacterium that lives in grain weevils. Compared with HS, the other two bacterial species have lost or deactivated about half their genes.

A Missing Link

According to Dale, the findings provide "a missing link in our understanding of how beneficial insect-bacteria relationships originate.
"They show that these relationships arise independently in each insect. The insect picks up a pathogen that is widespread in the environment and then domesticates it. This happens independently in each insect."
A competing theory is that parasitic wasps and mites spread symbiotic bacteria from one insect to another.

Dale says that theory cannot explain why such similar types of Sodalis bacteria are found in insects that differ widely in location and diet, including insects that feed either on plants or animals.
The new results support the theory that insects are infected by pathogenic bacteria from plants or animals in their environment, and that the bacteria evolve to become less virulent and to provide benefits to the insect. Then, instead of spreading from one insect to another, the bacteria spread from mother insects to their offspring.

Taming Invading Bacteria

Various bacteria live symbiotically in blood or fat cells or in special structures attached to the guts of as many as 10 percent of all insects. The bacteria gain shelter and nutrition from their insect hosts, and they produce nutrients--B vitamins and amino acids--to help feed the insects. Sometimes they also produce toxins to kill invaders, such as fungi or the eggs laid in an insect by a parasitic wasp.
Sodalis is only one of several types of bacteria that live in insects. Symbiotic bacteria are known for having the smallest genetic blueprints, or genomes, of any cellular organism because as they evolve inside an insect, they lose genes that would be needed for survival outside the insect.
But when biologists sequenced the new bacterium's genome, they found that HS has a relatively large genetic blueprint and is closely related to Sodalis-like bacteria that have smaller genomes and live in many species of insects, implying that Sodalis-like bacteria all descended from a bacterium like HS.

A Way to Block Some Insect-Spread Diseases?

The researchers believe the discovery could have important implications. They say it may be possible to genetically alter the new bacterium to block disease transmission by insects like tsetse flies and prevent crop damage by insect-borne viruses.
"If we can genetically modify a bacterium that could be put back into insects, it could be used as a way to combat diseases transmitted by those insects," says Adam Clayton, a University of Utah biologist and lead author of the paper unveiling the new bacterium and its genome.
Tsetse flies and aphids both carry symbiotic Sodalis bacteria related to strain HS. Sodalis doesn't grow well outside insects, but HS grows well in the lab. So it may be possible to insert genes in HS, and then place the bacteria in tsetse flies to kill the protozoan parasites that live in the flies and cause sleeping sickness in people and domestic animals in Africa.
Aphids transmit many plant viruses that attack soybeans, alfalfa, beets, beans and peanuts. Replacing their normal symbiotic bacteria with a genetically engineered strain of HS could interfere with disease transmission.
The researchers speculate that in addition to the HS bacterium, there are likely many other undiscovered bacteria in the environment that could form symbiotic relationships with insects.
"We have identified very few of the bacteria that exist in nature," says Dale, "and new species and strains like HS are often only discovered when they infect humans."
Additional co-authors of the paper are Maria Gutin, Arthur Pontes, Diane Dunn, Andrew von Niederhausern and Robert Weiss, all of the University of Utah. The National Institutes of Health also funded the research.

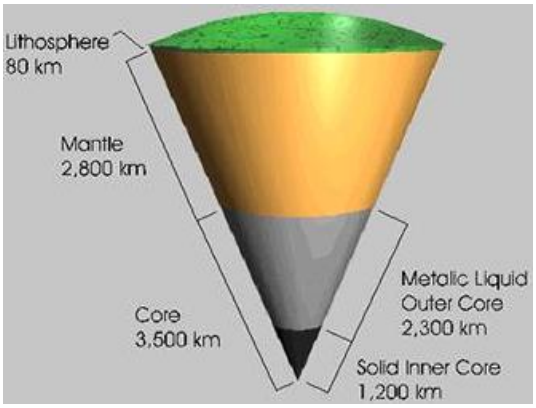
http://news.discovery.com/earth/earth-hum-helps-probe-interior-121126.html#mkcpgn=rssnws1

Earth's 'Hum' Helps Probe Planet's Interior

The global "hum" of the Earth is now helping geophysists probe the planet's deep interior.

Content provided by Charles Q. Choi, OurAmazingPlanet

The global "hum" of the Earth is now helping geophysicists probe the planet's deep interior, a group of researchers say. Since this hum - called seismic noise, which is generated by sources such as storm-driven ocean waves - is detectable everywhere on Earth, it could help scientists analyze the innards of the planet worldwide, investigators added in a new study detailed in the Nov. 23 issue of the journal Science.
PHOTOS: Top 10 Greatest Eruptions in Geologic History
Traditionally, researchers peer into the interior of the Earth by analyzing seismic waves generated by earthquakes. The way seismic waves zip through the planet depends on physical properties of the Earth's innards, such as rock composition, temperature and pressure. As such, the way the waves behave offers useful clues about details of Earth's geology that are otherwise largely hidden from view.



The Earth's Interior. USGS

"With these waves, seismologists produce images in a way similar to medical imaging," researcher Michel Campillo, a seismologist at Joseph Fourier University in Grenoble, France, told OurAmazingPlanet.

The problem with this strategy is that it depends on earthquakes. "Large earthquakes are rare - fortunately!" Campillo said. Quakes also mostly recur in specific places, which leads to some areas being imaged well but leaving others relatively obscure.
In addition to seismic waves from earthquakes, the interior of the Earth is pervaded by seismic noise, a collective hum resulting from the bombardment of Earth's surface by a variety of sources, such as the swelling of oceans during storms. "The noise was regarded as useless and even problematic since it hides slight earthquake signals," Campillo said.

Tracking noise

However, in recent years, by analyzing large amounts of seismic data collected over time, investigators successfully followed ambient seismic noise waves as they rippled across Earth's surface. Now scientists reveal they can also use ambient noise to image Earth's deep interior. The advantage of this strategy is that "ambient noise imaging can be applied in regions without earthquakes," Campillo said.
The scientists installed 42 seismic recording stations in northern Finland and compared seismic noise signals between each station. By filtering out earthquake signals and ambient seismic noise surface waves, they were able to reconstruct how ambient seismic noise rippled through the Earth.
"Finland was a good place because it is a place with very old and homogeneous crust," Campillo said. Its old age meant it had little in the way of new activity to confuse readings, while its uniform nature meant there was little diversity of material to complicate findings.

Geo toolbox

Using this data, the researchers imaged the transition zone separating the upper and lower layers of the Earth's mantle, the main layer just below Earth's crust. The top of the mantle was about 9 miles (15 kilometers) thick and 255 miles (410 km) from the Earth's surface, while its bottom was about 2.5 miles (4 km) thick and 410 miles (660 km) from the Earth's surface. The differences between top and bottom are due to changes in crystal structure resulting from how pressure varies according to depth. "These changes of microstructures result in increase of seismic speeds, which we eventually detect when waves are reflected on the layers where they occur," Campillo said.
Ultimately, ambient seismic noise might not only help researchers scan the mantle transition zone - where the upper and lower layers meet - but also probe all the way down to the core-mantle boundary.
"Ambient noise is another element in the geophysicist's toolbox," Campillo said. "Our study suggests that it could be developed everywhere, allowing for new collections of observations at the global scale."

http://www.eurekalert.org/pub_releases/2012-11/smri-cfi112712.php

Compound found in rosemary protects against macular degeneration in laboratory model

Sanford-Burnham researchers discover that carnosic acid, a component of the herb rosemary, promotes eye health in rodents - providing a possible new approach for treating conditions such as age-related macular degeneration

LA JOLLA, Calif. – Herbs widely used throughout history in Asian and early European cultures have received renewed attention by Western medicine in recent years. Scientists are now isolating the active compounds in many medicinal herbs and documenting their antioxidant and anti-inflammatory activities. In a study published in the journal Investigative Ophthalmology & Visual Science, Stuart A. Lipton, M.D., Ph.D. and colleagues at Sanford-Burnham Medical Research Institute (Sanford-Burnham) report that carnosic acid, a component of the herb rosemary, promotes eye health.
Lipton's team found that carnosic acid protects retinas from degeneration and toxicity in cell culture and in rodent models of light-induced retinal damage. Their findings suggest that carnosic acid may have clinical applications for diseases affecting the outer retina, including age-related macular degeneration, the most common eye disease in the U.S.

Age-related macular degeneration

Age-related macular degeneration likely has many underlying causes. Yet previous studies suggest that the disease might be slowed or improved by chemicals that fight free radicals - reactive compounds related to oxygen and nitrogen that damage membranes and other cell processes.
Lipton's team first discovered a few years ago that carnosic acid fights off free radical damage in the brain. In their latest study, Lipton and colleagues, including Tayebeh Rezaie, Ph.D. and Takumi Satoh, Ph.D., initially investigated carnosic acid's protective mechanism in laboratory cultures of retinal cells.
The researchers exposed the cells growing in the dish to hydrogen peroxide in order to induce oxidative stress, a factor thought to contribute to disease progression in eye conditions such as macular degeneration and retinitis pigmentosa. They found that cells treated with carnosic acid triggered antioxidant enzyme production in the

cells, which in turn lowered levels of reactive oxygen and nitrogen species (cell-damaging free radicals and peroxides).

Rosemary's therapeutic potential

Lipton, Rezaie, Satoh and colleagues next tested carnosic acid in an animal model of light-induced damage to photoreceptors - the part of the eye that converts light to electrical signals, enabling visual perception. As compared to the untreated group, rodents pre-treated with carnosic acid retained a thicker outer nuclear layer in the eye, indicating that their photoreceptors were protected. The carnosic acid-treated rodents also exhibited better electroretinogram activity, a measure of healthy photoreceptor function.

What's next for carnosic acid? "We're now developing improved derivatives of carnosic acid and related compounds to protect the retina and other brain areas from a number of degenerative conditions, including age-related macular degeneration and various forms of dementia," said Lipton, director of Sanford-Burnham's Del E. Webb Neuroscience, Aging, and Stem Cell Research Center and an active clinical neurologist.

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The study was co-authored by Tayebeh Rezaie, Sanford-Burnham; Scott R. McKercher, Sanford-Burnham; Kunio Kosaka, Nagase & Co., Ltd.; Masaaki Seki, Sanford-Burnham; Larry Wheeler, Allergan, Inc.; Veena Viswanath, Allergan, Inc.; Teresa Chun, Allergan, Inc.; Rabina Joshi, Sanford-Burnham; Marcos Valencia, Sanford-Burnham; Shunsuke Sasaki, Iwate University; Terumasa Tozawa, Iwate University; Takumi Satoh, Sanford-Burnham and Iwate University; and Stuart A. Lipton, Sanford-Burnham.

http://www.eurekalert.org/pub_releases/2012-11/uoc--fca111412.php

4 common antipsychotic drugs found to lack safety and effectiveness in older adults

Four of the antipsychotics most commonly prescribed off label for use in patients over 40 were found to lack both safety and effectiveness

In older adults, antipsychotic drugs are commonly prescribed off-label for a number of disorders outside of their Food and Drug Administration (FDA)-approved indications – schizophrenia and bipolar disorder. The largest number of antipsychotic prescriptions in older adults is for behavioral disturbances associated with dementia, some of which carry FDA warnings on prescription information for these drugs.

In a new study – led by researchers at the University of California, San Diego School of Medicine, Stanford University and the University of Iowa, and funded by the National Institute of Mental Health – four of the antipsychotics most commonly prescribed off label for use in patients over 40 were found to lack both safety and effectiveness. The results will be published November 27 in The Journal of Clinical Psychiatry.

The study looked at four atypical antipsychotics (AAPs) – aripiprazole (Abilify), olanzapine (Zyprexa), quetiapine (Seroquel), and risperidone (Risperdal) – in 332 patients over the age of 40 diagnosed with psychosis associated with schizophrenia, mood disorders, PTSD, or dementia.

"Our study suggests that off-label use of these drugs in older people should be short-term, and undertaken with caution," said Dilip V. Jeste, MD, Estelle and Edgar Levi Chair in Aging, Distinguished Professor of Psychiatry and Neurosciences, and director of the Stein Institute for Research on Aging at UC San Diego.

Results of the five-year study led by Jeste, who is also current president of the American Psychiatric Association (which was not involved in this research), showed that within one year of treatment, one-third of the patients enrolled in the study developed metabolic syndrome (medical disorders that can increase the risk of cardiovascular disease or diabetes). Within two years, nearly a quarter of the patients developed serious adverse effects and just over half developed non-serious adverse effects.

Because the patients enrolled in the study were all diagnosed with conditions with psychotic symptoms that required antipsychotic drug treatment according to their treating physicians, no placebo was used in the trial. Instead, the researchers used a technique called "equipoise stratified randomization" which is a hybrid of complete randomization and a clinician's choice method.

"Our goal was to ensure clinical relevance," said Jeste. Patients had to agree to be randomized to 2, 3 or 4 of the study drugs, as they or their physicians were allowed to exclude one or two of the study AAPs, due to past experience or anticipated risk of the particular drug. Treating clinicians could determine the optimal dosage.

"We attempted to make the study as 'user-friendly' as possible, to allow the drugs the best chance of success, while seeking to minimize the amount of bias," he explained.

While the researchers' intent was to continue the patients on the randomized medications for two years, the average length turned out to be only six months, after which the medications were halted or switched because they didn't work and/or had side effects.

Because of a notably high incidence of serious adverse events, quetiapine had to be discontinued midway through the trial. The researchers found that there were significant differences among patients willing to be randomized to different AAPs – thus, treating clinicians tended to exclude olanzapine and prefer aripiprazole as one of the possible choices in patients with existing metabolic problems. Yet, the different AAP groups did not appreciably differ in most outcome measures.
Using a common scale called the Brief Psychiatric Rating Scale (BPRS), to measure symptoms such as delusions, hallucinations, unusual behavior, depression, and anxiety, assessments were made at 6 weeks, 12 weeks, and then every 12 weeks. Results using "blind" raters showed no significant improvement in BPRS over a six-month period.
"While there were a few significant differences among the four drugs, the overall risk-benefit ratio for the AAPs in patients over age 40 was not favorable, irrespective of diagnosis and drug," said Jeste.
Jeste points out that clinicians, patients, and caregivers are often left with difficult and unclear choices for treatment for older persons with psychosis, such as that associated with dementia. Not only are psychosis and agitation common in persons with dementia but they also frequently cause considerable caregiver distress and hasten institutionalization of patients. At the same time, there are no FDA-approved alternatives to antipsychotics for this population, and the high cost of newer AAPs also makes their use problematic.
While the researchers say their findings do not suggest that these AAPs should be banned in older patients with psychiatric disorders, they do indicate that considerable caution is warranted in off-label, long-term use of the drugs in older persons.
"When these medications are used off-label, they should be given in low dosages and for short durations, and their side effects monitored closely," said Jeste. "Clearly, there is also a critical need to develop and test new interventions that are safe and effective in older people with psychotic disorders."
Other authors of this paper are Hua Jin, MD, Pei-an Betty Shih, PhD, Shahrokh Golshan, PhD, Sunder Mudaliar, MD, Robert Henry, MD, and Danielle K. Glorioso, MSW, from University of California, San Diego; Helena C. Kraemer, PhD, emerita professor of biostatistics in psychiatry at Stanford University, and Stephan Arndt, PhD, professor of psychiatry and biostatistics at the University of Iowa.
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http://www.eurekalert.org/pub_releases/2012-11/uok-ksf112712.php

Kentucky study finds common drug increases deaths in atrial fibrillation patients

Digoxin increases the possibility of death when used by patients wita atrial fibrillation

