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Heparin might be the key to prevent prion conversion and disease

Prions are infectious agents responsible for neurodegenerative diseases such as bovine spongiform encephalitis (commonly known as "mad cow disease") and Creutzfeldt–Jakob disease in humans.

Since the discovery in the 60s that an incurable and fatal disease could be caused by an infectious agent formed by nothing but converted misfolded proteins, the mechanisms responsible for the conversion of a normal prion protein into its infectious counterpart – the scrapie prion – have been relentlessly investigated. Researchers now know that once converted into the scrapie form, these abnormal proteins have the ability to sequestrate normal proteins, which are then converted to form an increasing aggregate of fibrils that builds up mainly in the brain.

More recently, several studies have suggested that a yet unknown cofactor plays a role in the process of conversion from a normal prion into the scrapie form. Among the factors potentially involved in the process are molecules belonging to the family of glycosaminoglycans, or simply GAGs. In fact, GAGs have been implicated in several degenerative diseases, including prion diseases. However, while some studies point to these molecules as the culprit for prion conversion, others suggest an opposite effect in which the molecules protect against prion conversion.

In a previous study, a group headed by Dr. Jerson Silva at the Federal University of Rio de Janeiro in Brazil showed that when bound to heparin, a molecule belonging to the family of GAGs, prions undergo aggregation that is similar to that observed with the scrapie form. However, this aggregation is only transient and in fact results in stabilization of the prion protein, which does not lead into prion conversion or disease.

In a paper entitled "Heparin binding confers prion stability and impairs its aggregation" and published ahead of print in The FASEB Journal, the group now unveils more details on heparin and prion conversion and presents additional evidence that might help explain the conflicting results previously reported.

Working with brain homogenates from animals with transmissible spongiform encephalopathy, the group found that heparin interactions with the terminal domains of a form of murine prion protein led to kinetic and thermodynamic stabilization of the prion protein, preventing its aggregation. "One possibility," explains Dr. Silva, "is that the negative charge of heparin molecules protects against the already known conversion effects caused by high temperatures. Alternatively, interaction of heparin with the prion protein might limit the access of the scrapie form to its normal counterpart, impairing the ability of the abnormal protein to sequestrate and convert normal prions."

Previous studies have shown that heparin of low molecular weight, as in Dr. Silva's study, is capable of crossing the blood–brain barrier, an ability essential to any drug or molecule thought to act in the brain. Additionally, LMWHep-Neuroparin, a small GAG of 2,100 Da, has shown a neuroprotective role in Alzheimer's disease animal models. Together, these findings may establish the groundwork for the development of GAG molecules for therapeutic use against prion diseases and other more common prion-like neurodegenerative diseases, such as Parkinson's, amyotrophic lateral sclerosis and Alzheimer's.

The study can be found at http://www.fasebj.org/content/early/2014/03/18/fj.13-246777.abstract

Funding: The study was funded by the National Council for Scientific and Technological Development (CNPq), the Rio de Janeiro State Foundation for Research (FAPERJ), the Ministry of Health (MS/Decit), the Coordination for the Improvement of Higher Education Personnel (CAPES) and the National Institute of Science and Technology for Structural Biology and Bioimaging (INBEB).

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Scientists find a molecular clue to the complex mystery of auxin signaling in plants

Interaction domain on proteins that modulate this potent hormone allows them to stack back-to-front like button magnets

Wikipedia lists 65 adjectives that botanists use to describe the shapes of plant leaves. In English (rather than Latin) they mean the leaf is lance-shaped, spear-shaped, kidney-shaped, diamond shaped, arrow-head-shaped, egg-shaped, circular, spoon-shaped , heart-shaped, tear-drop-shaped or sickle-shaped — among other possibilities.

How does the plant "know" how to make these shapes? The answer is by controlling the distribution of a plant hormone called auxin, which determines the rate at which plant cells divide and lengthen.

But how can one molecule make so many different patterns? Because the hormone's effects are mediated by the interplay between large families of proteins that either step on the gas or put on the brake when auxin is around. In recent years as more and more of these proteins were discovered, the auxin signaling machinery began to seem baroque to the point of being unintelligible.

Now the Strader and Jez labs at Washington University in St. Louis have made a discovery about one of the proteins in the auxin signaling network that may prove key to understanding the entire network.

In the March 24 issue of the Proceedings of the National Academy of Sciences they explain that they were able to crystallize a key protein called a transcription factor and work out its structure. The interaction domain of the protein, they learned, folds into a flat paddle with a positively charged face and a negatively charged face. These faces allow the proteins to snap together like magnets, forming long chains, or oligomers.

We have some evidence that proteins chain in plant cells as well as in solution, said senior author Lucia Strader, PhD, assistant professor of biology and an auxin expert. By varying the length of these chains, plants may fine-tune the response of individual cells to auxin to produce detailed patterns such as the toothed lobes of the cilantro leaf.

Combinatorial explosion

Sculpting leaves is just one of many roles auxin plays in plants. Among other things the hormone helps make plants bend toward the light, roots grow down and shoots grow up, fruits develop and fruits fall off.

"The most potent form of the hormone is indole-3-acetic acid, abbreviated IAA, and my lab members joke that IAA really stands for Involved in Almost Everything," Strader said.

The backstory here is that whole families of proteins intervene between auxin and genes that respond to auxin by making proteins. In the model plant Aribidopsis thaliana these include 5 transcription factors that activate genes when auxin is present (called ARFs) and 29 repressor proteins that block the transcription factors by binding to them (Aux/IAA proteins). A third family marks repressors for destruction.

"Different combinations of these proteins are present in each cell," said Strader. "On top of that, some combinations interact more strongly than others and some of the transcription factors also interact with one another."

In an idle moment David Korasick, a graduate fellow in the Strader and Jez labs and first author on the PNAS article, did a back-of-the-envelope calculation to put a number on the complexity of the system they were trying to understand. From a strictly mathematical point of view there are 3,828 possible combinations of the auxin-related Arabidopsis proteins. That is assuming interactions involve only one of each type of protein; if multiples are possible, the number, of course, explodes.

To make any headway, Strader said, we had a better understanding of how these proteins interact. The rule in protein chemistry is the opposite of the one in design: instead of form following function, function follows form. So to figure out a protein's form — the way it folds in space — they turned to the Jez lab, which specializes in protein crystallography, essentially a form of high-resolution microscopy that allows protein structures to be visualized at the atomic level.

Korasick had the job of crystallizing ARF7, a transcription factor that helps, Arabidopsis bend toward the light. With the help of Joseph Jez, PhD, associate professor of biology, Corey Westfall, and Soon Goo Lee), Korasick cut "floppy bits" off the protein that might have made it hard to crystallize, leaving just the part of the protein where it interacts with repressor molecules.

After he had that construct, crystallization was remarkably fast. He set up his first drops in solution wells on the 4th of July. The protein crystallized with a fuss, and he ran the crystals up to the Advanced Photon Source at the Argonne National Laboratory outside Chicago. By August 1 he had the diffraction data he needed to solve the protein's structure.

Surprise, surprise

The previous model for the interaction between a repressor and a transcription factor – a model that had stood for 15 years, Strader said– was that the repressor lay flat on the transcription factor, two domains on the repressor matching up with the corresponding two domains on the transcription factor.

The structural model Korasick developed showed that the two domains fold together to form a single domain, called a PB1 domain. A PB1 domain is a protein interaction module that can be found in animals and fungi as well as plants.

Strader, Jez et al.

The transcription factor ARF7 turned out to have a magnet-like interaction region, called a PB1 domain ,with positively (blue) and negatively (red) charged faces.

The repressor proteins, which are predicted to have PB1 domains identical to that of the ARF transcription factor, then stick to one or the other side of the transcription factor's PB1 domain, preventing it from doing its job. Experiments showed that there had to be a repressor protein stuck to both faces of the transcription factor's PB1 domain to repress the activity of auxin.

This means the model, which pairs a single repressor protein with a single transcription factor, is wrong, Strader said.

"Nor can we limit the interactions to just two," she said. "It could be hundreds for all we know."

In Korasick's crystal five of the ARF7 PB1 domains stuck to one another, forming a pentamer.