LEXINGTON, Ky. - Digoxin, a drug widely used to treat heart disease, increases the possibility of death when used by patients with a common heart rhythm problem − atrial fibrillation (AF), according to new study findings by University of Kentucky researchers. The results have been published in the prestigious European Heart Journal, and raises serious concerns about the expansive use of this long-standing heart medication in patients with AF.
UK researchers led by Dr. Samy Claude Elayi, associate professor of medicine at UK HealthCare's Gill Heart Institute, analyzed data from 4,060 AF patients enrolled in the landmark Atrial Fibrillation Follow-up Investigation of Rhythm Management (AFFIRM) trial. This analysis was intended to determine the relationship between digoxin and deaths in this group of patients with atrial fibrillation, and whether digoxin was directly responsible for some deaths.
"These findings raise important concerns about the safety of digoxin, one of the oldest and most controversial heart drugs," said Dr. Steven E. Nissen, chair of cardiovascular medicine at the Cleveland Clinic. "Although considered obsolete by some authorities, digoxin is still widely used. A thorough review by the FDA is warranted to determine whether regulatory action is needed, including stronger warnings about the use of digoxin in patients with atrial fibrillation. "
Digoxin is extracted from the foxglove plant and it helps the heart beat more strongly, and at a slower heart rate. It is commonly used in AF patients and in patients with heart failure. However, it can be problematic to use successfully as there is a narrow dose range at which it is effective, and beyond which it can be dangerous.
Though digoxin has been used by physicians treating AF for decades, until now, there has been limited evidence demonstrating the effect of digoxin in patients with this condition. "Digoxin in AF patients has hardly been studied," said Elayi. "The main prospective randomised controlled trials available with digoxin were performed in patients with heart failure and sinus rhythm, and routinely excluded AF patients."
The results of the analysis found that digoxin was associated with a 41 percent increase in deaths from any cause after controlling for other medications and risk factors. An increase in deaths occurred regardless of gender or the presence or absence of underlying heart failure. Digoxin was also associated with a 35 percent

increase in deaths from cardiovascular causes, and a 61 percent increase in deaths from arrhythmias or problems with the rate or rhythm of the heartbeat.
"Within five years of use, one additional AF patient out of six taking digoxin − compared to those not on digoxin in the AFFIRM trial− will die from any cause," Elayi said. "One additional patient out of eight will die from cardiovascular causes, and one additional patient out of 16 will die from arrhythmias.
"This study calls into question the widespread use of digoxin in patients with AF, particularly when used for controlling AF rate in a similar way as in the AFFIRM trial," Elayi said. "These findings suggest that physicians should try to control a patient's heart rate by using alternatives such as beta-blockers or calcium blockers ,as a first line treatment.
"If digoxin is used, prescribers should use a low dose with careful clinical follow up, evaluate potential drug interactions when starting new medications, and monitor digoxin levels."
In addition, patients should also be aware of potential toxicity and see their physicians immediately in specific clinical situations, he said. For instance, if they experience increasing nausea, vomiting, palpitations or syncope, as those may precede arrhythmic death, Elayi added.
The researchers say that the mechanism by which digoxin increases deaths among patients is unclear. Deaths from classic cardiovascular causes - whether or not they are due to arrhythmia - can partly but not entirely explain it. This suggests there must be some additional mechanism that remains to be identified, said Elayi.
"Our study underscores the importance of reassessing the role of digoxin in the contemporary management of AF in patients with or without HF," concluded the authors in their paper. "There is a need for further studies of the drug's use, particularly in systolic heart failure patients and AF – patients that would, in theory, benefit the most from digoxin."

http://www.eurekalert.org/pub_releases/2012-11/uomh-mww112612.php

Most women who have double mastectomy don't need it, U-M study finds

Worry about recurrence was driving factor, but 70 percent had very low risk of developing cancer in healthy breast

ANN ARBOR, Mich. - About 70 percent of women who have both breasts removed following a breast cancer diagnosis do so despite a very low risk of facing cancer in the healthy breast, new research from the University of Michigan Comprehensive Cancer Center finds.
Recent studies have shown an increase in women with breast cancer choosing this more aggressive surgery, called contralateral prophylactic mastectomy, which raises the question of potential overtreatment among these patients. The study found that 90 percent of women who had surgery to remove both breasts reported being very worried about the cancer recurring. But, a diagnosis of breast cancer in one breast does not increase the likelihood of breast cancer recurring in the other breast for most women.
"Women appear to be using worry over cancer recurrence to choose contralateral prophylactic mastectomy. This does not make sense, because having a non-affected breast removed will not reduce the risk of recurrence in the affected breast," says Sarah Hawley, Ph.D., associate professor of internal medicine at the U-M Medical School. Hawley will present the findings Nov. 30 at the American Society of Clinical Oncology's Quality Care Symposium.
The study authors looked at 1,446 women who had been treated for breast cancer and who had not had a recurrence. They found that 7 percent of women had surgery to remove both breasts. Among women who had a mastectomy, nearly 1 in 5 had a double mastectomy. In addition to asking about the type of treatment, researchers asked about clinical indications for double mastectomy, including the patients' family history of breast and ovarian cancer and the results of any genetic testing.
Women with a family history of two or more immediate family members (mother, sister, daughter) with breast or ovarian cancer or with a positive genetic test for mutations in the BRCA1 or BRCA2 genes may be advised to consider having both breasts removed, because they are at high risk of a new cancer developing in the other breast. But women without these indications are very unlikely to develop a second cancer in the healthy breast.
"For women who do not have a strong family history or a genetic finding, we would argue it's probably not appropriate to get the unaffected breast removed," says Hawley, who is also a research investigator at the Ann Arbor VA Center of Excellence in Clinical Care Management Research and a member of the U-M Institute for Healthcare Policy and Innovation.
A double mastectomy is a bigger operation that is associated with more complications and a more difficult recovery. Women might still need to undergo chemotherapy or radiation therapy after their surgery – treatments that are known to reduce the risk of cancer recurring – which could delay their recovery further.

The study suggests that concern about recurrence is one of the biggest factors driving the decision to have this surgery. Hawley says it's important to educate women better that a contralateral mastectomy will not reduce the risk of recurrence. She and her colleagues have recently received a large grant from the National Cancer Institute that will in part allow them to develop a decision tool to help guide women through breast cancer treatment choices.

"I believe surgeons are telling their patients that a contralateral mastectomy won't reduce their risk of recurrence and that it is associated with higher morbidity. But this procedure is still done and it's done in women who don't need to have it done. A decision tool like ours will solicit common misconceptions about breast cancer treatment and give women feedback to help them fully understand the options and risks involved," says Hawley.

Breast cancer statistics: 229,060 Americans will be diagnosed with breast cancer this year and 39,920 will die from the disease, according to the American Cancer Society

Additional authors: Reshma Jagsi, University of Michigan; Monica Morrow, Memorial Sloan-Kettering Cancer Center; Ann Hamilton, University of Southern California; Kendra Schwartz, Wayne State University; and Steven J. Katz, University of Michigan

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Reference: "Is Contralateral Prophylactic Mastectomy (CPM) Overused? Results from a Population-Based Study," American Society of Clinical Oncology Quality Care Symposium, Nov. 30-Dec. 1, 2012

http://www.eurekalert.org/pub_releases/2012-11/uog-mbf112712.php

Man's best friend: Common canine virus may lead to new vaccines for deadly human diseases

Researchers at the University of Georgia have discovered that a virus commonly found in dogs may serve as the foundation for the next great breakthrough in human vaccine development.

Athens, Ga. - Although harmless in humans, parainfluenza virus 5, or PIV5, is thought to contribute to upper respiratory infections in dogs, and it is a common target for canine vaccines designed to prevent kennel cough. In a paper published recently in PLOS ONE, researchers describe how this virus could be used in humans to protect against diseases that have eluded vaccine efforts for decades.

"We can use this virus as a vector for all kinds of pathogens that are difficult to vaccinate against," said Biao He, the study's principal investigator and professor of infectious diseases in UGA's College of Veterinary Medicine. "We have developed a very strong H5N1 flu vaccine with this technique, but we are also working on vaccines for HIV, tuberculosis and malaria."

PIV5 does not cause disease in humans, as our immune system is able to recognize and destroy it. By placing antigens from other viruses or parasites inside PIV5, it effectively becomes a delivery vehicle that exposes the human immune system to important pathogens and allows it to create the antibodies that will protect against future infection. This approach not only ensures full exposure to the vaccine but also is much safer because it does not require the use of attenuated, or weakened, pathogens. For example, an HIV vaccine delivered by PIV5 would contain only those parts of the HIV virus necessary to create immunity, making it impossible to contract the disease from the vaccine.

"Safety is always our number one concern," said He, who is also a Georgia Research Alliance distinguished investigator and member of the Faculty of Infectious Diseases. "PIV5 makes it much easier to vaccinate without having to use live pathogens."

Using viruses as a delivery mechanism for vaccines is not a new technique, but previous efforts have been fraught with difficulty. If humans or animals already possess a strong immunity to the virus used for delivery, the vaccine is unlikely to work, as it will be destroyed by the immune system too quickly.

"Pre-existing immunity to viruses is the main reason most of these vaccines fail," He said.

But in this latest study, He and his colleagues demonstrate that immunity to PIV5 does not limit its effectiveness as a vaccine delivery mechanism, even though many animals–including humans– already carry antibodies against it.

In their experiments, the researchers found that a single dose inoculation using PIV5 protected mice from the influenza strain that causes seasonal flu. Another single dose experimental vaccine also protected mice from the highly pathogenic and deadly H5N1 virus commonly known as bird flu.

This recent work is a culmination of more than fifteen years of research and experimentation with the PIV5 virus, and He has confidence that it will serve as an excellent foundation for vaccines to treat diseases in both animals and humans.

"I believe we have the best H5N1 vaccine candidate in existence," He said. "But we have also opened up a big field for a host of new vaccines."

http://www.wired.com/wiredscience/2012/11/inside-germanys-bold-plan-to-tap-the-oceans-resources/

Inside Germany's Bold Plan to Tap Deep-Sea Resources

Metal-rich sulfide rock deposits have begun to attract attention from mineral-mining companies

By Jeffrey MarlowEmail Author

Thirty-five hundred meters beneath the surface of the ocean, hydrothermal vents are spewing minerals from mid-ocean ridges, creating billowing plumes of photogenic "black smoke" and providing chemical energy for one of the most unique and unexpected ecosystems on the planet. This flocculent flow ultimately settles on the seafloor, producing metal-rich sulfide rock deposits that have begun to attract attention from mineral-mining companies.

Peter Herzig is the Executive Director of Germany's Helmholtz Centre for Ocean Research in Kiel (GEOMAR), one of the world's premier institutions of oceanographic research. He is firmly behind the mining of deep-sea sulfides, which could provide economically viable quantities of copper, zinc, gold, silver, indium, germanium, and gallium. A rock deposit equivalent to the volume of the Houston Astrodome could have a current market value of $5 billion, according to Herzig. The highly concentrated nature of the resource makes it a much more attractive target than the harvesting of manganese-rich nodules, whose sparse distribution would necessitate the oceanic equivalent of strip mining. "I personally cannot see manganese mining happening without very innovative new technologies," he cautions. Hydrothermally deposited sulfides are a different story, but Herzig is quick to acknowledge that mining must be done in an environmentally sensitive way. Only inactive sulfide systems – whose hydrothermal plumbing has turned off – should be on the table. "It would be a major mistake to go into those active systems," he says, "and that would not be tolerated."

Resource Exploitation is just one of four ways that Herzig has focused GEOMAR's resources on the potential monetization of the ocean, a platform he highlighted during an address at the Falling Walls Conference, a scientific jamboree held each Nov. 9 in Berlin.

Herzig is also looking to tap into gas hydrates – vast sub-seafloor deposits of difficult-to-access natural gas. Within a narrow envelope of particular pressure and temperature conditions, molecular-scale cages of water ice enclose methane, leading to the disconcerting curiosity of flammable ice. Methane hydrates are extensive in the deep sea, but their structural instability makes them a potentially volatile resource; widespread destabilization could spew vast quantities of methane into the atmosphere, enhancing the greenhouse effect.

But Herzig and his GEOMAR scientists have a plan. They propose an exercise in molecular sleight of hand, extracting methane molecules and replacing them with carbon dioxide before the structure becomes unstable. "The trick is that the carbon dioxide is not deposited as a gas," he points out, "but in solid phase. This way, for each methane that comes out, three carbon dioxide molecules go in," producing a mining operation that is, on balance, carbon-negative. He's already seen immense interest in Asia around methane hydrates, and Herzig is trying to position German industry to get in on the ground floor of what he believes is a coming boom.

GEOMAR is also looking to capitalize on natural substances – such as antibiotics or therapeutic enzymes – and lake-based aquaculture. "We need to get farmed fish off of fish-based diets," Herzig explains; "otherwise you're not producing a net increase in human-consumable food." The plan is to do so with a "closed-system approach," in which various trophic levels are cultivated and fish are fed algae or nematode worms.

Herzig's stridently pro-business steering of GEOMAR is a distinctive approach to deep-sea research, but he views his job with a heavy dose of realism. "As a society, we need to transfer basic knowledge into applications in some areas," he maintains. "In a future where we have 9 billion people on the planet, the land area won't grow, so we will be putting major pressure on the ocean for energy, food, and raw materials."

"It's just a matter of doing the resource math."

http://www.sciencedaily.com/releases/2012/11/121127093951.htm

Chemical 'Switches' for Neurodegenerative Diseases Discovered

Using a model, researchers have identified and "switched off" a chemical chain that causes neurodegenerative diseases

ScienceDaily -By using a model, researchers at the University of Montreal have identified and "switched off" a chemical chain that causes neurodegenerative diseases such as Huntington's disease, amyotrophic lateral sclerosis and dementia. The findings could one day be of particular therapeutic benefit to Huntington's disease patients. "We've identified a new way to protect neurons that express mutant huntingtin proteins," explained Dr. Alex Parker of the University of Montreal's Department of Pathology and Cell Biology and its affiliated CRCHUM Research Centre.

A cardinal feature of Huntington's disease -- a fatal genetic disease that typically affects patients in midlife and causes progressive death of specific areas of the brain -- is the aggregation of mutant huntingtin protein in cells.

"Our model revealed that increasing another cell chemical called progranulin reduced the death of neurons by combating the accumulation of the mutant proteins. Furthermore, this approach may protect against neurodegenerative diseases other than Huntington's disease."
There is no cure for Huntingdon's disease and current strategies show only modest benefits, and a component of the protein aggregates involved are also present in other degenerative diseases. "My team and I wondered if the proteins in question, TDP-43 and FUS, were just innocent bystanders or if they affected the toxicity caused by mutant huntingtin," Dr. Parker said. To answer this question, Dr. Parker and University of Montreal doctoral student Arnaud Tauffenberger turned to a simple genetic model based on the expression of mutant huntingtin in the nervous system of the transparent roundworm C. elegans. A large number of human disease genes are conserved in worms, and C. elegans in particular enables researchers to rapidly conduct genetic analyses that would not be possible in mammals.
Dr. Parker's team found that deleting the TDP-43 and FUS genes, which produce the proteins of the same name, reduced neurodegeneration caused by mutant huntingtin. They then confirmed their findings in the cell of a mammal cell, again by using models. The next step was then to determining how neuroprotection works. TDP-43 targets a chemical called progranulin, a protein linked to dementia. "We demonstrated that removing progranulin from either worms or cells enhanced huntingtin toxicity, but increasing progranulin reduced cell death in mammalian neurons. This points towards progranulin as a potent neuroprotective agent against mutant huntingtin neurodegeneration," Dr. Parker said. The researchers will need to do further testing this in more complex biological models to determine if the same chemical switches work in all mammals. If they do, then progranulin treatment may slow disease onset or progression in Huntington's disease patients.
A. Tauffenberger, B. P. Chitramuthu, A. Bateman, H. P. J. Bennett, J. A. Parker. Reduction of polyglutamine toxicity by TDP-43, FUS and Progranulin in Huntington's Disease models. Human Molecular Genetics, 2012; DOI: 10.1093/hmg/dds485

http://www.sciencedaily.com/releases/2012/11/121127094111.htm

Linguist Makes Sensational Claim: English Is a Scandinavian Language

Scientists now believe they can prove that English is in reality a Scandinavian language

ScienceDaily - "Have you considered how easy it is for us Norwegians to learn English?" asks Jan Terje Faarlund, professor of linguistics at the University of Oslo. "Obviously there are many English words that resemble ours. But there is something more: its fundamental structure is strikingly similar to Norwegian. We avoid many of the usual mistakes because the grammar is more or less the same.
Faarlund and his colleague Joseph Emmonds, visiting professor from Palacký University in the Czech Republic, now believe they can prove that English is in reality a Scandinavian language, in other words it belongs to the Northern Germanic language group, just like Norwegian, Danish, Swedish, Icelandic and Faroese. This is totally new and breaks with what other language researchers and the rest of the world believe, namely that English descends directly from Old English. Old English, or Anglo-Saxon, is a West Germanic language, which the Angles and Saxons brought with them from Northern Germany and Southern Jylland when they settled in the British Isles in the fifth century.

Old English died out

"Modern English is a direct descendant of the language of Scandinavians who settled in the British Isles in the course of many centuries, before the French-speaking Normans conquered the country in 1066," says Faarlund. He points out that Old English and Modern English are two very different languages. Why?
"We believe it is because Old English quite simply died out while Scandinavian survived, albeit strongly influenced of course by Old English," he says.
The 'cohabitation' between the British and the Scandinavians was largely hostile. Both fought for political hegemony. The descendants of the Vikings gained control of the eastern and northern parts of the country. The Danelaw was under the control of Scandinavian chiefs for half a century.
Like most colonists, the Scandinavian-speaking inhabitants found no reason to switch to the language of the country they had arrived in. "One especially important, geographic point in our study is that the East Midlands region, where the spoken language later developed into Modern English, coincides almost exactly with the densely populated, southern part of the Danelaw," says the professor. The language changed a great deal in the period after the Normans arrived. The miserable conditions people lived in at the time resulted in a complete merger of the two previously separate groups of people - the Old English speakers and the Scandinavian speakers - and out of this came Middle English - the predecessor of Modern English.

Adopted words they already had

The language adopted many words from the Danelaw's inhabitants who were of Norwegian and Danish descent. For example, all the lexical words in this sentence are Scandinavian: ***He took the knife and cut the steak*****.** Only he, the and and come from Old English.

"What is particularly interesting is that Old English adopted words for day-to-day things that were already in the language. Usually one borrows words and concepts for new things. In English almost the reverse is true -- the day-to-day words are Scandinavian, and there are many of them," says Faarlund.
Here are some examples***: anger, awe, bag, band, big, birth, both, bull, cake, call, cast, cosy, cross, die, dirt, dream, egg, fellow, flat, gain, get, gift, give, guess, guest, hug, husband, ill, kid, law, leg, lift, likely, link, loan, loose, low, mistake, odd, race, raise, root, rotten, same, seat, seem, sister, skill, skin, skirt, sky, steak, though, thrive, Thursday, tight, till, trust, ugly, want, weak, window, wing, wrong.***
The researchers believe that Old English already had 90 per cent of these concepts in its own vocabulary.
Took over the grammar
But the Scandinavian element was not limited to the vocabulary, which is normal when languages come into contact with each other. Even though a massive number of new words are on their way into a language, it nevertheless retains its own grammar. This is almost a universal law.
"But in England grammatical words and morphemes -- in other words the smallest abstract, meaningful linguistic unit -- were also adopted from Scandinavian and survive in English to this day."
Scandinavian syntax
The two researchers show that the sentence structure in Middle English -- and thus also Modern English -- is Scandinavian and not Western Germanic. "It is highly irregular to borrow the syntax and structure from one language and use it in another language. In our days the Norwegians are borrowing words from English, and many people are concerned about this. However, the Norwegian word structure is totally unaffected by English. It remains the same. The same goes for the structure in English: it is virtually unaffected by Old English."
"How can you illustrate this?"
"We can show that wherever English differs syntactically from the other Western Germanic languages -- German, Dutch, Frisian -- it has the same structure as the Scandinavian languages." Here are some examples:
* Word order: In English and Scandinavian the object is placed after the verb:
I have read the book.
Eg har lese boka.
German and Dutch (and Old English) put the verb at the end.
Ich habe das Buch gelesen.
* English and Scandinavian can have a preposition at the end of the sentence.
This we have talked about.
Dette har vi snakka om.
* English and Scandinavian can have a split infinitive, i.e. we can insert a word between the infinitive marker and the verb.
I promise to never do it again.
Eg lovar å ikkje gjera det igjen.
*** Group genitive:**
The Queen of England's hat.
Dronninga av Englands hatt.
"All of this is impossible in German or Dutch, and these kinds of structures are very unlikely to change within a language. The only reasonable explanation then is that English is in fact a Scandinavian language, and a continuation of the Norwegian-Danish language which was used in England during the Middle Ages."
"But why the inhabitants of the British Isles chose the Scandinavian grammar is something we can only speculate on," says Jan Terje Faarlund.

http://www.sciencedaily.com/releases/2012/11/121127094315.htm

Brief Exercise Immediately Enhances Memory

Results Apply to Older Adults Both With and Without Cognitive Deficits

ScienceDaily - A short burst of moderate exercise enhances the consolidation of memories in both healthy older adults and those with mild cognitive impairment, scientists with UC Irvine's Center for the Neurobiology of Learning & Memory have discovered. Most research has focused on the benefits of a long-term exercise program on overall health and cognitive function with age. But the UCI work is the first to examine the immediate effects of a brief bout of exercise on memory.
In their study, post-doctoral researcher Sabrina Segal and neurobiologists Carl Cotman and Lawrence Cahill had people 50 to 85 years old with and without memory deficits view pleasant images -- such as photos of nature and animals -- and then exercise on a stationary bicycle for six minutes at 70 percent of their maximum capacity immediately afterward.

One hour later, the participants were given a surprise recall test on the previously viewed images. Results showed a striking enhancement of memory by exercise in both the healthy and cognitively impaired adults, compared with subjects who did not ride the bike.

"We found that a single, short instance of moderately intense exercise particularly improved memory in individuals with memory deficits," Segal said. "Because of its implications and the need to better understand the mechanism by which exercise may enhance memory, we're following up this study with an investigation of potential underlying biological factors."

She believes the improved memory may be related to the exercise-induced release of norepinephrine, a chemical messenger in the brain known to play a strong role in memory modulation. This hypothesis is based on previous work demonstrating that increasing norepinephrine through pharmacological manipulation sharpens memory and that blocking norepinephrine impairs memory.

In the more recent research, Segal and her colleagues discovered that levels of salivary alpha amylase, a biomarker that reflects norepinephrine activity in the brain, significantly increased in participants after exercise. This correlation was especially strong in people with memory impairment.

"The current findings offer a natural and relatively safe alternative to pharmacological interventions for memory enhancement in healthy older individuals as well as those who suffer from cognitive deficits," Segal noted. "With a growing population of the aged, the need for improvement of quality of life and prevention of mental decline is more important than ever before."

Study results appear in the November issue (Volume 32, Number 4) of the Journal of Alzheimer's Disease. UCI's Alzheimer's Disease Research Center and the National Institute of Mental Health (grant number 575082), a division of the National Institutes of Health, supported the research.

Sabrina K Segal, Carl W Cotman, Lawrence F Cahill. Exercise-Induced Noradrenergic Activation Enhances Memory Consolidation in Both Normal Aging and Patients with Amnestic Mild Cognitive Impairment. Journal of Alzheimer's Disease, 2012 DOI: 10.3233/JAD-2012-121078

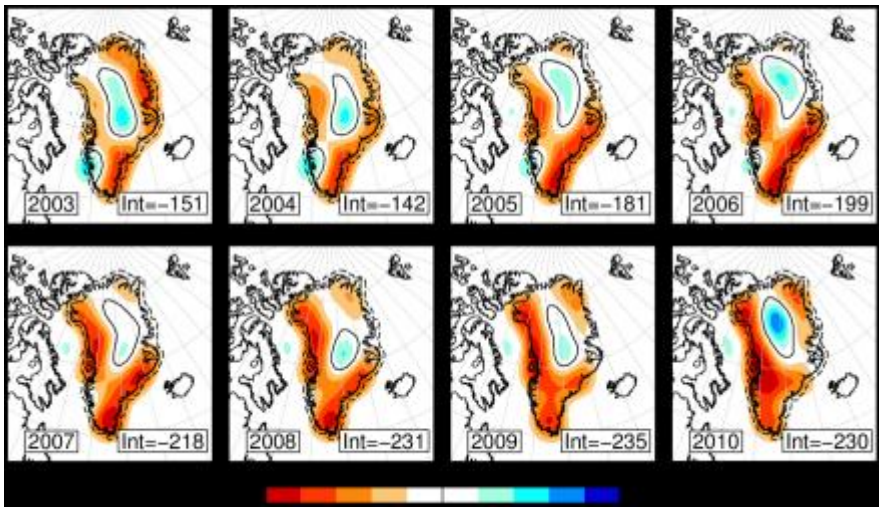
http://phys.org/news/2012-11-embracing-noise-greenland-complex-ice.html

Embracing data 'noise' brings Greenland's complex ice melt into focus

The rate at which it Greenland's ice sheet is melting might be accelerating more slowly than predicted

Phys.org - An enhanced approach to capturing changes on the Earth's surface via satellite could provide a more accurate account of how ice sheets, river basins and other geographic areas are changing as a result of natural and human factors. In a first application, the technique revealed sharper-than-ever details about Greenland's massive ice sheet, including that the rate at which it is melting might be accelerating more slowly than predicted.

Princeton University researchers developed a mathematical framework and a computer code to accurately capture ground-level conditions collected on particular geographic regions by the GRACE satellites (Gravity Recovery And Climate Experiment), according to a report in the Proceedings of the National Academy of Sciences. A joint project of NASA and the German Aerospace Center, GRACE measures gravity to depict how mass such as ice or water is distributed over the Earth's surface. A change in GRACE data can signify a change in mass, such as a receding glacier.



From 2003 to 2010, Greenland overall lost roughly 200 billion tons of ice each year, but glacier activity was regionally inconsistent. Ice loss was concentrated on the southeast and northwest coasts for most of the period, but the area of greatest melt activity began to migrate from the southeast to the northwest coast around 2008. By 2010, the southeast coast displayed only minor ice loss. Meanwhile, the higher and colder interior gained ice mass, as did the southwest coast, slightly, from 2003 to 2006. **Credit: Christopher Harig**

Typically, GRACE data are recorded for the whole globe and processed to remove large regional differences, said lead author Christopher Harig, a postdoctoral research associate in Princeton's Department of Geosciences. The result is a coarse image that can provide a general sense of mass change, but not details such as various mass fluctuations within an area.

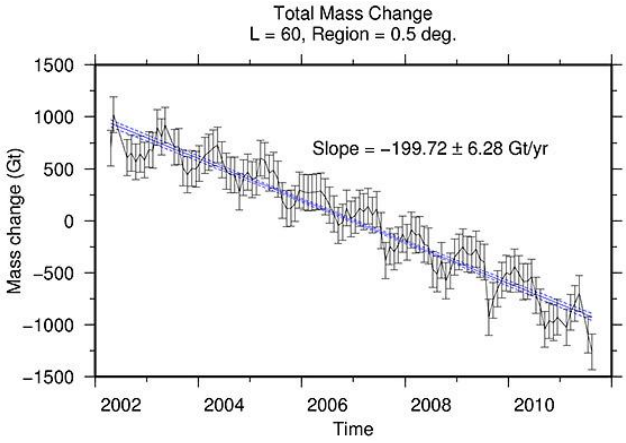
With their method, Harig and co-author Frederik Simons, an assistant professor of geosciences, can clean up data "noise" - the signal variations and distortions that can obscure satellite readings - and then recover the finer surface details hidden within. From this, they can configure regional information into a high-resolution map that depicts the specific areas where mass change is happening and to what degree.

"We try to do very little processing to the data and stay closer to the real signal," Simons said. "GRACE data contain a lot of signals and a lot of noise. Our technique learns enough about the noise to effectively recover the signal, and at much finer spatial scales than was possible before. We can 'see through' the noise and recover the 'true' geophysical information contained in these data. We can now revisit GRACE data related to areas such as river basins and irrigation and soil moisture, not just ice sheets."

The researchers tested their method on GRACE data for Greenland recorded from 2003 to 2010 and brought the complexities of the island's glaciers into clearer focus.

While overall ice loss on Greenland consistently increased between 2003 and 2010, Harig and Simons found that it was in fact very patchy from region to region.

In addition, the enhanced detail of where and how much ice melted allowed the researchers to estimate that the annual acceleration in ice loss is much lower than previous research has suggested, roughly increasing by 8 billion tons every year. Previous estimates were as high as 30 billion tons more per year.



Despite variations in glacier activity, Greenland experienced a steady ice loss of 200 billion tons annually, which could stack up on all of Manhattan to nearly 12,000 feet, or more than eight times taller than the Empire State Building. Nonetheless, the researchers estimated that the annual acceleration in ice loss is much lower than previous research has suggested, roughly increasing by 8 billion tons every year. Previous estimates were as high as 30 billion tons more per year. **Credit: Christopher Harig**

Douglas MacAyeal, a geophysical sciences professor at the University of Chicago, said that the research provides a standardized and accurate method for translating GRACE data, particularly for ice sheets. The sprawling, incomplete nature of the satellite's information has spawned a myriad of approaches to interpreting it, some unique to specific scientists, he said.

"GRACE data is notoriously noisy and spatially spread out, and this has resulted in 'ad hoc' methods for processing mass changes of Earth's ice sheets that have wildly different values," said MacAyeal, who is familiar with the Princeton work but had no role in it.

"In other words, each particular investigator ends up getting a different individual number for the net change in mass," he said. "What this research does is figure out a way to be more thoughtful and purposeful about exactly how to deal with GRACE's notorieties. This method would allow researchers to standardize a bit more and also to understand more precisely where they are, and where they are not, able to resolve ice changes."

Simons compared the noise that previously obscured a precise view of Greenland's glaciers to fog on a window. For a small area such as Greenland, the GRACE signal can be easily overwhelmed by noise, which has numerous causes such as the satellite's orbital position or even the type of mathematics researchers use to interpret data, Simons said.

Princeton University researchers developed an enhanced approach to capturing changes on the Earth's surface via satellite that could provide a more accurate account of how geographic areas change as a result of natural and human factors. In a first application, the technique brought the complexities of Greenland's massive ice sheet into clearer focus. From 2003 to 2012, the ice sheet experienced patchy fluctuations in ice loss and gain, while the areas of greatest melt gradually migrated from the southeast to the northwest coast. Credit: Christopher Harig

"Other researchers used less than perfect tools to wipe off the window more or less indiscriminately and quite literally left streaks on the data. They were thus less able to put the continent into the proper focus," he said.

"We effectively modeled then removed noise to get the ice-loss signal out of the data," Simons said. "We then recovered relatively tiny variations in ice mass that to others might have looked like noise, but that to us were shown to be signal."

The Princeton researchers found that Greenland lost roughly 200 billion tons of ice each year during the seven-year period studied, which falls within the range reported by other studies. The amount of ice lost annually could stack up on all of Manhattan to nearly 12,000 feet, or more than eight times taller than the Empire State Building, Harig said.

As expected, ice loss occurred in the lower, warmer coastal areas - as opposed to the higher and colder interior, which gained ice mass - but the melt was concentrated on the southeast and northwest coasts for most of the period studied. Indeed, many coastal areas showed no ice-mass loss, while the ice sheet on the southwest coast actually thickened slightly from 2003 to 2006.

But these trends were more complex when Harig and Simons got into the details. Surprisingly, the location of the greatest melt activity migrated around the island, shifting from the southeast to the northwest coast in just a few years. Ice loss on the southeast coast built up starting in 2003 and hit a highpoint in 2007. In 2008, loss on this coast began to recede and shift toward the northwest coast; by 2010, the southeast coast displayed only minor ice loss, while nearly the entire western coast exhibited the most severe melt. During this transition, melt also receded then picked up again on the northeastern coast with seemingly little overlap with activity elsewhere.

Details such as these can help scientists better understand the interplay between Greenland's glaciers and factors that influence melt such as ocean temperature, daily sunshine and cloud coverage, Harig said. That understanding can in turn help researchers determine how the Greenland ice sheet responds to climate change - and how much more ice loss to expect. At current melt rates, the Greenland ice sheet would take about 13,000 years to melt completely, which would result in a global sea-level rise of more than 21 feet (6.5 meters), Harig said.

"Scientists are not totally sure what the driving force of the melt on Greenland is on short, yearly timescales," Harig said. "There is no certainty about which outside factor is the most important or if all of them contribute. Being able to compare what is happening regionally to field observations from other researchers of what a glacier is doing helps us figure out what is causing all this melt."