"I like to think of the PB1 domains as magnets, " Strader said. "Like magnets, they can stick together, back-to-front, to form long chains."
"But we have to put an asterisk next to that," Korasick said, "because it's possible it's an artifact of crystallography and doesn't work that way in living plants."
But both Strader and Korasick suspect that it does. Strader points out that the complexity of the auxin signaling system has increased over evolutionary time as plants became fancier. A simple plant like the moss Physcomitrella patens has fewer signaling proteins than a complicated plant like soybean.
"Probably what that's saying is that it's really, really important for a plant to be able to modulate auxin signaling, to have the right amount in each cell, to balance positive and negative growth," Korasick said.
"The difference between plants and animals," said Strader, "is that plants have rigid cell walls. So when a plant cell decides to divide itself or length itself, that's a permanent decision, which is why it's so tightly controlled."
http://www.eurekalert.org/pub_releases/2014-03/tl-hps032114.php#rssowlmlink
Health-care professionals should prescribe sleep to prevent and treat metabolic disorders
Evidence increasingly suggests that insufficient or disturbed sleep is associated with metabolic disorders such as type 2 diabetes and obesity, and addressing poor quality sleep should be a target for the prevention – and even treatment – of these disorders, say the authors [1] of a Review, published in The Lancet Diabetes & Endocrinology journal.
"Metabolic health, in addition to genetic predisposition, is largely dependent on behavioural factors such as dietary habits and physical activity. In the past few years, sleep loss as a disorder characterising the 24-hour lifestyle of modern societies has increasingly been shown to represent an additional behavioural factor adversely affecting metabolic health," write the authors.
Addressing some types of sleep disturbance – such as sleep apnoea – may have a directly beneficial effect on patients' metabolic health, say the authors. But a far more common problem is people simply not getting enough sleep, particularly due to the increased use of devices such as tablets and portable gaming devices.
Furthermore, disruption of the body's natural sleeping and waking cycle (circadian desynchrony) often experienced by shift workers and others who work outside daylight hours, also appears to have a clear association with poor metabolic health, accompanied by increased rates of chronic illness and early mortality.
Although a number of epidemiological studies point to a clear association between poor quality sleep and metabolic disorders, until recently, the reason for this association was not clear. However, experimental studies are starting to provide evidence that there is a direct causal link between loss of sleep and the body's ability to metabolise glucose, control food intake, and maintain its energy balance.
According to the study authors, "These findings open up new strategies for targeted interventions aimed at the present epidemic of the metabolic syndrome and related diseases. Ongoing and future studies will show whether interventions to improve sleep duration and quality can prevent or even reverse adverse metabolic traits. Meanwhile, on the basis of existing evidence, health care professionals can be safely recommended to motivate their patients to enjoy sufficient sleep at the right time of day."
[1] The authors of the Review are Dr. Sebastian Schmid, University of Lübeck, Germany; Dr Manfred Hallschmid, University of Tübingen, Germany; and Professor Bernd Schultes, eSwiss Medical and Surgical Centre, St Gallen, Switzerland.

http://www.eurekalert.org/pub_releases/2014-03/uosc-cm032414.php#rssowlmlink

Computer models solve geologic riddle millions of years in the making

New study provides explanation for long-debated origin of bow-shaped mountain belts that form along the edges of colliding tectonic plates

An international team of scientists that included USC's Meghan Miller used computer modeling to reveal, for the first time, how giant swirls form during the collision of tectonic plates – with subduction zones stuttering and recovering after continental fragments slam into them.
The team's 3D models suggest a likely answer to a question that has long plagued geologists: why do long, curving mountain chains form along some subduction zones – where two tectonic plates collide, pushing one down into the mantle?
Based on the models, the researchers found that parts of the slab that is being subducted sweep around behind the collision, pushing continental material into the mountain belt.
With predictions confirmed by field observations, the 3D models show a characteristic pattern of intense localized heating, volcanic activity and fresh sediments that remained enigmatic until now.
"The new model explains why we see curved mountains near colliding plates, where material that has been scraped off of one plate and accreted on another is dragged into a curved path on the continent," Miller said.

Miller collaborated with lead author Louis Moresi from Monash University and his colleagues Peter Betts (also from Monash) and R. A. Cayley from the Geological Survey of Victoria in Australia. Their research was published online by Nature on March 23.
Their research specifically looked at the ancient geologic record of Eastern Australia, but is also applicable to the Pacific Northwest of the United States, the Mediterranean, and southeast Asia. Coastal mountain ranges from Northern California up to Alaska were formed by the scraping off of fragment of the ancient Farallon plate as it subducted beneath the North American continent. The geology of the Western Cordillera (wide mountain belts that extend along all of North America) fits the predictions of the computer model.
"The amazing thing about this research is that we can now interpret arcuate-shaped geological structures on the continents in a whole new way," Miller said. "We no longer need to envision complex motions and geometries to explain the origins of ancient or modern curved mountain belts."
The new results from this research will help geologists interpret the formation of ancient mountain belts and may prove most useful as a template to interpret regions where preservation of evidence for past collisions is incomplete - a common, and often frustrating, challenge for geologists working in fragmented ancient terrains.
Moresi was funded by the Australian Research Council and Miller was funded by NSF CAREER award.

http://www.eurekalert.org/pub_releases/2014-03/soir-ypn031114.php#rssowlmlink

Y-90 provides new, safe treatment for metastatic breast cancer

Largest study of its kind shows minimally invasive treatment may slow disease progression in liver while maintaining quality of life

SAN DIEGO - A minimally invasive treatment that delivers cancer-killing radiation directly to tumors shows promise in treating breast cancer that has spread to the liver when no other treatment options remain, according to research being presented at the Society of Interventional Radiology's 39th Annual Scientific Meeting. In the largest study of its kind to date, researchers reviewed treatment outcomes of 75 women (ages 26-82) with chemotherapy-resistant breast cancer liver metastases, which were too large or too numerous to treat with other therapies. The outpatient treatment, called yttrium-90 (Y-90) radioembolization, was safe and provided disease stabilization in 98.5 percent of the women's treated liver tumors.
"Although this is not a cure, Y-90 radioembolization can shrink liver tumors, relieve painful symptoms, improve the quality of life and potentially extend survival," said Robert J. Lewandowski, M.D., FSIR, associate professor of radiology at Northwestern University Feinberg School of Medicine in Chicago. "While patient selection is important, the therapy is not limited by tumor size, shape, location or number, and it can ease the severity of disease in patients who cannot be treated effectively with other approaches," he said.
Approximately 235,000 new cases of invasive breast cancer are diagnosed each year. Of these, approximately half of patients who develop metastatic disease will have cancer spread (metastasize) to the liver, explained Lewandowski. While chemotherapy is the standard treatment for these women, many will either have progressive liver disease despite multiple different treatment regimens while others will not tolerate the side effects from toxic agents. Currently, patients are considered for Y-90 radioembolization when they have no other treatment options, he said.
"The value of Y-90 radioembolization in treating patients with non-operative primary liver cancer and metastatic colon cancer has been demonstrated," said Lewandowski. Given the low toxicity and high disease control rates, this therapy is expanding to other secondary hepatic malignancies, he said. "We're looking to gain maximal tumor control while minimizing toxicity and preserving quality of life," he added.
Y-90 radioembolization is a minimally invasive, image-guided therapy where an interventional radiologist inserts a small tube, or catheter, through a tiny cut in the groin and guides it through the blood vessels and into the artery that supplies the liver. Micro beads are administered into the blood stream, float out to the smaller vessels that feed the tumor and emit cancer-killing radiation from inside the tumor. Because Y-90 is targeted directly to the tumor, radiation damage to healthy surrounding tissues is minimized.
In this study, imaging follow-up was available for 69 of the 75 women treated. In all of these women, liver tumors were growing prior to treatment. Following radioembolization, there was disease control in 98.5 percent of the liver tumors, with more than 30 percent reduction in tumor size for 24 women. The treatment had few side effects.
"Y-90 warrants further study of its efficacy in providing supportive care to relieve patients of debilitating symptoms and control the progression of their disease," said Lewandowski. More information about the Society of Interventional Radiology, finding an interventional radiologist in your area and minimally invasive treatments can be found online at http://www.SIRweb.org.
Abstract 192: "Yttrium-90 Radioembolization for Hepatic Breast Cancer Metastasis: A Contemporary Analysis of Safety, Response and Survival," R. Ryu, M.D., FSIR; K.T. Sato, M.D., FSIR; V.L. Gates, R. Salem, M.D., MBA, FSIR; R.J. Lewandowski; M.D., FSIR; radiology, Northwestern University Feinberg School of Medicine, Chicago, Ill.; A.C. Gordon,

radiology, Northwestern University Feinberg School of Medicine, Chicago, Ill. and biomedical engineering, Northwestern University, Evanston, Ill., SIR Annual Scientific Meeting, March 22-27. This abstract can be found at http://www.SIRmeeting.org.

http://wrd.cm/1lqTrmE

Serious Resistant Infections Increasingly Found in Children

Serious drug-resistant infections in children are rising across the United States.

By Maryn McKenna

Here's some disturbing news published late last week in the Journal of the Pediatric Infectious Diseases Society by a team of researchers from two Chicago medical institutions plus an expert analyst of antibiotic resistance: Serious drug-resistant infections in children are rising across the United States. While the rate of their occurrence remains low overall, they nonetheless increased two- to three-fold over 10 years.

The group plumbed a national database of disease-causing bacteria retrieved from child patients who were treated in intensive-care units, regular hospital wards, and outpatient clinics between the beginning of 1999 and the end of 2011, looking for a particular pattern of resistance. That pattern, known as ESBL for short (for extended-spectrum beta-lactamase), indicates that bacteria no longer respond to a wide array of common antibiotics: any chemical relative of penicillin, and any of the cephalosporins. Bacteria that are ESBL-resistant respond to only a few remaining big-gun drugs, notably a small family of drugs — already under pressure from other resistance factors — known as the carbapenems. ESBL resistance is a particular concern because it tends to occur in gut bacteria such as E. coli; bacteria that have picked up that resistance DNA can be carried around undetected in the intestines and then cause a surprise infection later. Plus, some of that resistance DNA resides on plasmids, small loops of genetic code that transfer easily from one bacterium to another.

Here's what the researchers found, looking at 368,398 bacterial isolates from child patients:

Among the bacteria collected in 1999-2001, ESBL resistance was present in 1.39 percent.

In the same period, resistance to third-generation cephalosporins was 0.28 percent.

In 2010-11, ESBL resistance rose to 3 percent and third-generation cephalosporin resistance to 0.92 percent.

The trends were consistent across all the places where children were treated: ICUs, regular hospital floors and outpatient clinics:

And, troublingly, the resistance patterns the group noted didn't stop at ESBL and third-generation cephalosporin resistance. They note:

The most common co-resistance to non-β-lactam antibiotics in both groups was trimethoprim/sulfamethoxazole (G3CR 52.8% and ESBL 66.1%), followed by aminoglycosides (G3CR 45.9% and ESBL 64.5%), and fluoroquinolones (G3CR 32.8% and ESBL 54.3%). Although the majority of isolates tested carbapenem-susceptible (G3CR 96.5% and ESBL 94.2%), multidrug resistance was common, with 46.8% and 74.4% of G3CR and ESBL isolates testing nonsusceptible to 3 or more drug classes. (Emphasis mine.)

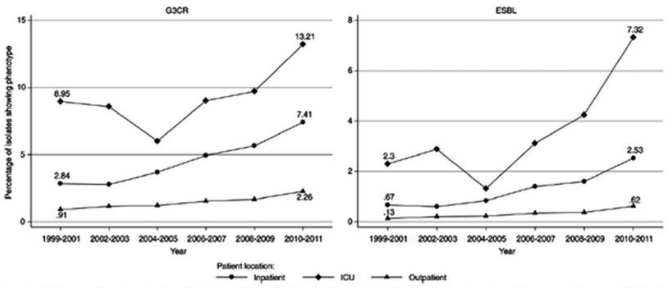

Figure 2. Healthcare setting and national trends in the prevalence of third-generation cephalosporin-resistant (G3CR) and extended-spectrum β-lactamase (ESBL) phenotypes among pediatric *Enterobacteriaceae* isolates in The Surveillance Network–USA database, 1999–2011. Markers show the bi-annual percentages of isolates in each healthcare setting that belonged to a resistance phenotype. Healthcare setting was determined by patient location at the time a microbiological sample was collected. Data for patients <1 year old were not available for all years and were excluded from analysis. Time trends were significant in the inpatient and outpatient setting for both phenotypes ($P < .01$, linear trend), and in the intensive-care unit (ICU) for G3CR ($P = .02$, quadratic trend). Note that the 2 graphs are on different scales to provide better definition, which gives the false appearance of steeper slopes for ESBL trends.

from Logan et al. 2014, p.4. original here.

So, what does this mean? The first thing to note is that there isn't all that much data on drug-resistant infections in children, so this is an important piece of news. A second point is that when drug resistance in children has been examined, the bacteria under study has more often been MRSA, drug-resistant staph, both its stubborn skin infections and also the virulent necrotizing penumonia that can kill a child in hours. So to have data about ESBL in children is new and important as well. The third, clearly, is that even though rates of ESBL in children are low, they are also rising — a trend that is also occurring in adults and that overall indicates that we are running out of the the antibiotic weapons we can direct against such infections.

But the really unnerving thing (though not new to anyone who has followed the ESBL story) is the high proportions of resistance that were found in children when they came to outpatient clinics: in 2010-11, 37.6 percent of the third-generation cephalosporin resistance and 48.8 percent of the ESBLs. The authors note that there is no way to know whether those children had previously been hospitalized, so it is possible they could have picked up those resistant bacteria inside a healthcare institution. But it is also possible that ESBL is spreading in children in the outside world. And that suggests that the problem of these difficult-to-treat bacteria is larger than anyone knows or can count.

Cite: Logan LK, Braykov NP, Weinstein RA, Laxminarayan R. Extended-Spectrum β-Lactamase–Producing and Third-Generation Cephalosporin-Resistant Enterobacteriaceae in Children: Trends in the United States, 1999–2011. Journal of the Pediatric Infectious Diseases Society, 2014. DOI:10.1093/jpids/piu010. Online here, supplementary materials here.

http://phys.org/news/2014-03-breast-microbiota-tantalizing.html#rssowlmlink

First look at breast microbiota raises tantalizing questions

The female breast contains a unique population of microbes relative to the rest of the body, according to the first-ever study of the breast microbiome.

That study sought to lay the groundwork for understanding how this bacterial community contributes to health and disease, says first author Camilla Urbaniak, a PhD student at the University of Western Ontario. The research was published ahead of print in Applied and Environmental Microbiology.

"Proteobacteria was the dominant phylum in healthy breast tissue," says Urbaniak, noting that it is found only in small proportions at other sites in the body. That may reflect the fact that breast tissue produces high concentrations of fatty acids, and these bacteria are fatty acid metabolizers. Proteobacteria is also the predominant phylum in human milk.

"The fact that beneficial bacteria, such as Lactobacillus and Bifidobacteria, were also detected makes us wonder whether their presence might be protective for both mother and child," says principal investigator Gregor Reid of the University of Western Ontario. Breast milk is one of the initial sources of gastrointestinal (GI) bacteria for newborns, and their GI microbiota are different if they are formula fed, says Urbaniak.

Conversely, Escherichia and Bacillus predominated in cancerous breasts. "Strains of Escherichia have been shown to have mutagenic and carcinogenic activity in the gut and the bladder," says Urbaniak.

In the study, the investigators collected breast tissue from 81 women. Ten of these had undergone breast reduction, and their breast microbiota served as controls. The remaining women had had benign or cancerous tumors. The tissue collected from these women was taken from about five centimeters from the tumor, from what is known as "normal adjacent" tissue. Bacterial censuses were taken using a molecular technique known as 16S ribosomal sequencing, and with cultures.

Studies of the microbiome in other parts of the body, most notably the gastrointestinal tract, have shown that certain changes in bacterial populations can lead to a variety of ills, from obvious gastrointestinal conditions such as inflammatory bowel disease to those more unexpected, such as diabetes, obesity, cancer and even neurological conditions.

"Future studies will examine how this breast microbiome is established, why no infections accompany colonization, despite the fact that some of these bacteria cause infections elsewhere in the body, what impact these organisms have on the host, and whether external factors such as diet, antibiotics, and illness affect this bacterial community, and what consequences that has for women and their offspring," says Urbaniak.

The manuscript can be found online at http://aem.asm.org/content/early/2014/03/03/AEM.00242-14.full.pdf+html. The final version of the article is scheduled for the May 2014 issue of Applied and Environmental Microbiology.

http://bit.ly/1maesz8

Government plans to cut number of elderly kept alive on feeding tubes

For the first time, Japan is trying to hold down the number of bedridden elderly people kept alive, sometimes for years, by feeding tubes.

by Kanoko Matsuyama - Bloomberg

The government is planning to cut payouts on insertions in new patients and encourage home care. About 260,000 elderly live on feeding tubes nationwide. Faced with a heavy public debt burden, the government is trying to curtail growth of a ¥38.5 trillion annual health bill by releasing patients from hospitals sooner.

The Health, Labor and Welfare Ministry also plans to boost reimbursements to institutions that check swallowing ability and encourage rehabilitation to help the bedridden eat naturally. The changes, effective April 1, mark the first time Japan has cut government reimbursements for the practice.

“Eating is one of the most important human dignities and the country is moving forward to protect it,” said Kazuhiro Nagao, a doctor and deputy director of the Japan Society for Dying with Dignity.

The use of feeding tubes at the end of life, which isn’t standard practice in the Western world, is common in Japan, the world’s fastest aging society. They often prolong the lives of terminally ill or dementia-plagued elderly and the ministry says almost a quarter of people nourished via feeding tubes were given one without an evaluation. The government reimburses about ¥100,700 per feeding tube surgery, including the cost for the kit and 45 minutes of work by three doctors, according to Gaihoren, a group of surgical societies that assesses reimbursements for surgeries.

More than 90 percent of the patients estimated to be fed in this manner are bedridden, according to a survey by the national hospital association. They are, on average, 81 years old and nourished by tube for 2.3 years. Most of the elderly who are put on feeding tubes are never taken off them. While almost a quarter of those fed via tube had the potential to eat by mouth again, only about 2 percent of them did so and had the tube removed, according to a study funded by the health ministry.