Michael Oppenheimer, Princeton's Albert G. Milbank Professor of Geosciences and International Affairs, said that the new level of detail Harig and Simons provide on Greenland's glaciers not only gives insight into what is causing the glaciers to melt, but what could possibly happen if they do.

Unlike water in a bathtub, sea-level rise is not uniform, said Oppenheimer, who is familiar with the research but had no role in it. Higher waters in certain locations may depend on which part of an ice sheet melts, he said. And determining which part of an ice sheet is melting the most requires precise details of ice loss and gain for specific glaciers - details that have largely been unavailable, Oppenheimer said.

"Nobody has really been able to take a look at an individual ice sheet and determine the influence that ice loss from different parts of that ice sheet could have on sea levels," Oppenheimer said.

"The details matter. Being able to pinpoint where and how much ice gain and loss there is tells you something about the driving forces behind it, and therefore how much we can expect in the future," he said. "A synoptic view at a high resolution is what GRACE always promised, and now this research has helped realize that potential. It's time to finally milk the data for as much detail as possible."

Harig is adapting the computer code - which is available online - to study GRACE data on ice loss in Antarctica and water accumulation in the Amazon River basin.

The paper, "Mapping Greenland's mass loss in space and time," was published online Nov. 19 in the Proceedings of the National Academy of Sciences. It was supported by a grant from the National Science Foundation.

More information: www.pnas.org/content/early/2012/11/14/1206785109.abstract Provided by Princeton University

http://blogs.scientificamerican.com/science-sushi/2012/11/27/plants-cry-for-help-attracts-the-wrong-crowd/

Plant's Cry For Help Attracts The Wrong Crowd

Researchers have discovered that hyperparasitoids can also smell the call being broadcast by the plant

By Christie Wilcox | November 27, 201

A simple white butterfly caterpillar (Pieris rapae) nibbles blissfully on a cabbage leaf, completely unaware of the complex interspecies interactions he has just set in motion. The cabbage, displeased with the damage the caterpillar is doing to its tissues, is releasing volatile compounds into the air, hoping to attract parasitoid wasps like Cotesia glomerata, which use caterpillars like the one eating through the cabbage's precious leaves as incubators for their larvae - and succeeds. Drawn by the compounds wafting off of the damage plant, a female wasp arrives and finds the defenseless caterpillar. Using a needle-like appendage, she injects her eggs into the caterpillar's body, and her larvae hatch and feed on the caterpillar's internal organs one by one, carefully selecting the least important so that their meal survives as long as possible. Finally, when they are ready to pupate, the wasp larvae tunnel out, and through a chemical trick, convince their half-dead host to spin them a protective web of silk. Success, thinks the plant (if plants could think); its cry for help has stopped another hungry caterpillar in its tracks.

But, as Dutch scientists have discovered, the story doesn't end there. What goes around comes around for the C. glomerata, as there are other wasps that use them as hosts, laying eggs in the wasp larvae that grew in the

caterpillar, like a parasitic Russian doll. Researchers have discovered that these hyperparasitoids (parasitoids of parasitoids) can smell the call being broadcast by the plant, too.
After all, the world is a large place. Parasites that need to find a very specific, small host benefit from having a way of finding what they need without wasting tons of energy searching. So it makes sense that Cotesia glomerata and other parasitoid wasps with caterpillar hosts are drawn to the chemical compounds emitted by damaged plants. If they're drawn, the wasps that parasitize them should be drawn, too. So the team tested this hypothesis by collecting air from undamaged plants, plants damaged by uninfected caterpillars, and plants damaged by caterpillars already infected with parasitiod wasp larvae, then presented those scents to hyperparasitoid wasps to see if they were attracted to them.
Not only were the wasps attracted to the smell of caterpillar damage in general, "we found that they preferentially detected odours of plants damaged by infected caterpillars," explained Dr Erik Poelman, lead author of the study published today in PLoS Biology. The wasps were nearly five times more attracted to the damage done by infected caterpillars. "We were excited by these results as they indicate that hyperparasitoids rely on a network of interactions among plant, herbivore and parasitoids to locate their host".
But how did the wasps detected whether the caterpillars were infected? Poelman and his team wanted to find out. It's known that infection can change the saliva contents of caterpillars, so they took the saliva from uninfected and infected caterpillars and presented those scents to the wasps, but the wasps didn't care. So while the infection is altering the caterpillar's saliva, the change in attractive chemicals had to be coming from the plant. They then tested the different air collections for volatile compounds, and found the ones damaged by caterpillars infected with Cotesia glomerata were only 40% similar to the ones damaged by uninfected caterpillars. Something about infection changes the saliva in a caterpillar, which in turn affects what volatile compounds a plant emits when it gets damaged by that saliva.
This complex web of interactions calls in to question the role of the plant compounds in the first place. Though they are often thought of as a 'cry for help,' the team noted that this may not be the case at all. "Although plant volatiles may function as a "cue" to parasitoids, they may not be a specific ''signal'' released by the plant (implying a selective benefit)," write the authors. "It is important to emphasize that volatile cues may provide many community members with information and thereby may not necessarily result in a fitness benefit to plants."
These findings also call into question the use of parasitoid wasps as biocontrol for managing pests. Cotesia glomarata has been introduced and intentionally released in a number of agricultural areas to control caterpillars like Pieris rapae. Recently, some have suggested that farmers might be able to spray the volatile compounds emitted by damaged plants to attract more parasitoids, as a way of reducing pest populations without using pesticides. But the authors think that this strategy might not be so clear-cut. "Our results show that hyperparasitoids may parasitize up to 55% of the parasitoid offspring, therefore potentially playing a major role in parasitoid population dynamics," they caution. "Overexpression of herbivore-induced plant volatiles [HIPVs] in crops or field application of synthetic parasitoid attractants may not benefit pest control in conditions where the responses of hyperparasitoids to HIPVs cause major mortality to parasitoids."
In other words, the interactions between species are far more complex than we once thought, and we can't assume we can predict how our manipulations will affect a community - which is generally the trouble we've gotten into when trying to use biocontrol mechanisms. The more we try to tinker with interspecies interactions, the more unintended consequences we seem to have.
Research: Poelman E., Bruinsma M., Zhu F., Boursault A. & et al (2012). Hyperparasitoids Use Herbivore-Induced Plant Volatiles to Locate Their Parasitoid Host., PLoS Biology, 10 (11) e1001435. DOI: 10.1371/journal.pbio.1001435.t005

http://www.nature.com/news/brain-s-reading-centres-are-culturally-universal-1.11883

Brain's 'reading centres' are culturally universal

Whether you are reading in Chinese or French, the same brain areas light up.

Philip Ball

Learning to read Chinese might seem daunting to Westerners used to an alphabetic script, but brain scans of French and Chinese native speakers show that people harness the same brain centres for reading across cultures. The findings are published today in the *Proceedings of the National Academy of Sciences*[1]. Reading involves two neural systems: one that recognizes the shape of the word and a second that asseses the physical movements used to make the marks on a page, says study leader Stanislas Dehaene, a cognitive neuroscientist the National Institute of Health and Medical Research in Gif-sur-Yvette, France.
But it has been unclear whether the brain networks responsible for reading are universal or culturally distinct. Previous studies have suggested that alphabetic writing systems (such as French) and logographic ones (such as

Chinese, in which single characters represent entire words) writing systems might engage different networks in the brain.
To explore this question, Dehaene and his colleagues used functional magnetic resonance imaging to examine brain activity in Chinese and French people while they read their native languages.
The researchers found that both Chinese and French people use the visual and gestural systems while reading their native language, but with different emphases that reflect the different demands of each language.
"Rather than focusing on ear and eye in reading, the authors rightly point out that hand and eye are critical players," says Uta Frith, a cognitive neuroscientist at University College London. "This could lead into novel directions - for instance, it might provide answers why many people with dyslexia also have very poor handwriting and not just poor spelling."
Understanding how the brain decodes symbols during reading - using both visual and motor centres - might also inform learning strategies for general literacy, and ways to attune them to children or adults.

Reading Chinese characters involves the same brain regions as used when reading French. **pzechner / Alamy**

Subliminal images

There is evidence[2, 3] that for all languages, reading activates a shape-recognition region in the brain's posterior left hemisphere - the visual word-forming area (VWFA). But some research[5] has indicated that readers of Chinese - which places great emphasis on the order and direction of writing strokes - also use other brain networks involved in the motor skills that are engaged for writing. Motor processing is universally used for writing and involves[4] a brain region known as Exner's area. The researchers postulated that this region is also activated in reading to interpret the gestures assumed to have gone into making the marks.
To try to isolate the different brain regions involved in reading, Dehaene and his colleagues measured Chinese and French readers' response times in recognizing words on a screen. But unbeknown to the subjects, their responses were being subtly manipulated by a process called priming, in which other words or word-like symbols appear for just 50 milliseconds before the target word is shown - too briefly for the subjects to register the 'primes' consciously.
These subliminal images can assist or hinder the recognition process by tampering with the visual or the gestural reading system. For example, the priming word could be the target word written backwards - this slows the recognition process by disrupting the gestural reading system. Or flashing the same target word assists recognition when it is shown properly later. The researchers found that both the VWFA and Exner's area were indeed activated in French and Chinese subjects. But there were cultural differences: for example, the effects of gestural direction were stronger for the Chinese. Frith says that harnessing the gestural system more in education might help young children with reading. "So far the motor decoding side has been rather neglected in reading education," she says.

Nature doi:10.1038/nature.2012.11883
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http://www.wired.com/wiredscience/2012/11/bad-pork-cu/

Resistant Bacteria in Pork - And Problematic Pharmaceuticals Too

Tests on pork chops and ground pork, showed high rates of contamination with a range of bacteria, and also showed evidence of a drug so controversial that it is banned in some other countries

By Maryn McKennaEmail Author

Bad news today from an investigation conducted by Consumers Union that was released on the web and will be published in the January issue of the nonprofit's magazine, Consumer Reports. Tests on pork chops and ground pork, bought in six cities under a variety of labels, showed high rates of contamination with a range of bacteria, many of which were antibiotic-resistant - and also showed evidence of a drug so controversial that it is banned in some other countries.
The first set of tests, on 198 samples (148 from pork chops and 50 of ground pork), found contamination with Yersinia enterocolitica, Enterococcus, staph, Salmonella and Listeria monocytogenes. The rates of

contamination with most of those were relatively low - 11 percent of samples for enterococci, 7 percent for staph, less for salmonella and listeria - but the rate for yersinia was a jaw-dropping 69 percent. Only 23 percent of the samples carried none of those bacteria.
Among the bacteria isolated from the pork:

Out of 132 samples testing positive for Yersinia, 121 were resistant to at least one class of antibiotics, and 52 were resistant to two or more.

Out of 14 samples testing positive for staph, 13 were resistant to at least one class of antibiotics, and nine were resistant to two or more.

Out of 8 samples testing positive for salmonella, 6 were resistant to at least one class of antibiotics, and three were resistant to at least five drug types.

Out of 19 samples positive for enterococci, 12 were resistant to at least one class of antibiotics.

The second set of tests, on a separate 240 samples, found the controversial drug ractopamine in 20 percent of them. Ractopamine encourages pigs to put on lean muscle. It is legal in the United States - and because it is legal, given, usually without being disclosed, to at least 60 percent of pigs raised here - but it is banned in the European Union, China and Taiwan, which keeps U.S. exports from being sold in those markets. (The Food and Environment Reporting Network, with whom I have collaborated on stories, did an excellent investigation of ractopamine earlier this year.)
Constant readers will recognize that this is yet another in a sadly long line of research that routinely finds antibiotic-resistant bacteria in our food. But in addition to confirming past concerns, this report breaks new ground in two ways. First, there has been little testing for ractopamine in U.S. meat, because it is legal here. Second, most testing programs - including those run by the federal government - don't test for yersinia, a gut-dwelling bacterium that can cause acute diarrheal illness. Finding yersinia, let alone drug-resistant yersinia, is truly new.
The investigation concludes that programs meant to protect against bacterial contamination are not working, and asked the government for response. USDA told CU: "Very low (bacterial) contamination levels in hog carcasses indicate that companies' practices are adequately controlling pathogens." In addition, the nonprofit asked the hog industry for comment on the ractopamine findings. The response, quoting from the article:
"Ractopamine is approved and used in 26 other countries, including some of the Asian countries," says Dave Warner, director of communications for the National Pork Producers Council, an industry group. "The issues with China and Taiwan have nothing to do with the safety of the product. Countries that have banned pork or meat from animals fed ractopamine are doing it to protect their domestic pork industries. This is not about food safety."
Late today, Rep. Louise Slaughter (D-New York), the member of Congress who has been the strongest voice for controlling resistant bacteria in food, had this to say about the CU findings:

It's getting harder and harder for the food processing industry and the FDA to ignore the fact that the overuse of antibiotics in animals is threatening public health. Their half-measures and voluntary guidelines are no longer enough - we must act swiftly to reverse this public health crisis. I have legislation awaiting a vote in Congress to address this problem once and for all - and it's time we pass it into law.

For more, find the complete CU investigation, with background documents, at their website via ***this link.***

http://www.eurekalert.org/pub_releases/2012-11/byu-csm112812.php

College students more eager for marriage than their parents

Oprah's exchange with Justin Bieber a familiar conversation in American families

Reaching adulthood certainly takes longer than it did a generation ago, but new research shows one way that parents are contributing to the delay. A national study found that college students think 25 years old is the "right age" to get married, while a majority of parents feel 25 is still a little too soon. So it's no coincidence that when Justin Bieber said he'd like to wed by 25, Oprah Winfrey urged him to wait longer.
"The assumption has been that the younger generation wants to delay marriage and parents are hassling them about when they would get married," said Brian Willoughby, a professor at Brigham Young University and lead author of the study. "We actually found the opposite, that the parental generation is showing the 'slow down' mindset more than the young adults."
Willoughby and his co-authors in BYU's School of Family Life gathered info from 536 college students and their parents from five college campuses around the country (BYU was not in the sample). As they report in The Journal of Social and Personal Relationships, the scholars found the hesitation is consistent across gender.
"Initially we thought that this might be dads wanting their daughters to delay marriage," Willoughby said. "Moms and dads trended together – gender wasn't a factor."
One of the driving forces behind parents' restraint is the feeling that their children should get an education first. While they generally feel marriage is important, parents think the "right age" is one year older than what their

children say. Excluding teen marriages, research doesn't support the notion that there is an optimal time to tie the knot.
"I think parents have a lot of fear for their kids that makes them want to delay the transitions to adulthood," Willoughby said. According to Census data, the median age for first marriages is 27. Willoughby says that what people say is the "right age" generally comes a few years before the actual marriage age.
"What happens is that someone thinks that 25 is when they want to get married," Willoughby said. "So at age 25, they start changing their patterns around dating, and it takes two or so years to make the transition."
Though BYU students weren't in Willoughby's sample, the university's own records show about 25 percent of its students are married. Willoughby said that Mormon young adults typically marry about two years younger than their peers nationally and have risen in sync with national trends.
Chad Olsen, a graduate student in BYU's School of Family Life, is a co-author on the new study. Professors Jason Carroll, Larry Nelson and Rick Miller are also co-authors.

http://www.eurekalert.org/pub_releases/2012-11/lu-bct112812.php

Brain cell transplants in early 2013

As part of the European study TRANSEURO, five patients with Parkinson's disease will undergo brain cell transplants at Skåne University Hospital in Lund, Sweden, in early 2013. These are the first operations of their kind in Europe for over 10 years.