Japan's shrinking labor force means there are fewer taxpayers to pay for government-funded care of dependent seniors. A quarter of Japanese are over the age of 65 now and by 2060 about 40 percent will fall into that demographic, according to National Institute of Population and Social Security Research.
Cash reimbursed to hospitals from the national health insurance program for inserting the tubes will be cut 40 percent to ¥60,700 as of April, while ¥25,000 will be added if a swallowing evaluation is done before the insertion, the health ministry said.
Rehab per session will be doubled to ¥3,700 for hospitals "with an outcome of 35 percent recovery or higher."
The price paid back to stop the feeding and stitch up the incision will rise 17 percent to ¥140,400. Hospitals performing 50 surgeries a year or more will face a further 20 percent cut in payouts for each new feeding-tube case "if they don't evaluate all cases and the recovery is lower than 35 percent" from April next year.
Recuperation hospitals will be encouraged to speed up rehab to help discharge patients from hospitals quicker, said Yukihiko Ikebata, vice chairman of Japan Association of Medical and Care Facilities, which represents recuperation hospitals.
The new rules recommend a guideline used for stroke patients to assess swallowing ability with feeding tube cases. That includes practices such as checking throat muscles by having a patient swallow food coated with an imaging agent and see how it travels using X-rays or endoscopes. The rules require patients, many of them suffering from advanced dementia, to travel to a clinic or a hospital from nursing homes for rehab and could be stressful and risky for them, said Hidehiro Ozeki, chairman of research committee at Japanese Council of Senior Citizens Welfare Service, which represents nursing homes for terminal seniors.
Some remain skeptical that the practice to insert a tube, which is so ingrained in medical and nursing culture, will slow anytime soon. The new rules won't lower the number of new cases as most hospital have less than 50 cases and won't see the additional 20 percent cut, said Tatsuro Ishizaki, a researcher at Tokyo Metropolitan Institute of Gerontology.
There still needs to be a broad discussion on how to cope with end of life care in an aging society medically, ethically and economically to change the overall situation, said Yoshihiro Takayama, infectious disease specialist at Okinawa Prefectural Chubu Hospital.
While Kanao Tsuji, director of Suidobashi Higashiguchi Clinic in Tokyo, expects the new rules to reduce the number of new cases, he says that feeding the elderly orally will put pressure on homes as the process and preparation can take around 90 minutes.
The elderly will still benefit from better care as doctors will try to strike a better balance between extending life and improving its quality, said Ichiro Fujishima, director of Hamamatsu City Rehabilitation Hospital and chairman of the Society of Swallowing and Dysphagia of Japan. "A focus on swallowing evaluation and rehab will encourage doctors to think more about balancing the two and will help patients to be discharged from facilities," he said.

http://www.eurekalert.org/pub_releases/2014-03/taac-trp032514.php#rssowlmlink

Texas researcher: Peaches inhibit breast cancer metastasis in mice

Lab tests at Texas A&M AgriLife Research have shown that treatments with peach extract inhibit breast cancer metastasis in mice.

COLLEGE STATION – AgriLife Research scientists say that the mixture of phenolic compounds present in the peach extract are responsible for the inhibition of metastasis, according to the study, which was this month published in the Journal of Nutritional Biochemistry.
"Cancer cells were implanted under the skin of mice with an aggressive type of breast cancer cells, the MDA-MB-435, and what we saw was an inhibition of a marker gene in the lungs after a few weeks indicating an inhibition of metastasis when the mice were consuming the peach extract," said Dr. Luis Cisneros-Zevallos, a food scientist for AgriLife Research in College Station. "Furthermore, after determining the dose necessary to see the effects in mice, it was calculated that for humans it would be equivalent to consuming two to three peaches per day."
This is very important because it can be translated into something that is also beneficial for people, he added.
This work builds upon previous work at AgriLife Research released a few years ago, which showed that peach and plum polyphenols selectively killed aggressive breast cancer cells and not the normal ones, Cisneros-Zavallos said.
The previous work as well as the present one was conducted by Cisneros-Zevallos, Dr. David Byrne, both with AgriLife Research; Dr. Weston Porter, Texas A&M University department of veterinary physiology and pharmacology; and then-graduate student Giuliana Noratto, who is now on the faculty at Washington State University.

In the western hemisphere, breast cancer is the most common malignant disease for women, he said. In the U.S. last year, the American Cancer Society estimated about 232,340 new cases of invasive breast cancer among women.
Most of the complications and high mortality associated with breast cancer are due to metastasis, Cisneros-Zevallos pointed out. "The importance of our findings are very relevant, because it shows in vivo the effect that natural compounds, in this case the phenolic compounds in peach, have against breast cancer and metastasis. It gives opportunity to include in the diet an additional tool to prevent and fight this terrible disease that affects so many people," he said.
The study was conducted using the peach variety Rich Lady. However, according to Cisneros-Zevallos, most peach fruit share similar polyphenolic compounds but might differ in content. The study also determined that the underlying mechanism by which peach polyphenols are inhibiting metastasis would be by targeting and modulating the gene expression of metalloproteinases.
"In general, peach fruit has chemical compounds that are responsible for killing cancer cells while not affecting normal cells as we reported previously, and now we are seeing that this mixture of compounds can inhibit metastasis," said Cisneros-Zevallos. "We are enthusiastic about the idea that perhaps by consuming only two to three peaches a day we can obtain similar effects in humans. However, this will have to be the next step in the study for its confirmation." Cisneros-Zevallos continues testing these extracts and compounds in different types of cancer as well as in diabetes studies in vitro and in vivo to understand the molecular mechanisms involved.
The work documenting the health benefits of stone fruit has been supported by the Vegetable and Fruit Improvement Center at Texas A&M, the U.S. Department of Agriculture and the California Tree Fruit Agreement.

http://www.eurekalert.org/pub_releases/2014-03/mbae-sy032014.php#rssowlmlink

Study yields 'Genghis Khan' of brown bears, and brown and polar bear evolution

Male bears are seemingly always on the prowl, roaming much greater distances than females, particularly for mating.

For bear evolution, studying the paternally inherited Y chromosome is therefore a rich source to trace both the geographic dispersal and genetic differences between bear species.
This new study is particularly important, because a large part of our current knowledge about range-wide population structuring in mammals relies on data from maternally inherited mitochondrial DNA (mtDNA). More extensive male than female movement in bears and many other mammals implies that males carry genetic material over greater geographic distances than females. Therefore, the pronounced population structuring that has been reported for female-inherited mtDNA genes in brown bears might not be representative of the species as a whole.
By mining the genome of a recently sequenced polar bear, researchers from Axel Janke´s group at the Biodiversity and Climate Research Centre in Frankfurt, Germany, developed Y chromosome-specific markers, and analyzed several regions of the Y chromosome from a broad geographic sample of 130 brown and polar bears. They also included a continuous 390,000 base pair long stretch of genomic Y chromosomal region available in brown, polar and black bear genomes to gain a better understanding of the paternal signature of bear evolution.
They found evidence of extensive male gene flow that has led to the distribution of some brown bear Y chromosomes across incredibly large geographic distances, with two brown bears as far away as Norway and the Alaskan ABC islands carrying very similar Y chromosomes. This implies that one male brown bear lineage has spread across most of the brown bear's distribution range. "This pattern in brown bears covers even larger geographic areas than analogous findings from humans, where the Y-chromosomal lineage of Genghis Khan, founder of the Mongol Empire, was spread across much of Asia," said Tobias Bidon and Frank Hailer, lead authors of the study.
Because their data consistently showed that black, brown and polar bears carry highly distinct Y chromosome lineages, the researchers also estimated the timing of the split between the male lineages of brown and polar bears. The obtained time estimate for the speciation event of brown and polar bears is ca. 0.4 to 1.1 million years ago. This is significantly older than previous estimates based on mtDNA, confirming recent observations from autosomal markers that brown and polar bears from a genetic point of view represent highly distinct species. The study also shows that dispersing males connect the enigmatic brown bear population of the Alaskan ABC-islands to the North American mainland, and that the resulting movement of genes is substantial enough to maintain high genetic variability within this island population.
The study demonstrates that the Y chromosome represents an understudied part of the mammalian genome, providing crucial information to our understanding of the geographic structuring and evolutionary history of species.

http://www.eurekalert.org/pub_releases/2014-03/du-cid032514.php#rssowlmlink

Catheter innovation destroys dangerous biofilms

New design could reduce threat of infection from millions of urinary catheters

DURHAM, N.C. -- For the millions of people forced to rely on a plastic tube to eliminate their urine, developing an infection is nearly a 100 percent guarantee after just four weeks. But with the help of a little bubble-blowing, biomedical engineers hope to bring relief to urethras everywhere.

About half of the time, the interior of long-term urinary catheters become plagued by biofilms -- structures formed by colonies of bacteria that are extremely difficult to kill. Once established, it is only a matter of time before the biofilm becomes a welcoming host for other, more dangerous bacteria or begins to choke urine drainage, causing leakage -- or even trauma to the patient's body.

Duke University engineers have developed a new urinary catheter design that can eliminate nearly all of the hard-to-kill biofilm from the catheter's walls. Instead of focusing on expensive antibacterial coatings, the researchers use physical deformation to knock the infectious film from its moorings. "A biofilm is like a city that protects and harbors harmful bacteria," said Vrad Levering, a PhD student in biomedical engineering. "Our solution is like an earthquake that demolishes the infrastructure, leaving the rubble to be easily washed away by a flood of urine." The study appears online March 25 in Advanced Healthcare Materials. One in five people admitted to the hospital requires a urinary catheter, contributing to the more than 30 million used each year in the United States. These catheters are the number-one cause of hospital-acquired infections in the United States. Outside of the hospital, catheters are also commonly required by paralysis victims and the immobile elderly. And with an aging population, the use of catheters is likely to increase in coming decades.

For years, researchers have focused on developing antimicrobial treatments to stop the formation of biofilms, but as the statistics indicate, they have yet to find an affordable, effective solution. Besides the costs and technical challenges, many doctors fear antimicrobial solutions would promote the evolution of antibiotic-resistant superbugs. So Duke engineers decided to think outside of the cylinder.

"We ran experiments showing that if you stretch an elastic piece of rubber at a proper rate, you can pop various types of sticky biofilms right off of its surface," said Xuanhe Zhao, professor of mechanical engineering and materials science, whose team partnered with that of Gabriel Lopez, professor of biomedical engineering. "Those tests were initially aimed at cleaning submerged surfaces in marine environments, but the principle has many possible applications," continued Lopez. "So we thought, why not catheters?"

Their first model features a single channel that can be inflated with liquid or air running parallel to the main urinary tract, with nothing but a thin, flexible barrier between the two. Pushing liquid through the small inflation channel forces the thin wall into the urinary tract while leaving the outer dimensions of the catheter intact.

A prototype molded from a 3D printed form worked beautifully, Levering said. The sudden deformation unseated more than 90 percent of the biofilm, which was washed away by a flow matching the slow movement of urine. Biofilm on the wall opposite the inflation channel was mostly unharmed, but the collaborative team has plans to produce a new prototype with inflation channels running along both sides of the main channel.

Lopez believes the demonstration is a clear proof-of-principle that their simple mechanical solution could revolutionize the catheter industry. Because the design would have low implementation costs, closely adheres to the dimensions of current catheters and would be easy for medical clinicians to operate, the team hopes to bring it to market and is currently searching for partners.

"There are more than 30 million of these used every year," said Levering. "And for a technology that has changed very little in 50 years, the problem is kind of atrocious. We hope we have found a solution."

Levering said the general concept has potential applications for a wide range of industries currently plagued by biofilms, such as dairy processing, petroleum transport, city drinking water and heat exchangers.

"We don't want to get in over our heads, but there are lots of other places where biofilms are severe problems," said Levering. "It's a multi-billion-dollar-per-year problem for sea water filtration alone. There are definitely other potential markets out there."

The research was a collaboration between the Lopez and Zhao groups that, besides Levering, includes Qiming Wang, a PhD student in mechanical engineering and materials science, and Phanindhar Shivapooja, a PhD student in biomedical engineering.

This work was supported by the National Science Foundation's Research Triangle Materials Research Science and Engineering Center (DMR-1121107), the Office of Naval Research (N0014-13-1-0828) and National Institutes of Health Training Grant (#5T32GM008555-18).

"Soft Robotic Concepts in Catheter Design: an On-demand Fouling-release Urinary Catheter," Levering, V., Wang, Q., Shivapooja P., Zhao, X., Lopez, G.P. Advanced Healthcare Materials, 2014. DOI: 10.1002/ ((ADHM.201400035))

http://www.eurekalert.org/pub_releases/2014-03/smh-slh032514.php#rssowlmlink

Strictly limiting hours surgical residents can work has not improved patient safety

Too-restricted hours may work for some residents, but not for surgical residents

TORONTO - Strictly limiting the number of hours surgical residents can work has not improved patient outcomes but may have increased complications for some patients and led to higher failure rates on certification exams, a research paper concludes.

Traditionally, doctors in the residency phase of their training spent very long hours in a hospital –often around-the-clock--so they could see a wide variety and high volume of patients. In the last 10 years, health authorities started limiting those hours in the hopes of improving patient safety and the education and well-being of doctors. In 2003, the Accreditation Council for Graduate Medical Education in the United States limited residents' hours to 80 per week. In 2011, the council prohibited first-year residents from working 24 shifts.

In Canada, on-call shifts were limited to 16 hours in Quebec after a provincial arbitrator ruled that in 2011 that a 24-hour on-call shift posed a danger to residents' health and violated the Charter of Rights. Last year a National Steering Committee on Resident Duty Hours said the status quo was unacceptable and that shifts of 24 hours or longer without sleep should be avoided. It urged all provinces and health care institutions to develop comprehensive strategies to minimize fatigue and fatigue-related risks during residency.

Dr. Najma Ahmad, a trauma surgeon at St. Michael's Hospital who was a member of the national group, published a paper today in the Annals of Surgery that found the too-restricted hours may work for some residents, but not for surgical residents. "A one-size fits all approach to resident duty hours may not be appropriate for all specialties," said Dr. Ahmed, noting that the American College of Surgeons Division of education has stated that mastery in surgery requires "extensive and immersive experiences."

She said the emphasis should be on reducing the amount of non-educational work residents do and to find ways to manage fatigue such as making sure they get enough uninterrupted sleep. Dr. Ahmed, who is also director of the University of Toronto's General Surgery Program, conducted a meta-analysis of 135 articles on the impact of resident duty hours on clinical and educational outcomes in surgery.

"In surgery, recent changes in hours for residents are not consistently associated with improved resident well-being and may have negative impacts on patient outcomes and performance on certification exams," she said.

Dr. Ahmed said that shorter hours for residents means more shift handovers, which means less continuity of care and more opportunities for information to get lost or not passed along. Shorter shifts may also reduce residents' ability to observe the natural course of a patient's recovery and recognize when a patient starts to experience complications.

"We must remember that the objective of residencies is to train expert clinicians. In the case of surgery, this requires a lot of time in the operating room, under the mentorship of an expert surgeon. Coaching in the operating room specifically requires that mentors observe progress, provide feedback and then look for progress at the next opportunity."

http://www.medscape.com/viewarticle/821980?src=rss#rssowlmlink

Topol on the Icons of Medicine: Time to Retire the Relics?

This is Eric Topol, Medscape Editor-in-Chief. The topic at hand today is icons of medicine and how they may be changing.

Eric J. Topol, MD

The icon I like to harp on is the stethoscope, and that inclination has been reinforced recently by an editorial from a group at Mount Sinai saying, "Rest in peace, stethoscope."[1] In fact, at the Mount Sinai Medical School in New York City, as well as at the University of South Carolina, they are giving medical students the modern version of the stethoscope -- namely high-resolution hand-held ultrasound devices -- because the old stethoscope, which has been around for almost 200 years, is now considered a relic, at least by some.

A health system in Minnesota is training primary care physicians to perform a head-to-toe ultrasound exam and to not even use the old stethoscope -- which, by the way, was not really a stetho*scope*; it was a stetho*phone*. It did not scope or look at anything. The use of ultrasound in this way is an interesting trend and perhaps what we will have as a new icon of medicine.

Another icon is the white coat. An interesting *New York Times* article[2] questioned whether white coats will be around much longer. There have been concerns that the white coat is a reservoir of bacteria and pathogens and may be making nosocomial infections worse. Moreover, it has always been something that created distance between the patient and physician -- part of the whole theme of medical paternalism.

Other suggestions are to wear white coats with short sleeves or to abandon white coats, similar to the recommendation that male physicians stop wearing ties because they also are a known potential carrier of pathogens.
We are in a time of medicine with a lot of turbulence, a lot of change, which leads us to question some of the most revered and time-honored icons, such as the stethoscope and the white coat. Whether they will ever completely go away remains to be seen, but they are at least certainly being challenged.
I believe that challenging prevailing dogma and ritual use of certain things is always a good thing. Thank you.

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http://bit.ly/QqUo1H

Stem cells offer clue to bipolar disorder treatment

What a nerve! Skin cells taken from people with bipolar disorder have been turned into brain cells.

18:57 25 March 2014 by Colin Barras

These in turn are offering up clues about the changes in the brain that drive the disorder, and may also provide a way to test new treatments.
About three in every 100 people develop bipolar disorder – a mental illness characterised by episodes of depression and euphoria. But the condition remains poorly understood.
That's because it would be too invasive to obtain and study viable nerve cells from the brains of people with the condition.
There are also no good animal models, because bipolar disorder – although highly heritable – has, for the most part, not been linked to any specific genes that can be studied using animals.
"People say the condition is probably the result of a lot of small contributions by multiple genes," says Sue O'Shea at the University of Michigan in Ann Arbor.

Clear differences

Now O'Shea and her colleagues may have found an ethical way to make a genetic model of the condition. First, they took skin samples from 22 people with bipolar disorder and 10 healthy volunteers. They induced these adult skin cells to return to a stem-cell-like state, creating what are called induced pluripotent stem cells (iPSCs) and then encouraged these cells to mature into neurons.
O'Shea was surprised to find that neurons derived from people with bipolar disorder grew differently from those from people without the condition. "I was expecting it would take decades of careful science before we would find any real differences," she says.
The "bipolar" neurons expressed more genes involved in calcium signalling between cells. Interfering with this cellular communication can disrupt healthy brain activity, and calcium signalling has already been implicated as a likely factor in diseases like bipolar disorder. Treating the cells with lithium – a common treatment for bipolar disorder – reduced the abnormal signalling to normal levels.
Some of the genes which influenced activity of neurons were not previously known to be involved in bipolar disorder. "Some of the genes misdirect neurons to the wrong area in the brain," says O'Shea.