The TRANSEURO study, which in Sweden is led by Lund University, is now taking a critical approach to the viability of cell therapy as a future treatment for Parkinson's disease. Can we replace cells that die as a result of our most common neurological diseases? What are the therapies of the future for neurodegenerative diseases like Parkinson's and Alzheimer's?
Under the leadership of Professor of Neurology Olle Lindvall, brain researchers in Lund had already developed a method of transplanting nerve cells in the 1980s. In 1987, brain surgeon Stig Rehncrona operated on the very first patient. That study was historic and marked the first repair of the human nervous system. The news was cabled out to all the world's media and the Swedish researchers soon graced the front page of the New York Times.
"Since the advances made in the 1980s and 1990s, the research field has encountered many obstacles. In the early 2000s, two American studies produced negative results, which meant that cell transplants for Parkinson's disease came to a dead end", says Professor Anders Björklund, who in the 1980s was responsible for the ground-breaking discoveries in the laboratory.
Despite the unsatisfactory results presented in the American trials, cell therapy has still been seen to have effects that are entirely unique in the history of research on Parkinson's. A third of the transplant patients have seen significant benefits of cell therapy over a very long period without medication, in some cases up to 20 years.
"For a disease with a very demanding medication regime, and for which the effects of the standard medication begin to diminish after 5 years, cell therapy represents a hope of a different life for many Parkinson's sufferers", says Professor Håkan Widner, who is in charge of patient recruitment in Lund.
"The results of TRANSEURO will play an important role in the immediate future of cell therapy as a viable treatment. We have scrutinized the failed American studies in an attempt to optimise the technique, improve patient selection and conduct more personalised follow-up. We are hopeful that the results will be different this time", says Professor Widner.

http://www.eurekalert.org/pub_releases/2012-11/uow-mot112812.php

Most of the harmful mutations in people arose in the past 5,000 to 10,000 years

Spectrum of human genetic diversity today is vastly different from only 200 to 400 generations ago

A study dating the age of more than 1 million single-letter variations in the human DNA code reveals that most of these mutations are of recent origin, evolutionarily speaking. These kinds of mutations change one nucleotide – an A, C, T or G – in the DNA sequence. Over 86 percent of the harmful protein-coding mutations of this type arose in humans just during the past 5,000 to 10,000 years.
Some of the remaining mutations of this nature may have no effect on people, and a few might be beneficial, according to the project researchers. While each specific mutation is rare, the findings suggest that the human population acquired an abundance of these single-nucleotide genetic variants in a relatively short time.
"The spectrum of human diversity that exists today is vastly different than what it was only 200 to 400 generations ago," said Dr. Joshua Akey, associate professor of genome sciences at the University of Washington in Seattle. He is one of several leaders of a multi-institutional effort among evolutionary geneticists to date the first appearance of a multitude of single nucleotide variants in the human population.

Their findings appear in the Nov. 28 edition of Nature. The lead author is Dr. Wenqing Fu of the UW Department of Genome Sciences.
The work stems from collaboration among many genome scientists, medical geneticists, molecular biologists and biostatisticians at the UW, the University of Michigan, Baylor College of Medicine in Houston, the Broad Institute at MIT and Harvard, and the Population Genetics Working Group. The study is part of the Exome Sequencing Project of the National Heart, Lung, and Blood Institute at the National Institutes of Health.
To place this discovery in the context of the prehistory and ancient history of people, humans have been around for roughly 100,000 years. In the Middle East, cities formed nearly 8,500 years ago, and writing was used in Mesopotamia at least 5,500 years ago.
The researchers assessed the distribution of mutation ages by re-sequencing 15,336 protein-coding genes in 6,515 people. Of them, 4,298 were of European ancestry, and 2,217 were African.
The researchers based their explanation for the enormous excess of rare genetic variants in the present-day population on the Out-of-Africa model of the human diaspora to other parts of the world.
"On average, each person has about 150 new mutations not found in either of their parents," Akey said. "The number of such genetic changes introduced into a population depends on its size."
Larger populations, continuing to multiply by producing children, have more opportunities for new mutations to appear. The number of mutations thereby increases with accelerated population growth, such as the population explosion that began 5,115 years ago.
During the Out of Africa migration of some early humans into Europe and beyond some 50,000 years past, a population bottleneck occurred: The number of humans plummeted, and the shrinking remnant became more genetically similar. Back then, mutations that were only slightly damaging had a greater probability of being carried from one generation to the next, Akey explained. "Those mutations don't influence the ability to survive and reproduce," he said. "The Out of Africa bottleneck led to inefficient purging of the less-harmful mutations."
His group found that, compared to Africans, people of European descent had an excess of harmful mutations in essential genes, which are those required to grow to adulthood and have offspring, and in genes linked to Mendelian, or single-mutation diseases.
The study team also observed that the older the genetic variant, the less likely it was to be deleterious. In addition, certain genes, they learned, harbored only younger, more damaging, mutations that surfaced less than 5,000 years ago. These include 12 genes linked to such diseases as premature ovarian failure, Alzheimer's, hardening of the heart arteries, and an inherited form of paralysis.
Overall, the researchers predicted that about 81 percent of the single-nucleotide variants in their European samples, and 58 percent in their African samples, arose in the past 5,000 years. Older single- nucleotide variants – first appearing longer than 50,000 years ago – were more frequent in African samples.
The scientists also noted that mutations affecting genes involved in metabolic pathways – chemical reactions in the body to generate and tap energy – tended not to be weeded out by selective forces. Aberrant metabolism contributes to diabetes, lipid disorders, obesity, and insulin resistance – all common, modern scourges.
The researchers pointed out that the results illustrate the profound effect recent human evolutionary history has had on the burden of damaging mutations in contemporary populations.
"The historical details of human protein-coding variation provide practical information for prioritizing approaches to disease gene discovery," Akey said.
Although the enlarged mutational capacity resulting from population growth has led to a greater incidence of genetic disorders among the world's 7 billion people, there is brighter side to the story.
Mutations have fostered the great variety of traits seen among modern humans, according to the researchers, who added, "They also may have created a new repository of advantageous genetic variants that adaptive evolution may act upon in future generations."

http://www.sciencedaily.com/releases/2012/11/121128132259.htm

Human Genetic Variation Recent, Varies Among Populations

Nearly three-quarters of mutations in genes that code for proteins -- the workhorses of the cell -- occurred within the past 5,000 to 10,000 years, fairly recently in evolutionary terms.

ScienceDaily - Nearly three-quarters of mutations in genes that code for proteins -- the workhorses of the cell -- occurred within the past 5,000 to 10,000 years, fairly recently in evolutionary terms, said a national consortium of genomic and genetic experts, including those at Baylor College of Medicine.
"One of the most interesting points is that Europeans have more new deleterious (potentially disease-causing) mutations than Africans," said Dr. Suzanne Leal, professor of molecular and human genetics at BCM and an author of the report. She is also director of the BCM Center for Statistical Genetics. "Having so many of these

new variants can be partially explained by the population explosion in the European population. However, variation that occur in genes that are involved in Mendelian traits and in those that affect genes essential to the proper functioning of the cell tend to be much older." (A Mendelian trait is controlled by a single gene. Mutations in that gene can have devastating effects.)

How events affected genome

The amount variation or mutation identified in protein-coding genes (the exome) in this study is very different from what would have been seen 5,000 years ago, said Leal and her colleagues in the report that appears online in the journal Nature. The report shows that "recent" events have a potent effect on the human genome. Eighty-six percent of the genetic variation or mutations that are expected to be harmful arose in European-Americans in the last five thousand years, said the researchers.

The researchers used established bioinformatics techniques to calculate the age of more than a million changes in single base pairs (the A-T, C-G of the genetic code) that are part of the exome or protein-coding portion of the genomes (human genetic blueprint) of 6,515 people of both European-American and African-American decent. The research was an offshoot of the National Heart, Lung and Blood Institute Exome Sequencing Project.

Human population increase

"The recent dramatic increase in human population size, resulting in a deluge of rare functionally important variation, has important implications for understanding and predicting current and future patterns of human disease and evolution," wrote the authors in their report.

Others institutions that took part in this research include the University of Washington, Seattle; University of Michigan, Ann Arbor; the Broad Institute of MIT and Harvard.

Funding for the research came from the GO (Grand Opportunity) Exome Sequencing Project (NHLBI grants RC2 HL-103010 (Heart GO), RC2 HL-102923 (Lung GO) and RC2 HL-102924 (WHISP). The exome sequencing was supported by NHLBI grants RC2HL-102925 (Broad GO) and RC2 HL-102926 (Seattle GO).

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http://www.eurekalert.org/pub_releases/2012-11/osu-aoc112812.php

Analysis of conflicting fish oil studies finds that omega-3 fatty acids still matter

A recent analysis has sorted through many competing findings, and helps to explain why so many of the studies seem to arrive at differing conclusions

CORVALLIS, Ore. – Literally hundreds of clinical trials, including some that have gained widespread attention, have been done on the possible benefits of omega-3 fatty acids for the prevention of heart disease – producing conflicting results, varied claims, and frustrated consumers unsure what to believe.

A recent analysis done by scientists in the Linus Pauling Institute at Oregon State University, published in the Journal of Lipid Research, has sorted through many of these competing findings, and it helps to explain why so many of the studies seem to arrive at differing conclusions.

The review concludes that both fish consumption and dietary omega-3 fatty acid supplements may still help prevent heart disease; that some fatty acids, from certain sources, are more effective than others; that these compounds may have enormous value for serious health problems other than heart disease; and that the very effectiveness of modern drug therapies for heart disease may be one explanation for the conflicting findings on the benefits of omega-3 fatty acids.

"After decades of studying omega-3 fatty acids, it's clear that they have value in primary prevention of heart disease," said Donald Jump, author of the analysis, a principal investigator in the Linus Pauling Institute, and professor in the OSU College of Public Health and Human Sciences.

"It's less clear how much impact fish oils have in preventing further cardiovascular events in people who already have heart disease," Jump said. "The studies done several decades ago showed value even for that patient population, but the more recent studies are less conclusive. We believe that one explanation is the effectiveness of current state-of-the-art treatments now being offered."

Some of the earliest work that raised interest in omega-3 fatty acids was done in the 1970s with Greenland Inuits, who ate large amounts of fish and were found to have unusually low levels of cardiovascular disease. But, Jump said, millions of people now at risk for cardiovascular disease take medications such as statin drugs for high cholesterol; fibrates for high triglycerides; anti-thrombotics to thin their blood; and other drugs with anti-inflammatory or anti-arrhythmia effects. Fish oils can have positive effects on virtually all of these same cardiovascular risk factors, Jump said, but so can the drugs.

"Some of the early studies done on fish oil were prior to so many effective medications being widely available and heavily used," Jump said. "And people often forget that nutrients, like fish oils, are less potent than prescription drugs, and often have their best value when used for extended periods.
"When so many people in these studies are taking a regimen of medications to address the same issues that fish oil might also affect, it's easy to understand why any added benefit from the fish oils is more difficult to detect," he said.
The point, Jump said, is not that omega-3 fatty acids have no value – they do. But for studies of their value in cardiovascular disease, which are often done when patients are taking other medications, that value is less clear. A wide body of other research, he says, makes it clear that omega-3 fatty acids also have health benefits that go beyond cardiovascular disease. They have been shown to improve visual acuity; improve cognitive function and reduce dementia; reduce inflammation and perhaps some types of cancer, such as colon cancer; and reduce total mortality. Among the findings of this review:

An important type of omega-3 fatty acid for human health is DHA, which is the predominant omega-3 fatty acid that accumulates in tissues.

Plant-derived sources of these fatty acids, such as flaxseed oil or chia seeds, have less benefit than those from cold-water fish, because of differences in how the human body processes these nutrients.

For individuals unwilling or unable to consume fish or fish-oil supplements, some products made from yeast or algae are high quality.

It's difficult to be certain of the amount of omega-3 fatty acids in farm-raised fish, since these fish require dietary omega-3 supplementation.

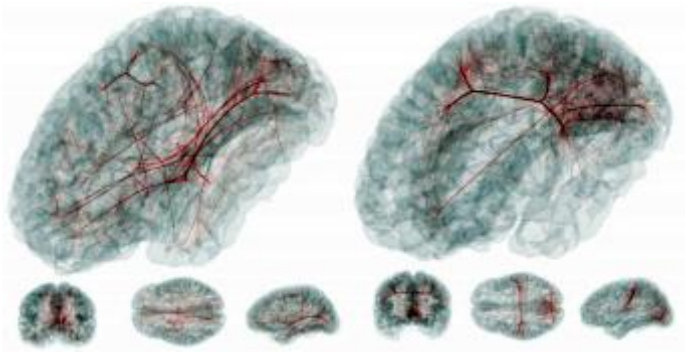
"We still believe the evidence is strong that the EPA and DHA content in heart tissues and blood is important to health and to the prevention of cardiovascular disease," Jump said. "To meet the current recommendations for primary prevention of cardiovascular disease, individuals are advised to consume 200-300 milligrams of combined EPA and DHA per day."
This research was supported by the U.S. Department of Agriculture and the National Institutes of Health.

http://ars.to/UzRC8r

Some comatose brains remain active, but can't enable conscious actions

Key areas of comatose brains lose ability to coordinate activities.

by John Timmer - Nov 29 2012, 1:02am TST



Neural imaging has helped change our perspective on what goes on in the brains of people who have lost consciousness for extended periods. Structural studies have shown that, while some people end up comatose or vegetative because of significant structural damage, others remain unconscious despite having brains that appear largely intact. And, in a recent case, a patient who has been categorized as vegetative for over a decade showed brain activity that suggested he was responding to researchers' queries.
These findings suggest that there may be two ways to end up comatose: either through physical damage to the brain, or because key areas of the brain are no longer able to coordinate their activities. A paper published in yesterday's PNAS provides further support to this latter proposition, but the authors don't seem to go as far as they could in supporting it.
The researchers had permission to track the activity of the brains of 17 people with "severely impaired consciousness" due to a non-neural medical conditions (they generally lost consciousness due to cardiac and/or respiratory failure). 20 healthy individuals volunteered to act as controls.
The activity in each of 417 anatomically defined brain regions was tracked using functional MRI, after which a computerized analysis was done to see which areas were active at similar times. More specifically, every single region was compared pairwise to all 416 of the other regions, with wavelet analysis being used to detect correlations in activity. That data was used to establish links among different regions, and the results were then subjected to network analysis, which identified features like the degree of global connectivity and the location of key hubs in the network.
On a gross level, the measures of network structure all looked very similar between healthy and comatose individuals. Measures like the degree of clustering and the modularity were all within statistical error between the two groups. If the analysis had stopped there, you'd have to conclude that unconsciousness changes very little.

But the researchers didn't stop there. They developed a measure that represented the degree to which each brain region acted as a hub, forming connections with a cluster of other regions with coordinated activity. They then confirmed that the regions identified as hubs were generally similar in both of the two populations (volunteers and patients). This suggested that the measure they had developed actually reflected something about the brain activity.

With that validation in hand, they compared the two populations. And that's where a big difference became apparent: areas that had been hubs in healthy people were no longer central in the comatose, and vice versa. Or, as the authors put it, "The nodes that had the highest hubness scores in healthy volunteers showed the greatest reduction in patients, whereas the nodes that had the lowest hubness scores in healthy volunteers showed the greatest increase in patients."

This implies that different areas of the brain are talking to each other in comatose patients. This supports the idea that the loss of consciousness in these patients may result (at least in part) from the fact that key areas of the brain are no longer coordinating their activity in a way that can enable conscious actions.

The authors note a number of appropriate cautions for functional MRI studies: a small population, the danger of small shifts in position causing anatomical structures to be misidentified, and so on. In general, they suggest that these probably weren't sufficient to throw their conclusions off.

But they missed a big opportunity to help validate their data. We already have plenty of anatomic studies that show which areas are physically linked to others in the brain and, in many cases, there is functional evidence that shows that these connected regions coordinate their activity. This information should give the researchers the opportunity to see if their wavelet analysis was actually capturing what we already know about biology. For whatever reasons, they didn't do it.

PNAS, 2012. DOI: 10.1073/pnas.1208933109 (About DOIs).

http://www.wired.com/wiredscience/2012/11/mind-controlled-robotic-arm/

Mind-Controlled Artificial Limbs Fusing Man and Machine Coming Next Year

A postdoctoral student has developed a technique for implanting thought-controlled robotic arms and their electrodes directly to the bones and nerves of amputees

By Liat Clark, Wired UK

A postdoctoral student has developed a technique for implanting thought-controlled robotic arms and their electrodes directly to the bones and nerves of amputees, a move which he is calling “the future of artificial limbs”. The first volunteers will receive their new limbs early in 2013.