Right cell, wrong place

This could cause some neurons programmed to become part of one brain region – the cortex, for example – to express genes typical of a different brain region entirely. Such a genetic difference might provide clues as to why certain people are predisposed to developing bipolar disorder in later life, she says. What might trigger the condition is still unclear.
Carrie Bearden at the University of California, Los Angeles, thinks the work is very interesting. She says bipolar disorder may not have been a target of iPSC research before now because the genetics of the condition seem so elusive. "I think that the methodology opens up incredible new avenues for future research," she says.
"It's very early days," says O'Shea, but she hopes that one day the neuronal model could be used to test new therapies for bipolar disorder.
It may even be possible to take skin samples from people with the condition, convert the cells into neurons, and then work out in a dish which therapy or combination of therapies will be most beneficial for each person. At the moment, many people with bipolar disorder must undergo months or years of trial and error experimenting to find a therapy that can improve their condition.

Journal reference: Translational Psychiatry, DOI: 10.1038/tp.2014.12

http://phys.org/news/2014-03-english-students-benefit-two-language-immersion.html#rssowlmlink

English students benefit more in two-language instructional programs than immersion

Over the long term students in classrooms taught in two languages not only catch up to their English immersion counterparts, but they eventually surpass them

Like a growing number of school systems across the country, San Francisco Unified School District is tasked with educating increasing rolls of students for whom English is not their first language. In the United States, the school-aged population has grown a modest 10 percent in the last three decades, while the number of children speaking a language other than English at home has soared by 140 percent. Against this backdrop, researchers at the Stanford Graduate School of Education (GSE) and San Francisco Unified School District (SFUSD) are examining student performance in various types of English-language learning programs.

The first focuses on how long it takes non-English-speaking students to reach English proficiency and be reclassified out of English learner (EL) status. The second looks at the same students' academic trajectories over time, comparing outcomes of four English-learner instructional program types.

The results show that while students in English immersion programs perform better in the short term, over the long term students in classrooms taught in two languages not only catch up to their English immersion counterparts, but they eventually surpass them, both academically and linguistically. The researchers will present findings at a meeting of the SFUSD School Board on Tuesday, March 25. The meeting starts at 6 p.m.

In their study, the researchers identified a group of about 18,000 English-learner students in the San Francisco school system who entered kindergarten as early as the fall of 2001. They were enrolled in four distinct linguistic instructional environments, and the researchers followed their progress for 10 years.

Much debate in the educational community centers on which type of educational approach works best to help non-English-speaking students learn English, as well as other subjects such as math, science and history, at the same time. Until recently, the discussion has been fueled largely by preconceptions and evidence from a set of relatively small-scale studies, because robust data on large numbers of English-learner students in diverse instructional programs was not yet available. The Stanford-SFUSD research team is among the first to do a large-scale quantitative analysis on the comparative efficacy of these programs.

"With this study we're interested in helping the district figure out what works best for those who matter most: the students," said Sean Reardon, a professor of education and scholar at Stanford's Center for Education Policy Analysis, who directed the study. "Unfortunately, in the past there has been precious little data and rigorous evidence; we wanted to see if we could provide better evidence to inform the scholarly debate."

Adding data to the debate

Among the more significant findings, Reardon and his colleagues discovered that students in English-immersion classrooms perform better than those in two-language classrooms in the early grades, but those in the two-language programs catch up to or even surpass their counterparts by middle school.

Although the study found that students in English immersion programs have a better academic performance by second grade than students in programs that teach in both English and another language, this pattern changes a few years later. By middle school, the students in the two-language programs score substantially above students in the English-only programs on a range of metrics.

Take, for example, students' performance on the state's English Language Arts test. Although English learners in the "dual immersion" program score 0.15 standard deviations below their peers in English immersion in this subject in second grade, the rate of growth of their test scores is so fast that by fifth grade onward their scores surpass those of their peers in English immersion. By eighth grade they score about 0.2 standard deviations above their peers in English immersion.

"I think the big finding is that, by and large, students – particularly Latino students – who start out in the two-language programs have very different later trajectories than those starting in English immersion," Reardon said. "A lot of people worry that students in bilingual and dual immersion programs might never catch up, but this study shows convincingly that they do catch up and, in many ways, outperform their peers over time."

The researchers gathered data on the diverse population of English-learner students in the San Francisco school district. Next, they weighed such factors as what program the students were in, their initial level of English proficiency and what their parents' preferences were for the type of program their children would attend. They then examined how that cohort performed academically over the next decade.

Tying schools to scholars

The study is part of an unusual partnership between the GSE and the San Francisco Unified School District. The two organizations are working hand in hand to select research questions that are of pressing importance to the district and that are relevant to educators nationwide.

The initiative offers Stanford researchers unprecedented access to SFUSD data, while encouraging close collaboration between researchers and practitioners, who have direct experience in what is happening in the classroom. The English-learner research is one of several dozen research projects underway, including a study of the benefits of an iPad mathematics game and efforts to identify students at highest risk of failing to complete high school.

Christina Mei-Yue Wong, a special assistant to SFUSD Superintendent Richard Carranza, and Ritu Khanna, an assistant superintendent, worked closely with Reardon and his team of researchers to structure and conduct the study.

Wong noted that since 1974, the district has provided bilingual education programs to support English learners' access to the core curriculum. While California voters placed severe restrictions on bilingual education in 1998 with the passing of Proposition 227, SFUSD used a system of parental waivers to allow them to continue offering two-language instruction among other options for English learners. But it was not known how two-language approaches compared with English-only approaches.

SFUSD proved a perfect test bed for the study, Reardon said. "San Francisco Unified is a remarkably diverse school system where there are students who speak English, Spanish and Cantonese, of course, but 68 other languages as well," he said.

Like many things related to education today, however, the issue of bilingual classrooms is complex and easily influenced by preconceptions. Reardon cautions against looking past the data.

"One of the big arguments against bilingual education is that it may do students a disservice because they don't learn English well and also suffer academically. Others contend that English learners in English immersion classrooms are suffering because they spend the first couple years not knowing what's going on," he said. "Our data suggest that students in two-language classrooms – those where they are taught both in English and their first language – do better if we just give them enough time. Focusing on the long term is key."

http://www.eurekalert.org/pub_releases/2014-03/acs-bmc032614.php#rssowlmlink

Beer marinade could reduce levels of potentially harmful substances in grilled meats

The smells of summer — the sweet fragrance of newly opened flowers, the scent of freshly cut grass and the aroma of meats cooking on the backyard grill — will soon be upon us.

Now, researchers are reporting that the very same beer that many people enjoy at backyard barbeques could, when used as a marinade, help reduce the formation of potentially harmful substances in grilled meats. The study appears in ACS' Journal of Agricultural and Food Chemistry.

I.M.P.L.V.O. Ferreira and colleagues explain that past studies have shown an association between consumption of grilled meats and a high incidence of colorectal cancer. Polycyclic aromatic hydrocarbons (PAHs) are substances that can form when meats are cooked at very high temperatures, like on a backyard grill. And high levels of PAHs, which are also in cigarette smoke and car exhaust, are associated with cancers in laboratory animals, although it's uncertain if that's true for people. Nevertheless, the European Union Commission Regulation has established the most suitable indicators for the occurrence and carcinogenic potency of PAHs in food and attributed maximum levels for these compounds in foods. Beer, wine or tea marinades can reduce the levels of some potential carcinogens in cooked meat, but little was known about how different beer marinades affect PAH levels, until now.

The researchers grilled samples of pork marinated for four hours in Pilsner beer, non-alcoholic Pilsner beer or a black beer ale, to well-done on a charcoal grill. Black beer had the strongest effect, reducing the levels of eight major PAHs by more than half compared with unmarinated pork. "Thus, the intake of beer marinated meat can be a suitable mitigation strategy," say the researchers. *The authors acknowledge funding from Universidade do Porto.*

http://nyti.ms/1dXlgeG

Discovery of Planetoid Hints at Bigger Cousin in Shadows

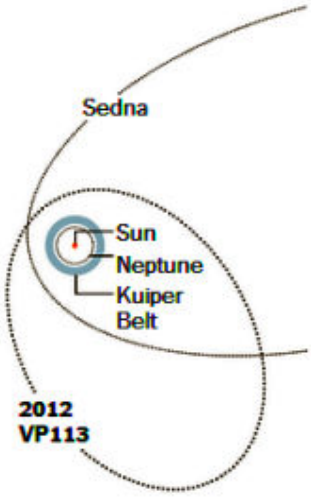
Astronomers have discovered a second icy world orbiting in a slice of the solar system where, according to their best understanding, there should have been none.