“The benefits have no precedent,” Max Ortiz Catalan, who carries out research in biomedicine and artificial intelligence at the Chalmers University of Technology in Sweden, told Wired.co.uk. “They will be able to simultaneously control several joints and motions, as well as to receive direct neural feedback on their actions. These features are today not available for patients outside research labs. Our aim is to change that.”

Ordinary myoelectric prostheses work by placing electrodes over the skin to pick up nerve signals that would ordinarily be sent by the brain to the limb. An algorithm then translates these signals, and sends instructions to motors within the electronic limb. Since the electrodes are applied to the skin surface, however, they will undoubtedly encounter countless issues in maintaining the fluid transferal of information back and forth between the brain and the limb. By implanting those electrodes directly to the patient’s nerves, Catalan is hoping to get one step closer than anyone else to replicating natural movement.

“Our technology helps amputees to control an artificial limb, in much the same way as their own biological hand or arm, via the person’s own nerves and remaining muscles,” he said.

Using the Osseointegrated Prosthesis for the Rehabilitation of Amputees (OPRA) method developed by Rickard Brånemark at Sahlgrenska University Hospital in Gothenburg, Catalan and his team plan to forgo traditional sockets in place of bone-anchored prostheses attached via titanium screws. It was a method inspired by Brånemark’s father, who was the first to discover that titanium can fuse with bone tissue.

“The operation will consist of placing neural and muscular electrodes on the patient’s stumps, as well as placing the bidirectional interfaces into the human body.”

A titanium implant acts as the bidirectional interface, transmitting signals from the electrodes, placed on nerves and muscles, to the limb. It is a truer replication of how the arm was designed to work, with information from existing nerves being transferred to the limb and to the implant, where algorithms can translate thought-controlled instructions into movement. It is, Catalan told Wired.co.uk, a “closed loop control” that moves us “one step further to providing natural control of the artificial limb”. Add to this the fact that every finger is motorised and can be individually controlled, and Catalan’s bold statement might just be accurate.

The first surgeries, due to be carried out by Brånemark in January or February 2013, will all be on patients that had limbs amputated several years prior. Asked whether or not this will make success harder, Catalan said it was one question they are looking to answer.
"The possibilities are higher in recent amputation. Our first patients however, have been amputated for several years. This project aims to answer several very interesting scientific questions in neurorehabilitation."
In preparation, for both the amputees' learning and the algorithm's, Catalan has been training his subjects in the lab using virtual reality simulations. "It provides real-time feedback to the patients on their performance executing different motions. It is definitely very important for them to re-learn some motions, and for us to quantitatively qualify our algorithms' performance."
The work echoes that of the Centre for Bionic Medicine in Chicago. In October Zac Vawter highlighted the centre's work by climbing 103 flights of stairs using his bionic leg, attached following an amputation technique called targeted muscle reinnervation (TMR). This involves transferring amputated nerves to remaining muscle and skin so that they can provide additional signals the limb's inbuilt microprocessor can process - it dramatically improves the reactivity of a robotic prosthetic. Catalan is in touch with the Centre and plans to collaborate and combine the two technologies to help create an "osseointegrated human-machine gateway".
"We definitely see the combination of these technologies as the future of artificial limbs," he told Wired.co.uk. "They have done excellent work, a lot of very useful scientific research has come from Todd Kuiken'sgroup. We have complementing technologies, while targeted muscle TMR is useful to provide additional control signals in the muscles, it still needs surface electrodes."
Ultimately, Catalan hopes the surgical trials will prove the potential for dramatic progress in prosthetics and secure the university more funding to take that progress from a clinical setting, to a real world one on a far larger scale.
"This technology can then become a reality for lots of people. We want to leave the lab and become part of the patients' everyday life. If the first operations this winter are successful, we will be the first research group in the world to make 'thought-controlled prostheses' a reality for patients to use in their daily activities, and not only inside research labs." *Source: Wired.co.uk*

http://www.sciencedaily.com/releases/2012/11/121128162201.htm

NSAID Use Linked to Reduced Hepatocellular Carcinoma Risk and Mortality Due to Chronic Liver Disease

Aspirin use is associated with a decreased risk of developing hepatocellular carcinoma and death from chronic liver disease

ScienceDaily - Researchers found that aspirin use is associated with a decreased risk of developing hepatocellular carcinoma and death from chronic liver disease (CLD), according to a study published November 28 in the Journal of the National Cancer Institute.
Hepatocellular carcinoma (HCC), the most common type of primary liver cancer, occurs mainly among patients with CLD. Previous reports have linked chronic inflammation due to CLD to cellular processes that could promote carcinogenesis. Because of their anti-inflammatory properties and widespread use to prevent cardiovascular and cerebrovascular disease, nonsteroidal anti-inflammatory drugs (NSAIDs) including aspirin and nonaspirin NSAIDs are being investigated as cancer chemopreventive agents. NSAIDs have been shown to have a beneficial effect in observational studies and clinical trials on risk of some cancers. However, the relationship between NSAID use and risk of HCC and death from CLD is unclear.
To investigate this relationship, Vikrant V. Sahasrabuddhe, M.B.B.S., Dr.P.H, from the Division of Cancer Epidemiology and Genetics at the National Cancer Institute, and colleagues, performed an observational study of 300,504 men and women aged 50 to 71 years enrolled in the National Institutes of Health-AARP Diet and Health Study who reported their aspirin and nonaspirin NSAID use and were followed-up for 10-12 years. The researchers linked the self-reported use of aspirin and nonaspirin NSAIDs to registry data on diagnoses of 250 cases of HCC and 428 deaths due to CLD to perform their study.
The researchers found that the use of NSAIDs was associated with a reduced risk of HCC and a reduced risk of death from CLD compared to non-users. Study participants who used aspirin had a 41% reduced risk of HCC and a 45% reduced risk of death from CLD, whereas those who used non-aspirin NSAIDs experienced a 26% reduced risk of CLD mortality but no reduced risk of HCC. The authors conclude that "these associations are prominent with the use of aspirin, and if confirmed, might open new vistas for chemoprevention of HCC and CLD."
In an accompanying editorial, Isra G. Levy, M.B., BCh., MSc., and Carolyn P. Pim, M.D., both from the Department of Epidemiology and Community Medicine at the University of Ottawa in Canada discuss how the

known causes of chronic liver disease and primary liver cancer are hepatitis B and C virus infections, alcohol use, and a link between obesity and diabetes has been suggested. "We already have cheap, readily available interventions," such as vaccines for hepatitis B and C virus but "effective strategies for reduction of HBV and HCV are not always available or fully applied." Also, alcohol abuse and obesity are complex and multifactorial challenges that require interventions at the individual and system levels." They conclude that although we should study the potential of new chemopreventive strategies such as NSAID use, we should also continue to focus on improving the established practices and interventions.

Vikrant V. Sahasrabuddhe, Munira Z. Gunja, Barry I. Graubard, Britton Trabert, Lauren M. Schwartz, Yikyung Park, Albert R. Hollenbeck, Neal D. Freedman, and Katherine A. McGlynn. Nonsteroidal Anti-inflammatory Drug Use, Chronic Liver Disease, and Hepatocellular Carcinoma. J Natl Cancer Inst, November 28, 2012 DOI: 10.1093/jnci/djs452

http://www.eurekalert.org/pub_releases/2012-11/bmj-rtf112912.php

Running too far, too fast, and too long speeds progress 'to finish line of life'

Limit vigorous exercise to 30 to 50 minutes a day max, say researchers

Vigorous exercise is good for health, but only if it's limited to a maximum daily dose of between 30 and 50 minutes, say researchers in an editorial published online in Heart.

The idea that more and more high intensity exercise, such as marathons, can only do you good, is a myth say the US cardiologists, and the evidence shows that it's likely to more harm than good to your heart.

"If you really want to do a marathon or full distance triathlon, etc, it may be best to do just one or a few and then proceed to safer and healthier exercise patterns," they warn.

"A routine of moderate physical activity will add life to your years as well as years to your life. In contrast, running too far, too fast, and for too many years may speed one's progress to towards the finishing line of life."

[Run for your life….at a comfortable speed and not too far Online First doi 10.1136//heartjrnl-2012-302886.pdf]

http://www.eurekalert.org/pub_releases/2012-11/bu-ctf112912.php

Controversial treatment for autism may do more harm than good, Baylor University researchers find

A controversial treatment for autism spectrum disorder (ASD) is not only ineffective but may be harmful, according to a study conducted by Baylor University researchers.

WACO, Texas - The treatment, known as chelation, attempts to eliminate metals such as mercury from the body. "The chemical substances used in chelation treatment have a myriad of potentially serious side effects such as fever, vomiting, hypertension, hypotension, cardiac arrhythmias and hypocalcemia, which can cause cardiac arrest," said Tonya N. Davis, Ph.D., assistant professor of educational psychology in Baylor's School of Education and co-author of the study. To view the study, published in Research in Autism Spectrum Disorders, visit http://www.sciencedirect.com/science/article/pii/S1750946712000724.

In one example mentioned in the research, "a 5-year-old with ASD died from cardiac arrest caused by hypocalcemia while receiving intravenous chelation." And, a 2008 clinical study of chelation treatment for autism was suspended due to potential safety risks associated with chelation.

"Chelation therapy represents the 'cart before the horse' scenario where the hypothesis supporting the use of chelation was not validated prior to using it as a form of treatment. Evidence does not support the hypothesis that ASD symptoms are associated with specific levels of metals in the body," said Davis, supervisor of the Applied Behavior Analysis Program at the Baylor Autism Resource Center.

In the study, Davis and colleagues reviewed the research findings of five published studies on chelation. In the studies, 82 participants ages 3 to 14 received chelation treatment ranging from one to seven months.

Of the five studies, four showed mixed results - some positive and negative outcomes for each of the study participants - and one study showed all positive results. But after closer review, Davis and her research team found "methodological weaknesses" in the studies. "Several studies used numerous treatments at once in addition to chelation that made it impossible to determine if the positive results could be attributed to chelation alone," Davis said.

Ultimately, Davis found that the research studies did not support the use of chelation as some have claimed and were "insufficient, which is the lowest level of certainty." "The use of chelation to remove metals from the body in order to ameliorate ASD could be seen as unfounded and illogical," said Davis.

Despite the risks and lack of evidence supporting chelation, in an Internet survey, more than 7 percent of parents said they have tried chelation treatment for their children.

"Other researchers have found that validation of a treatment, or lack thereof, does not appear to have an influence over what treatment parents elect to use. Most parents believe in 'leaving no stone unturned' when trying to treat their children with ASD and are willing to try anything they believe might help their child," Davis said.

Davis and her colleagues hope their findings can help parents make decisions about the course of treatment to undertake for their children.
"My hope is that this research will help parents make informed choices when selecting treatments for their child with ASD. While I understand a parent's desire to try anything and everything that may help their child, as a researcher, it is difficult to watch a family spend time, money, and resources on interventions that research has found to be ineffective, or worse, potentially dangerous," Davis said.
Other contributing authors to the study include: Daelynn Copeland and Shanna Attai of Baylor; Mark O'Reilly and Soyeon Kang of The University of Texas at Austin; Russell Lang of Texas State University-San Marcos; Mandy Rispoli of Texas A&M University, Jeff Sigafoos of Victoria University of Wellington, New Zealand; Giulio Lancioni of the University of Bari, Italy, and Austin Mulloy of Virginia Commonwealth University.

http://www.eurekalert.org/pub_releases/2012-11/uoc--urf112912.php

UCLA researchers find evidence for water ice deposits and organic material on Mercury

Planetary scientists have identified water ice and unusually dark deposits within permanently shadowed areas at Mercury's north pole.

Using data collected by NASA's MESSENGER spacecraft, a team from UCLA crafted the first accurate thermal model of the solar system's innermost planet, successfully pinpointing the extremely cold regions where ice has been found on or below the surface.
The researchers say the newly discovered black deposits are a thin crust of residual organic material brought to the planet over the past several million years through impacts by water-rich asteroids and comets.
Understanding how water ice has been preserved on Mercury and where it came from may help scientists determine the conditions necessary for sustaining life on other planets.
This research, one of three MESSENGER papers published online today in the journal Science (and scheduled for upcoming print publication), sheds light on the long-standing issue of ice on Mercury. Several independent lines of evidence now reveal that the sun-scorched planet has extensive water ice deposits at its poles.
In the early 1990s, scientists were surprised to find that areas near Mercury's poles were unusually bright when observed with radar from Earth, a potential indication that ice might be present.
UCLA's David Paige, the lead author of one of the new Science papers and a self-described "professional ice finder," has studied the poles of planetary bodies in the solar system, from Mercury to Pluto.
"Mercury is the innermost planet in the solar system, and, arguably, it's among the least explored," said Paige, a professor of Earth and space sciences. "The surface of Mercury exhibits the most extreme range of temperatures of any body we know of in the solar system."
Within a single polar crater on Mercury, there are spots that reach the oven-like temperature of 500 degrees Fahrenheit within sight of areas cold enough to freeze and preserve water ice for billions of years. These "natural freezers" exist within the shadowed areas of polar-crater rims, which never experience direct sunlight due to the low angle of the sun at such high latitudes, Paige said.
Paige's team was able to use the first detailed topographic map of Mercury's north polar region produced by MESSENGER to generate an accurate thermal model of the pole. Their calculations of the planet's sub-surface temperatures are a near-perfect match to Earth-based radar observations and surface-brightness measurements made by the Mercury Laser Altimeter (MLA) instrument onboard the orbiting spacecraft.
Where their temperature model predicts water ice should be stable on the surface, the MLA nearly always measures unusually bright patches, indicative of surface ice deposits. In places where it is too warm for surface ice but cold enough for ice to exist beneath the surface, the MLA sees unusually dark material.
"This stuff we find covering the ice is darker than the rest of Mercury, which is already a really dark planet. That's amazing," Paige said. "At the very least, it means there is something out of the ordinary going on inside these permanently shadowed areas where the ice has accumulated."
The mysterious dark substance likely arrived on Mercury as part of the comets and asteroids that periodically crash into the planet, bringing water ice and a diverse cocktail of organic material, Paige said. In the searing daytime heat of Mercury, the only place water and organics can survive is within permanently shadowed craters. But only in the very coldest areas of the permanently shadowed regions can water ice exist on the surface. In the warmer shadowed areas, the top layers of ice begin to evaporate away into space, leaving behind a layer of hardy organic molecules that are stable at higher temperatures and which turn black over time when exposed at the surface. Once the dark layer is thick enough, it protects the ice underneath, allowing a sub-surface ice deposit to survive.
"There are areas on the surface where it is too hot for ice to exist, but radar data from Earth show something bright reflecting from these areas, so we're pretty sure that there's water ice buried underneath," said co-author

Matthew Siegler, a researcher at the Jet Propulsion Laboratory and a UCLA alumnus. "You need some kind of insulating layer to keep that heat from getting down to the ice."
The presence of bright ice and dark organics on Mercury's surface presents a mystery for MESSENGER researchers. Large comets and asteroids periodically impact Mercury, covering a huge swath of the planet in a layer of dirt and dust and adding further craters to the airless planet's already scarred landscape. For the water ice and black organic layers to remain exposed on Mercury's ancient surface, the deposits must have formed recently in the planet's geological history, or they must be maintained by new water brought to Mercury by smaller, more frequent impacts.
"Billions of years ago, the Earth acquired a layer of water and other volatile material that formed atmospheres, oceans and even the first organic molecules that started life," Paige said. "Understanding the origin of that material is a very important problem and is essential to finding out about the potential habitability of planetary systems around other stars."
Ellen Harju, a graduate student in the UCLA Department of Earth and Space Sciences, is a co-author of the paper.
Paige's study was published alongside two other MESSENGER papers, with colleagues David Lawrence and Greg Neumann as the lead authors. All three research discoveries were showcased today in a press conference on NASA TV.
Launched in 2004, MESSENGER became the first spacecraft to orbit Mercury in March of 2011. Previously, the closest glimpse of the planet was provided by three fly-bys by the Mariner 10 spacecraft in 1974-75. The name MESSENGER, short for MErcury Surface, Space ENvironment, GEochemistry and Ranging, was chosen to evoke the Greco-Roman messenger deity Mercury, a god of trade, merchants and travel.

http://www.eurekalert.org/pub_releases/2012-11/ciot-me112912.php

More evidence for an ancient Grand Canyon

Caltech study supports theory that giant gorge dates back to Late Cretaceous period