By KENNETH CHANGMARCH 26, 2014

“They’re in no man’s land,” Scott S. Sheppard, of the Carnegie Institution for Science in Washington, said of the objects, which orbit far beyond the planets and even the ring of icy debris beyond Neptune known as the Kuiper belt. Intriguingly, the astronomers said that details of the orbits hint at perhaps an unseen planet several times the size of Earth at the solar system’s distant outskirts.

The new planetoid, an estimated 250 miles wide, is now 7.7 billion miles from the sun, about as close as it gets. At the other end of its orbit, the planetoid, which for now carries the unwieldy designation of 2012 VP113, loops out to a distance of 42 billion miles. Neptune, by contrast, is a mere 2.8 billion miles from the sun.

Much farther out, a trillion miles, the solar system is believed to be surrounded by a sphere of icy bodies known as the Oort cloud, where many comets are thought to originate. But between the Kuiper belt and the Oort cloud, astronomers had expected empty space. The discovery, by Dr. Sheppard and Chadwick A. Trujillo of the Gemini Observatory in Hawaii, is reported in the journal Nature.



For convenience, the scientists shortened the 2012 VP113 designation to VP, which in turn inspired their nickname for the planetoid: Biden, after Vice President Joseph R. Biden. Dr. Trujillo said they had not decided what to propose for the official name. The existence of 2012 VP113 could help explain why there is anything out there at all.

In the 2000s, when Michael E. Brown, an astronomer at the California Institute of Technology, scanned the outer solar system, his biggest discovery was Eris, a ball of ice in the Kuiper belt that was Pluto-size or slightly bigger, the impetus for the demotion of Pluto to dwarf planet.

Dr. Brown's oddest discovery, however, came a couple of years earlier: Sedna, a 600-mile-wide planetoid also beyond the Kuiper belt, three times as far from the sun as Neptune. Its 11,400-year orbit stretches farther than that of 2012 VP113.

A Second Sednoid ***In 2003, astronomers unexpectedly discovered the planetoid Sedna, orbiting the sun beyond the Kuiper Belt, an area of frozen objects just outside Neptune's orbit. Astronomers have now discovered a second object in this region, which has the current designation 2012 VP113.*** **Source: Scott S. Sheppard/ Carnegie Institution for Science**

In the youth of the solar system, there would not have been enough matter out there to coalesce into something as large as Sedna. It was too far out to have been flung by the gravitational slings of big planets, but too close to have been nudged by the gravitational tides of the Milky Way.

Having found one such body, astronomers expected to quickly find more, and they came up with a name for them: Sednoids. But for years, no one found any.

For the latest search, Dr. Trujillo and Dr. Sheppard used a 13-foot telescope at the Cerro Tololo Inter-American Observatory in Chile. In November 2012, they spotted a moving point of light beyond the Kuiper belt — 2012 VP113. Follow-up observations last year confirmed it was a Sednoid. Scientists have come up with various ideas to explain such bodies. Dr. Brown, for one, thinks the Sednoids were pushed there when the sun was part of a dense cluster of stars — "a fossil record of the birth of the solar system," he said.

Others suggest that a rogue planet, ejected from the inner solar system, dragged the Sednoids along as it flew through the Kuiper belt. Dr. Trujillo and Dr. Sheppard point out that the orbits of Sedna and 2012 VP113 have similarities to those of several other Kuiper belt bodies, which could be a sign of an unseen planet's gravitational influence.

Computer simulations showed that the similarities could be explained by a planet with a mass five times that of Earth about 23 billion miles from the sun, too dim to be seen.

Harold F. Levison of the Southwest Research Institute in Boulder, Colo., who models the beginning of the solar system, agreed that this was a possibility. "I think they've convinced me there's something going on," he said of Dr. Trujillo and Dr. Sheppard. "But I think it's too early to say that it's a planet."

The astronomers expect to find more Sednoids in the next few years, which could solve the mystery of their origin. "When we find 10 of them, I'll tell you what the answer is," Dr. Brown said.

http://www.eurekalert.org/pub_releases/2014-03/ep-poc032614.php#rssowlmlink

Patches of cortical layers disrupted during early brain development in autism

Researchers at the University of California, San Diego School of Medicine and the Allen Institute for Brain Science have published a study that gives clear and direct new evidence that autism begins during pregnancy.

The study will be published in the March 26, 2014 online edition of the New England Journal of Medicine.

The researchers – by Eric Courchesne, PhD, professor of neurosciences and director of the Autism Center of Excellence at UC San Diego, Ed S. Lein, PhD, of the Allen Institute for Brain Science in Seattle, and first author Rich Stoner, PhD, of the UC San Diego Autism Center of Excellence – analyzed 25 genes in post-mortem brain tissue of children with and without autism. These included genes that serve as biomarkers for brain cell types in different layers of the cortex, genes implicated in autism and several control genes.

"Building a baby's brain during pregnancy involves creating a cortex that contains six layers," Courchesne said. "We discovered focal patches of disrupted development of these cortical layers in the majority of children with autism." Stoner created the first three-dimensional model visualizing brain locations where patches of cortex had failed to develop the normal cell-layering pattern.

"The most surprising finding was the similar early developmental pathology across nearly all of the autistic brains, especially given the diversity of symptoms in patients with autism, as well as the extremely complex genetics behind the disorder," explained Lein.
During early brain development, each cortical layer develops its own specific types of brain cells, each with specific patterns of brain connectivity that perform unique and important roles in processing information. As a brain cell develops into a specific type in a specific layer with specific connections, it acquires a distinct genetic signature or "marker" that can be observed.
The study found that in the brains of children with autism key genetic markers were absent in brain cells in multiple layers. "This defect," Courchesne said, "indicates that the crucial early developmental step of creating six distinct layers with specific types of brain cells – something that begins in prenatal life – had been disrupted."
Equally important, said the scientists, these early developmental defects were present in focal patches of cortex, suggesting the defect is not uniform throughout the cortex. The brain regions most affected by focal patches of absent gene markers were the frontal and the temporal cortex, possibly illuminating why different functional systems are impacted across individuals with the disorder.
The frontal cortex is associated with higher-order brain function, such as complex communication and comprehension of social cues. The temporal cortex is associated with language. The disruptions of frontal and temporal cortical layers seen in the study may underlie symptoms most often displayed in autistic spectrum disorders. The visual cortex – an area of the brain associated with perception that tends to be spared in autism – displayed no abnormalities.
"The fact that we were able to find these patches is remarkable, given that the cortex is roughly the size of the surface of a basketball, and we only examined pieces of tissue the size of a pencil eraser," said Lein. "This suggests that these abnormalities are quite pervasive across the surface of the cortex."
Researchers used data collected for the Allen Brain Atlas, as well as the BrainSpan Atlas of the Developing Human Brain, which was developed by a consortium of partners and funded by the National Institute of Mental Health. These rich resources allowed the scientific team to identify specific genes in the developing human brain that could be used as biomarkers for the different layer cell types.
Researching the origins of autism is challenging because it typically relies upon studying adult brains and attempting to extrapolate backwards. "In this case," Lein noted, "we were able to study autistic and control cases at a young age, giving us a unique insight into how autism presents in the developing brain."
"The finding that these defects occur in patches rather than across the entirety of cortex gives hope as well as insight about the nature of autism," added Courchesne.
According to the scientists, such patchy defects, as opposed to uniform cortical pathology, may help explain why many toddlers with autism show clinical improvement with early treatment and over time. The findings support the idea that in children with autism the brain can sometimes rewire connections to circumvent early focal defects, raising hope that understanding these patches may eventually open new avenues to explore how that improvement occurs.
Additional contributors to the study include Maggie L. Chow, PhD, and Subhojit Roy, MD, PhD, UC San Diego; Maureen P. Boyle, PhD, UC San Diego and Allen Institute; Peter R. Mouton, PhD, University of South Florida School of Medicine; Anthony Wynshaw-Boris, MD, PhD, Case Western Reserve University School of Medicine; and Sophia A. Colamarino, PhD, Stanford University School of Medicine.
This research was supported by funds from the Simons Foundation, the Peter Emch Family Foundation, Cure Autism Now/Autism Speaks, the Thursday Club Juniors, the UC San Diego Autism Center of Excellence (NIMH grant P50-MH081755), and the Allen Institute for Brain Science (NIMH grant RC2MH089921).
http://www.eurekalert.org/pub_releases/2014-03/p-ccb032014.php#rssowlmlink

Crows complete basic 'Aesop's fable' task

Crows understand water displacement at the level of a small child

New Caledonian crows may understand how to displace water to receive a reward, with the causal understanding level of a 5-7 year-old child, according to results published March 26, 2014, in the open access journal PLOS ONE by Sarah Jelbert from University of Auckland and colleagues.
Understanding causal relationships between actions is a key feature of human cognition. However, the extent to which non-human animals are capable of understanding causal relationships is not well understood. Scientists used the Aesop's fable riddle— in which subjects drop stones into water to raise the water level and obtain an out-of reach-reward—to assess New Caledonian crows' causal understanding of water displacement. These crows are known for their intelligence and innovation, as they are the only non-primate species able to make tools, such as prodding sticks and hooks. Six wild crows were tested after a brief training period for six

experiments, during which the authors noted rapid learning (although not all the crows completed every experiment). The authors note that these tasks did not test insightful problem solving, but were directed at the birds' understanding of volume displacement.