PASADENA, Calif. - For over 150 years, geologists have debated how and when one of the most dramatic features on our planet - the Grand Canyon - was formed. New data unearthed by researchers at the California Institute of Technology (Caltech) builds support for the idea that conventional models, which say the enormous ravine is 5 to 6 million years old, are way off.
In fact, the Caltech research points to a Grand Canyon that is many millions of years older than previously thought, says Kenneth A. Farley, Keck Foundation Professor of Geochemistry at Caltech and coauthor of the study. "Rather than being formed within the last few million years, our measurements suggest that a deep canyon existed more than 70 million years ago," he says. Farley and Rebecca Flowers - a former postdoctoral scholar at Caltech who is now an assistant professor at the University of Colorado, Boulder - outlined their findings in a paper published in the November 29 issue of Science Express.
Building upon previous research by Farley's lab that showed that parts of the eastern canyon are likely to be at least 55 million years old, the team used a new method to test ancient rocks found at the bottom of the canyon's western section. Past experiments used the amount of helium produced by radioactive decay in apatite - a mineral found in the canyon's walls - to date the samples. This time around, Farley and Flowers took a closer look at the apatite grains by analyzing not only the amount but also the spatial distribution of helium atoms that were trapped within the crystals of the mineral as they moved closer to the surface of the earth during the massive erosion that caused the Grand Canyon to form.
Rocks buried in the earth are hot - with temperatures increasing by about 25 degrees Celsius for every kilometer of depth - but as a river canyon erodes the surface downwards towards a buried rock, that rock cools. The thermal history - shown by the helium distribution in the apatite grains - gives important clues about how much time has passed since there was significant erosion in the canyon. "If you can document cooling through temperatures only a few degrees warmer than the earth's surface, you can learn about canyon formation," says Farley, who is also chair of the Division of Geological and Planetary Sciences at Caltech.
The analysis of the spatial distribution of helium allowed for detection of variations in the thermal structure at shallow levels of Earth's crust, says Flowers. That gave the team dates that enabled them to fine-tune the timeframe when the Grand Canyon was incised, or cut. "Our research implies that the Grand Canyon was directly carved to within a few hundred meters of its modern depth by about 70 million years ago," she says.
Now that they have narrowed down the "when" of the Grand Canyon's formation, the geologists plan to continue investigations into how it took shape. The genesis of the canyon has important implications for understanding the evolution of many geological features in the western United States, including their tectonics and topography, according to the team.

"Our major scientific objective is to understand the history of the Colorado Plateau - why does this large and unusual geographic feature exist, and when was it formed," says Farley. "A canyon cannot form without high elevation - you don't cut canyons in rocks below sea level. Also, the details of the canyon's incision seem to suggest large-scale changes in surface topography, possibly including large-scale tilting of the plateau."
"Apatite 4He/3He and (U-Th)/He evidence for an ancient Grand Canyon" appears in the November 29 issue of the journal Science Express. Funding for the research was provided by the National Science Foundation.

http://phys.org/news/2012-11-employers-hiring-potential-playmates-candidates.html

Employers often more interested in hiring potential playmates than the very best candidates

Employers are often more focused on hiring someone they would like to hang out with than they are on finding the person who can best do the job

Employers are often more focused on hiring someone they would like to hang out with than they are on finding the person who can best do the job, suggests a study in the December issue of the American Sociological Review.

"Of course, employers are looking for people who have the baseline of skills to effectively do the job," said study author Lauren A. Rivera, an assistant professor of management and organizations and sociology at Northwestern University. "But, beyond that, employers really want people who they will bond with, who they will feel good around, who will be their friend and maybe even their romantic partner. As a result, employers don't necessarily hire the most skilled candidates."

Titled, "Hiring as Cultural Matching: The Case of Elite Professional Service Firms," the study is based on 120 interviews with professionals involved in undergraduate and graduate hiring in elite U.S. investment banks, law firms, and management consulting firms as well as participant observation of a recruiting department. Rivera conducted the interviews—40 per industry—from 2006 through 2008 and the fieldwork within the recruiting department of an elite professional service firm over nine months in 2006 and 2007.

According to the study, which Rivera said is the first systematic, empirical investigation of whether shared culture between employers and job candidates matters in hiring, evaluators at firms often valued their personal feelings of comfort, validation, and excitement over indentifying candidates with superior cognitive or technical skills. In fact, more than half of the evaluators in the study ranked cultural fit—the perceived similarity to a firm's existing employee base in leisure pursuits, background, and self-presentation—as the most important criterion at the job interview stage.

"It is important to note that this does not mean employers are hiring unqualified people," Rivera said. "But, my findings demonstrate that—in many respects—employers hire in a manner more closely resembling the choice of friends or romantic partners than how one might expect employers to select new workers. When you look at the decision to date or marry someone what you think about is commonalities. Do you have a similar level of education? Did you go to a similar caliber school? Do you enjoy similar activities? Are you excited to talk to each other? Do you feel the spark? These types of things are salient at least to the employers I've studied."

The study also found that the cultural similarities valued at elite professional service firms have important socioeconomic dimensions. "Evaluators are predominately white, Ivy League-educated, upper-middle or upper class men and women who tend to have more stereotypically masculine leisure pursuits and favor extracurricular activities associated with people of their background," Rivera said.

"Given that less affluent students are more likely to believe that achievement in the classroom rather than on the field or in the concert hall matters most for future success and focus their energies accordingly, the types of cultural similarities valued in elite firms' hiring processes has the potential to create inequalities in access to elite jobs based on parental socioeconomic status."

As for whether her findings about the importance of cultural fit in hiring practices at elite professional service firms are generalizable across other types of occupations, Rivera said they likely are to some extent. "I think that the process is generalizable, but I think the degree to which cultural similarity matters in the decision to hire varies across occupations depending on their technical demands, their degree of social demands, and how structured interviews are," Rivera said. "So, for example, if you were hiring a neurosurgeon, I think there would be more of an emphasis on performance than cultural fit."

In addition, Rivera said the types of cultural similarities employers value may not be the same for all occupations. "Cultivating leisure time is a hallmark of the upper-middle and upper classes, and it's really important as a class marker and as a source of identity," she said. "You may see different types of cultural similarities that matter in occupations that are less elite."

Provided by American Sociological Association

http://www.sciencedaily.com/releases/2012/11/121129173850.htm

People Not Hooked On Fish Could Get Their Omega-3 Through New Dairy Products, Study Suggests

Not everyone has a taste for fish, even though it is a natural source of heart-healthy omega-3 fatty acids.

ScienceDaily - And while a growing number of omega-3 enriched foods may net health benefits for people who resist the lure of salmon or sashimi, milk remains the product that has gotten away in what has become a billion-dollar health industry. But now, food science researchers at Virginia Tech may have reeled milk into the omega-3 delivery system, showing it is possible to incorporate fish oil into milk and dairy-based beverages in amounts sufficient to promote heart health, without destroying the product's taste or limiting its lifespan.

Even better, the milk passes the sniff test. Twenty-five volunteers evaluated one-ounce cups of standard 2 percent milk alongside samples of skim milk containing 78 parts butter oil to 22 parts fish oil in institutionally approved study conditions.

"We couldn't find any aroma differences," said Susan E. Duncan, a professor of food science and technology in the College of Agriculture and Life Sciences. "We were concerned the fish oil would undergo a chemical process called oxidation, which would shorten the milk's shelf life, or the milk would acquire a cardboard or paint flavor by reacting with the fish oil. It appears we have a product that is stable, with no chemical taste or smell issues."

The study, featured in the November issue of the Journal of Dairy Science, tested four different ratios of butter oil to fish oil in the production of pasteurized, fatty acid-fortified beverages.

The aroma-free formulation delivered 432 milligrams of heart-healthy fatty acids per cup, close to the 500 milligram daily target for healthy people suggested by a broad range of health studies. The U.S. Department of Agriculture suggests daily consumption of 250 milligrams per day in healthy adults.

Research has shown omega-3 fatty acids are helpful for preventing coronary disease, reducing inflammation, assisting infant brain development, and maintaining brain function.

Meanwhile, the American Heart Association recommends eating two servings of fatty fish per week, citing research that has shown omega-3 fatty acids decrease the risk of potentially fatal heart arrhythmias, decrease triglyceride levels, slow growth of atherosclerotic plaque, and slightly lower blood pressure.

But fish hasn't caught on with everyone, making room for new foods and beverages fortified with omega-3s in an expanding marketplace. Sales are expected to reach more than $3 billion in 2016, according to marketing analysts.

"I think the dairy industry can look at our study and determine whether it is plausible to modify its products," Duncan said. "I would like to help people who love milk, yogurt, and dairy, which have intrinsic nutritional value, address an additional need in their diets, especially if they don't like to eat fish or can't afford it. One of these dairy servings a day apparently is enough to sustain enough continuous omega-3 to benefit heart health."

If such a product catches on with consumers, Duncan said the next step for researchers is to follow groups of volunteers in an epidemiological study of whether the food improves health outcomes.

"Milk was first fortified with Vitamin D as a way to fight rickets -- a disease that leads to soft or weak bones," said Kerry E. Kaylegian, a dairy foods research and extension associate with Penn State's College of Agricultural Sciences, who was not involved in the research. "It was a good approach to address a dietary deficiency disease, because so many people drink milk, which is already loaded with nutrients. This study describes fortification of milk with omega-3 fatty acids EPA and DHA. We can't say lack of those compounds definitively causes cardiac disease, but there is evidence that they protect us and contribute to heart and brain health. Milk would be a good delivery vehicle for those nutrients."

R.L. Moore, S.E. Duncan, A.S. Rasor, W.N. Eigel, S.F. O'Keefe. Oxidative stability of an extended shelf-life dairy-based beverage system designed to contribute to heart health. Journal of Dairy Science, 2012; 95 (11): 6242 DOI: 10.3168/jds.2012-5364

http://www.bbc.co.uk/news/health-20539835

Stem cells being made from blood

A patient's own blood has been used to make personalised stem cells, which doctors hope will eventually be used to treat a range of diseases.

By James Gallagher Health and science reporter, BBC News

The team at the University of Cambridge says this could be one of the easiest and safest sources of stem cells.

In a study, published in the journal Stem Cells: Translational Medicine, the cells were used to build blood vessels. However, experts cautioned that the safety of using such stem cells was still unclear.

Stem cells are one of the great hopes of medical research. They can transform into any other type of cell the body is built from - so they should be able to repair everything from the brain to the heart, and eyes to bone.

One source of stem cells is embryos, but this is ethically controversial and they would be rejected by the immune system in the same way as an organ transplant.
Researchers have shown that skin cells taken from an adult can be tricked into becoming stem cells, which the body should recognise as part of itself and would not reject.
The team at Cambridge looked in blood samples for a type of repair cell that whizzes through the bloodstream repairing any damage to the walls of blood vessels. These were then converted into stem cells.
Dr Amer Rana said this method was better than taking samples from skin.
"We are excited to have developed a practical and efficient method to create stem cells from a cell type found in blood," he said. "Tissue biopsies are undesirable - particularly for children and the elderly - whereas taking blood samples is routine for all patients."
Dr Rana told the BBC the cells also appeared to be safer to use than those made from skin. "The fact that these appeared to be fairly stable is very promising," he said. "The next stage obviously is to say, 'OK if we can do all this, let's actually make some clinical grade cells,' we can then move this technology into the clinic for the first time."
Prof Chris Mason, an expert on regenerative medicine at University College London, said there was some "beautiful work" coming out of the lab in Cambridge. "It's a hell of a lot easier to get a blood sample than a high quality skin sample, so that's a big benefit," he said. "However, induced pluripotent stem cells [those converted from adult cells] are still very new, we need far more experience to totally reprogram a cell in a way we know to be safe."
The British Heart Foundation said these cells had "great potential".
The Medical Research Council said there was "rapid progress" being made in the this field.

http://www.eurekalert.org/pub_releases/2012-11/gsoa-naa113012.php

Native Americans and Northern Europeans more closely related than previously thought

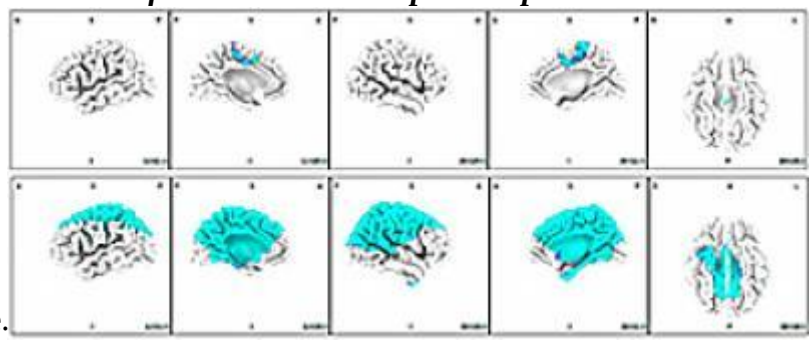
Statistical tools used to show Neanderthals mixed with modern humans also show that Native Americans and Northern Europeans share a common ancestor, according to new research in the journal Genetics

BETHESDA, MD –Using genetic analyses, scientists have discovered that Northern European populations - including British, Scandinavians, French, and some Eastern Europeans—descend from a mixture of two very different ancestral populations, and one of these populations is related to Native Americans. This discovery helps fill gaps in scientific understanding of both Native American and Northern European ancestry, while providing an explanation for some genetic similarities among what would otherwise seem to be very divergent groups. This research was published in the November 2012 issue of the Genetics Society of America's journal GENETICS (http://www.genetics.org).
According to Nick Patterson, first author of the report, "There is a genetic link between the paleolithic population of Europe and modern Native Americans. The evidence is that the population that crossed the Bering Strait from Siberia into the Americas more than 15,000 years ago was likely related to the ancient population of Europe."
To make this discovery, Patterson worked with Harvard Medical School Professor of Genetics David Reich and other colleagues to study DNA diversity, and found that one of these ancestral populations was the first farming population of Europe, whose DNA lives on today in relatively unmixed form in Sardinians and the people of the Basque Country, and in at least the Druze population in the Middle East. The other ancestral population is likely to have been the initial hunter-gathering population of Europe. These two populations were very different when they met. Today the hunter-gathering ancestral population of Europe appears to have its closest affinity to people in far Northeastern Siberia and Native Americans.
The statistical tools for analyzing population mixture were developed by Patterson and presented in a systematic way in the report. These tools are the same ones used in previous discoveries showing that Indian populations are admixed between two highly diverged ancestral populations and showing that Neanderthals contributed one to four percent of the ancestry of present-day Europeans. In addition, the paper releases a major new dataset that characterizes genetic diversity in 934 samples from 53 diverse worldwide populations.
"The human genome holds numerous secrets. Not only does it unlock important clues to cure human disease, it also reveal clues to our prehistoric past," said Mark Johnston, Editor-in-Chief of the journal GENETICS. "This relationship between humans separated by the Atlantic Ocean reveals surprising features of the migration patterns of our ancestors, and reinforces the truth that all humans are closely related."
CITATION: Nick Patterson, Priya Moorjani, Yontao Luo, Swapan Mallick, Nadin Rohland, Yiping Zhan, Teri Genschoreck, Teresa Webster, and David Reich Ancient Admixture in Human History Genetics November 2012 Volume 192, pp 1065-1093
FUNDING: U.S. National Science Foundation HOMINID grant 1032255, and by National Institutes of Health grant GM100233.

http://www.eurekalert.org/pub_releases/2012-11/uoc--isp113012.php

In schizophrenia patients, auditory cues sound bigger problems

Deficiencies in the neural processing of auditory tones can evolve into a cascade of dysfunctional information processing across wide swaths of the brain in schizophrenia patients



In this schematic, reduced activation in discrete medial prefrontal brain regions is depicted (in blue) in schizophrenia patients, occurring 0.2 seconds after sound changes (top panel), cascading forward to widespread brain regions associated with the automatic activation of attentional networks 0.1 second later (bottom panel). **UC San Diego School of Medicine**

Researchers at the University of California, San Diego School of Medicine and the VA San Diego Healthcare System have found that deficiencies in the neural processing of simple auditory tones can evolve into a cascade of dysfunctional information processing across wide swaths of the brain in patients with schizophrenia. The findings are published in the current online edition of the journal Neuroimage.

Schizophrenia is a mental disorder characterized by disturbed thought processes and difficulty in discerning real from unreal perceptions. Common symptoms include auditory hallucinations and unfounded suspicious ideas. The disorder affects about 1 percent of the U.S. population, or roughly 3 million people.

"Impairments in the early stages of sensory information processing are associated with a constellation of abnormalities in schizophrenia patients," said Gregory Light, PhD, associate professor of psychiatry at UC San Diego and senior author of the study.

These impairments, according to Light, may explain how schizophrenia patients develop clinical symptoms such as hearing voices that others cannot hear and difficulty with cognitive tasks involving attention, learning and recalling information. "If someone's brain is unable to efficiently detect subtle changes in sounds despite normal hearing, they may not be able to automatically direct their attention and rapidly encode new information as it is being presented."

Light and colleagues used electroencephalography – a technique that records patterns of electrical brain activity using electrodes positioned on the scalp – on 410 schizophrenia patients and 247 nonpsychiatric comparison subjects. The researchers employed novel computational imaging approaches to deconstruct the brain dynamics that underlie two leading neurobiological markers used in schizophrenia research: mismatch negativity (MMN) and P3a event-related potentials.

In healthy volunteers, a specific pattern of EEG responses across a complex network of brain structures is elicited within a fraction of a second in response to changes in auditory tones. In patients with schizophrenia, the researchers found that this normal process is disrupted. Reduced activity in specific areas of the medial frontal lobe quickly propagated to other regions of the brain that support activation of attentional networks.

"Changes in the tone of speech convey complex information including nuances of emotional meaning and content," said Light, who is also associate director of the VISN-22 Mental Illness, Research, Education and Clinical Center (MIRECC) at the San Diego VA Medical Center. "If a patient's brain is not processing auditory information optimally, he or she may miss out on important-but-subtle social cues and other critical information. They may not properly recognize sarcasm or humor that is carried by pitch changes in speech. This can be a major barrier to achieving better functioning in social relationships, school or job performance, and ultimately limit their overall quality of life."

In research published earlier this year, Light and colleagues established that MMN and P3a showed promise for unlocking the elusive brain and molecular dysfunctions of schizophrenia patients. "These brain-based biomarkers may eventually prove to be useful for assisting clinicians with diagnosis, guiding treatment decisions, and tracking therapeutic response over time. These measures may also predict which individuals are at risk for developing a serious mental illness and are most likely to benefit from course-altering early interventions."

According to Stephen R. Marder, MD, VISN-22 MIRECC director and a professor at UCLA's Semel Institute for Neuroscience and Human Behavior, "this study makes a valuable contribution to our understanding of how impairments in the very early processing of sensory information in schizophrenia can explain the complex symptoms of the illness. This new knowledge may also be useful in developing better pharmacological and non-pharmacological treatments for schizophrenia."

Co-authors of this study are Hidetoshi Takahashi, UCSD Department of Psychiatry and National Center of Neurology and Psychiatry, Japan; Anthony J. Rissling, Kenji Kirihara, Marlena Pela, and Joyce Sprock, UCSD Department of Psychiatry; Robert Pascual-Marqui, Key Institute for Brain-Mind Research, University Hospital of Psychiatry, Switzerland; and David Braff, UCSD Schizophrenia Research Program.

Funding for this research came, in part, from the National Institute of Mental Health (grants MH079777, MH042228 and MH065571), the Department of Veteran Affairs and the Mitsubishi Pharma Research Foundation.

http://www.sciencedaily.com/releases/2012/11/121130094725.htm

Could Mistletoe Give the Kiss of Death to Cancer?

Mistletoe has become an important symbol of Christmas, but it also has the potential to play a vital role as an alternative therapy for sufferers of colon cancer.

ScienceDaily - At the University of Adelaide in Australia, scientists are interested in how the extract of mistletoe could either assist chemotherapy or act as an alternative to chemotherapy as a treatment for colon cancer. Colon cancer is the second greatest cause of cancer death in the Western world. Mistletoe extract is already authorized for use by sufferers of colon cancer in Europe, but not in some countries such as Australia and the United States due to a lack of scientific testing.

For her Honours research project recently completed at the University of Adelaide, Health Sciences student Zahra Lotfollahi compared the effectiveness of three different types of mistletoe extract and chemotherapy on colon cancer cells. She also compared the impact of mistletoe extract and chemotherapy on healthy intestinal cells. In her laboratory studies, she found that one of the mistletoe extracts -- from a species known as Fraxini (which grows on ash trees) -- was highly effective against colon cancer cells in cell culture and was gentler on healthy intestinal cells compared with chemotherapy.

Significantly, Fraxini extract was found to be more potent against cancer cells than the chemotherapy drug. "This is an important result because we know that chemotherapy is effective at killing healthy cells as well as cancer cells. This can result in severe side effects for the patient, such as oral mucositis (ulcers in the mouth) and hair loss," Ms Lotfollahi says. "Our laboratory studies have shown Fraxini mistletoe extract by itself to be highly effective at reducing the viability of colon cancer cells. At certain concentrations, Fraxini also increased the potency of chemotherapy against the cancer cells. "Of the three extracts tested, and compared with chemotherapy, Fraxini was the only one that showed a reduced impact on healthy intestinal cells. This might mean that Fraxini is a potential candidate for increased toxicity against cancer, while also reducing potential side effects. However, more laboratory testing is needed to further validate this work," Ms Lotfollahi says.

"Mistletoe extract has been considered a viable alternative therapy overseas for many years, but it's important for us to understand the science behind it," says one of Ms Lotfollahi's supervisors, the University of Adelaide's Professor Gordon Howarth, a Cancer Council Senior Research Fellow.

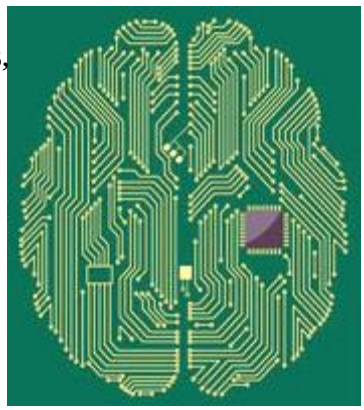
"Although mistletoe grown on the ash tree was the most effective of the three extracts tested, there is a possibility that mistletoe grown on other, as yet untested, trees or plants could be even more effective.

"This is just the first important step in what we hope will lead to further research, and eventually clinical trials, of mistletoe extract in Australia," Professor Howarth says.

http://bit.ly/VoqP7Z

Artificial Brain Mimics Human Abilities and Flaws

Spaun, a new software model of a human brain, is able to play simple pattern games, draw what it sees and do a little mental arithmetic.



Spaun's mistakes, not its abilities, are what surprised its makers the most. **Credit: Seamartini Graphics, Shutterstock**

Spaun, a new software model of a human brain, is able to play simple pattern games, draw what it sees and do a little mental arithmetic. It powers everything it does with 2.5 million virtual neurons, compared with a human brain's 100 billion. But its mistakes, not its abilities, are what surprised its makers the most, said Chris Eliasmith, an engineer and neuroscientist at the University of Waterloo in Canada. Ask Spaun a question, and it hesitates a moment before answering, pausing for about as long as humans do. Give Spaun a list of numbers to memorize, and it falters when the list gets too long. And Spaun is better at remembering the numbers at the beginning and end of a list than at recalling numbers in the middle, just like people are.

"There are some fairly subtle details of human behavior that the model does capture," said Eliasmith, who led the development of Spaun, or the Semantic Pointer Architecture Unified Network. "It's definitely not on the same scale [as a human brain]," he told TechNewsdaily. "It gives a flavor of a lot of different things brains can do."

Eliasmith and his team of Waterloo neuroscientists say Spaun is the first model of a biological brain that performs tasks and has behaviors. Because it is able to do such a variety of things, Spaun could help scientists understand how humans do the same, Eliasmith said. In addition, other scientists could run simplified simulations of certain brain disorders or psychiatric drugs using Spaun, he said.

A Brain with Thought and Action

Researchers have made several brain models that are more powerful than Spaun. The Blue Brain model at the Ecole Polytechnique Fédérale de Lausanne in France has 1 million neurons. IBM's SyNAPSE project has 1 billion neurons. Those models aren't built to perform a variety of tasks, however, Eliasmith said.

Spaun is programmed to respond to eight types of requests, including copying what it sees, recognizing numbers written with different handwriting, answering questions about a series of numbers and finishing a pattern after seeing examples.

Spaun's myriad skills could shed light on the flexible, variable human brain, which is able to use the same equipment to control typing, biking, driving, flying airplanes and countless other tasks, Eliasmith said. That knowledge, in turn, could help scientists add flexibility to robots or artificial intelligence, he said. Artificial intelligence now usually specializes in doing only one thing, such as tagging photos or playing chess. "It can't figure out to switch between those things," he said.

In addition, artificial intelligence isn't built to mimic the cellular structure of human brains as closely as Spaun and other brain models do. Because Spaun runs more like a human brain, other researchers could use it to run health experiments that would be unethical in human study volunteers, Eliasmith said. He recently ran a test in which he killed off the neurons in a brain model at the same rate that neurons die in people as they age, to see how the dying off affected the model's performance on an intelligence test.

Such tests would have to be just first steps in a longer experiment, Eliasmith said. The human brain is so much more complex than models that there's a limit to how much models are able to tell researchers. As scientists continue to improve brain models, the models will become better proxies for health studies, he said.

Next Up: a Brain in Real Time

There's one major way Spaun differs from a human brain. It takes a lot of computing power to perform its little tasks. Spaun runs on a supercomputer at the University of Waterloo, and it takes the computer two hours to run just one second of a Spaun simulation, Eliasmith said.

So Eliasmith's next major step for improving Spaun is developing hardware that lets the model work in real time. He'll cooperate with researchers at the University of Manchester in the U.K. and hopes to have something ready in six months, he said.

In the far future, people may find Spaun's humanlike flaws deliberately built into robot assistants, Eliasmith said. "Those kinds of features are important in a way because if we're interacting with an agent and it has a kind of memory that we're familiar with, it'll more natural to interact with," he added.

Eliasmith and his colleagues published their latest paper about Spaun today (Nov. 29) in the journal Science.

http://arstechnica.com/security/2012/11/malware-siphons-data-on-new-rocket-from-japanese-space-agency/

Malware siphons data on new rocket from Japanese space agency

Solid-fuel rocket is intended for launching satellites and space probes.

by Dan Goodin - Dec 1 2012, 2:10am TST

Information on one of Japan's newest rockets was stolen from a desktop computer that was infected with malware, according to a published report that cited officials from the country's space agency.

The computer, located in the Japan Aerospace Exploration Agency's Tsukuba Space Center northeast of Tokyo, was found to be collecting data and transmitting it to computers outside the agency, according to a story published Friday morning by the New York Times. The computer was disinfected after malware was found on it on November 21, and an investigation failed to find any other infected machines.

Some of the data siphoned out of the computer involved Epsilon, a solid-fuel rocket still under development, according to the post. It is ostensibly intended to launch satellite and space probes, although solid-fuel rockets of its size can also be used militarily for intercontinental ballistic missiles. Epsilon also has the ability to be remotely controlled by a personal computer. Its first launch is scheduled for about a year from now.

Over the past decade, incidents involving computer-based espionage have grown increasingly common. A variety of targets from around the world, including those in private industry, government agencies, and human rights organizations, have frequently been hit, with evidence often implicating actors linked to the Chinese government. Highly sophisticated malware dubbed Flame, which reportedly was jointly developed by the US and Israeli governments, has also been used to spy on Iran.

On Friday, researchers from antivirus provider Kaspersky Lab, published details on a targeted attack on Syria's Ministry of Foreign Affairs.

http://phys.org/news/2012-11-couple-convicted-gm-secrets.html

Couple convicted of stealing GM trade secrets *(Update)*

A former General Motors engineer with access to the automaker's hybrid technology was convicted along with her husband of stealing trade secrets for possible use in China.

AP - Shanshan Du won a transfer within GM in 2003 to be closer to the technology and then copied documents until she accepted a severance offer and left the company in 2005, prosecutors said.

Du, 54, and Yu Qin, 51, were found guilty Friday by a federal jury in Detroit after a trial that lasted weeks. Qin also was convicted of wire fraud and attempting to obstruct justice by shredding documents. They shook each other's hand after the verdict but declined to comment, as did their attorneys.

Du faces up to 10 years in prison, while her husband faces up to 30. No sentencing date has been set.

Prosecutors told jurors that GM trade secrets were found on at least seven computers owned by the Oakland County couple.

The government doesn't believe the information ever made it to China, although Qin had set up his own company, Millennium Technology International, and claimed to have made contact with GM competitors overseas. Defense lawyers acknowledged that GM information was in the couple's possession, but they downplayed the commercial significance.

In her closing argument, Assistant U.S. Attorney Cathleen Corken said Du was the "linchpin" in the scheme because of her job at the automaker. "It can't happen without her," the prosecutor said Thursday.

Corken noted that the agents kept an eye on the couple after searching their home in 2006 and watched Qin dump shredded documents in a grocery store Dumpster. "Is that the conduct of innocent people?" she asked.

Corken said the technology was worth at least $40 million, the price that other automakers paid GM to get it.

Du and Qin, both U.S. citizens, had been under scrutiny for years after GM accused them of theft.

They were charged in 2006 with destroying documents sought by investigators, but that case was dropped while investigators pursued a broader probe that led to an indictment in 2010.

It's not the first trade secrets prosecution in the Detroit auto industry. In 2011, an engineer who stole information from Ford Motor Co. was sentenced to nearly six years in prison.

Xiang Dong Yu, also known as Mike Yu, admitted copying thousands of documents with details on engine transmission systems and electrical power supply before leaving Ford to work for a Chinese competitor in 2008.

"We are committed to protecting Michigan's technology, and we hope that this prosecution will send a message that stealing proprietary information from an employer or competitor is a serious crime," U.S. Attorney Barbara McQuade said.

http://www.eurekalert.org/pub_releases/2012-12/uoe-ooi113012.php

Origin of intelligence and mental illness linked to ancient genetic accident

Scientists have discovered for the first time how humans – and other mammals – have evolved to have intelligence

Scientists have discovered for the first time how humans – and other mammals – have evolved to have intelligence.

Researchers have identified the moment in history when the genes that enabled us to think and reason evolved.

This point 500 million years ago provided our ability to learn complex skills, analyse situations and have flexibility in the way in which we think.

Professor Seth Grant, of the University of Edinburgh, who led the research, said: "One of the greatest scientific problems is to explain how intelligence and complex behaviours arose during evolution."

The research, which is detailed in two papers in Nature Neuroscience, also shows a direct link between the evolution of behaviour and the origins of brain diseases.

Scientists believe that the same genes that improved our mental capacity are also responsible for a number of brain disorders.

"This ground breaking work has implications for how we understand the emergence of psychiatric disorders and will offer new avenues for the development of new treatments," said John Williams, Head of Neuroscience and Mental Health at the Wellcome Trust, one of the study funders.

The study shows that intelligence in humans developed as the result of an increase in the number of brain genes in our evolutionary ancestors.

The researchers suggest that a simple invertebrate animal living in the sea 500 million years ago experienced a 'genetic accident', which resulted in extra copies of these genes being made.

This animal's descendants benefited from these extra genes, leading to behaviourally sophisticated vertebrates – including humans.
The research team studied the mental abilities of mice and humans, using comparative tasks that involved identifying objects on touch-screen computers.
Researchers then combined results of these behavioural tests with information from the genetic codes of various species to work out when different behaviours evolved.
They found that higher mental functions in humans and mice were controlled by the same genes.
The study also showed that when these genes were mutated or damaged, they impaired higher mental functions.
"Our work shows that the price of higher intelligence and more complex behaviours is more mental illness," said Professor Grant.
The researchers had previously shown that more than 100 childhood and adult brain diseases are caused by gene mutations.
"We can now apply genetics and behavioural testing to help patients with these diseases", said Dr Tim Bussey from Cambridge University, which was also involved in the study.
The study was funded by the Wellcome Trust, the Medical Research Council and European Union.