VIDEO: This video shows example trials for each of the six experiments.

Crows completed 4 of 6 water displacement tasks, including preferentially dropping stones into a water-filled tube instead of a sand-filled tube, dropping sinking objects rather than floating objects, using solid objects rather than hollow objects, and dropping objects into a tube with a high water level rather than a low one. However, they failed two more challenging tasks, one that required understanding of the width of the tube, and one that required understanding of counterintuitive cues for a U-shaped displacement task. According to the authors, results indicate crows may possess a sophisticated—but incomplete—understanding of the causal properties of volume displacement, rivalling that of 5-7 year old children.

Sarah Jelbert added, "These results are striking as they highlight both the strengths and limits of the crows' understanding. In particular, the crows all failed a task which violated normal causal rules, but they could pass the other tasks, which suggests they were using some level of causal understanding when they were successful."

Citation: Jelbert SA, Taylor AH, Cheke LG, Clayton NS, Gray RD (2014) Using the Aesop's Fable Paradigm to Investigate Causal Understanding of Water Displacement by New Caledonian Crows. PLoS ONE 9(3): e92895. doi:10.1371/journal.pone.0092895

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http://www.eurekalert.org/pub_releases/2014-03/nch-sik032614.php#rssowlmlink

Study identifies key player in motor neuron death in Lou Gehrig's disease

Amyotrophic lateral sclerosis, also known as Lou Gehrig's disease, is marked by a cascade of cellular and inflammatory events that weakens and kills vital motor neurons in the brain and spinal cord.

The process is complex, involving cells that ordinarily protect the neurons from harm. Now, a new study by scientists in The Research Institute at Nationwide Children's Hospital points to a potential culprit in this good-cell-gone-bad scenario, a key step toward the ultimate goal of developing a treatment.

Motor neurons, or nerve cells, in the brain and spinal cord control the function of muscles throughout the body. In amyotrophic lateral sclerosis (ALS), motor neurons die and muscles weaken. Patients gradually lose the ability to move and as the disease progresses, are unable to breathe on their own. Most people with ALS die from respiratory failure within 3 to 5 years from the onset of symptoms.

For the study, published online this month in Neuron, researchers examined a protein involved in transcriptional regulation, called nuclear factor-kappa B (NF-κB), known to play a role in the neuroinflammatory response common in ALS. NF-ƘB has also been linked to cancer and a number of other inflammatory and autoimmune diseases.

Using animal models, the researchers studied disease progression in mice in which NF-ƘB had been inhibited in two different cell types — astrocytes, the most abundant cell type in the human brain and supporters of neuronal function; and microglia, macrophages in the brain and spinal cord that act as the first and main form of defense against invading pathogens in the central nervous system. Inhibiting NF-ƘB in microglia in mice slowed disease progression by 47 percent, says Brian Kaspar, MD, a principal investigator in the Center for Gene Therapy at Nationwide Children's and senior author of the new study.

"The field has identified different cell types in addition to motor neurons involved in this disease, so one of our approaches was to find out what weapons these cells might be using to kill motor neurons," Dr. Kaspar says. "And our findings suggest that the microglia utilize an NF-κB-mediated inflammatory response as one of its weapons."

Inhibiting the protein in astrocytes had no impact on disease progression, so the search for the weapons that cell type uses against motor neurons continues. These preliminary findings also don't tell scientists how or why NF-κB turns the ordinarily protective microglia into neuron-killing molecules. But despite the mysteries that remain, the study moves scientists closer to finding a treatment for ALS.

The search for an ALS therapy has been focused in two directions: identifying the trigger that leads to disease onset and understanding the process that leads to disease progression. Changes in motor neurons are involved in disease onset, but disease progression seems to be dictated by changes to astrocytes, microglia and oligodendrocytes. Some cases of ALS are hereditary but the vast majority of patients have no family ties to the disease. The complexity of the disease and the lack of a clear familiar tie make screening before disease onset nearly impossible, highlighting the importance of slowing the disease, Dr. Kaspar says.

"Focusing on stopping the changes that occur in astrocytes and microglia has clinical relevance because most people don't know they're getting ALS, says Dr. Kaspar, who also is an associate professor of pediatrics and neurosciences at The Ohio State University College of Medicine. "We have identified a pathway in microglia that may be targeted to ultimately slow disease progression in ALS and are exploring potential therapeutic strategies and may have broader implications for diseases such as Alzheimer's and Parkinson's Disease amongst others."

http://phys.org/news/2014-03-major-west-antarctic-glacial-loss.html#rssowlmlink

New study shows major increase in West Antarctic glacial loss

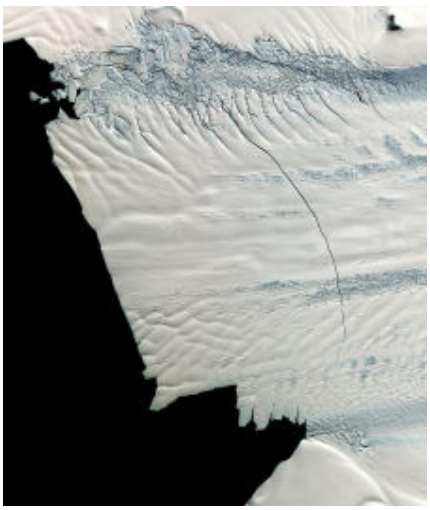
Six massive glaciers in West Antarctica are moving faster than they did 40 years ago, causing more ice to discharge into the ocean and global sea level to rise, according to new research.

The amount of ice draining collectively from those half-dozen glaciers increased by 77 percent from 1973 to 2013, scientists report this month in Geophysical Research Letters, a journal of the American Geophysical Union. Pine Island Glacier, the most active of the studied glaciers, has accelerated by 75 percent in 40 years, according to the paper. Thwaites Glacier, the widest glacier, started to accelerate in 2006, following a decade of stability.

The study is the first to look at the ice coming off the six most active West Antarctic glaciers over such an extended time period, said Jeremie Mouginot, a glaciologist at University of California-Irvine (UC-Irvine) who co-authored the paper. Almost 10 percent of the world's sea-level rise per year comes from just these six glaciers, he said. "What we found was a sustained increase in ice discharge—which has a significant impact on sea level rise," he said.

The researchers studied the Pine Island, Thwaites, Haynes, Smith, Pope and Kohler glaciers, all of which discharge ice into a vast bay known as the Amundsen Sea Embayment in West Antarctica.

The amount of ice released by these six glaciers each year is comparable to the amount of ice draining from the entire Greenland Ice Sheet annually, Mouginot said. If melted completely, the glaciers' disappearance would raise sea levels another 1.2 meters (four feet), according to co-author and UC-Irvine Professor Eric Rignot.



A satellite image of Pine Island Glacier shows an 18-mile-long crack across the glacier. Researchers used cracks and other physical features on the glaciers to calculate glacier acceleration by comparing image data from year to year to see how far the cracks traveled. **Credit: NASA**

The decades of increasing speeds and ice loss are "a strong indication of a major, long-term leakage of ice into the ocean from that sector of Antarctica," noted Rignot.

"This region is considered the potential leak point for Antarctica because of the low seabed. The only thing holding it in is the ice shelf," said Robert Thomas, a glaciologist at the NASA Wallops Flight Facility, in Wallops Island, Va., who was not involved in the study. Ice shelves are platforms of permanent floating ice that form where glaciers meet the sea. In West Antarctica, ice shelves prevent the glaciers investigated in the study from slipping more rapidly into the ocean.

Mouginot and his colleagues used satellite data to look at sequential images of the glaciers from 1973 to 2013. The scientists then calculated how fast the ice was moving by tracking surface features, such as cracks in the ice, to determine the distance the glaciers traveled from month to month and year to year.

While the study considered the six glaciers collectively, it also revealed unprecedented change on the individual glacier level. Thwaites Glacier, the largest of the six with a width of 120 kilometers (75 miles), experienced a decade of near-stability until 2006, when its speed picked up by 0.8 kilometers (half a mile) per year – a 33 percent increase in speed, according to the study. This is the first time that such changes on Thwaites Glacier have been observed, said Mouginot.

Of all the glaciers in the study, Pine Island Glacier accelerated the most since 1973, increasing by 1.7 kilometers (one mile), per year. That's a 75 percent increase in speed from approximately 2.5 kilometers (1.5 miles) per year in 1973 to 4 kilometers (2.5 miles) per year in 2013.

Both Pine Island and Thwaites glaciers contribute the most to overall ice discharge—about three-fourths of the total amount documented in the study.

However, scientists also documented even higher rates of increased discharge in some of the smaller glaciers. Smith and Pope Glaciers nearly tripled the amount of ice they drained into the ocean since 1973.

The research team also found that the Pine Island Glacier is accelerating along its entire drainage system—up to 230 kilometers (155 miles) inland from where it meets the ocean.

"This paper is important in showing that a glacier can actually 'feel' what is happening far downstream of itself," said Thomas. "It means that if you disturb the ice sheet near the coast, the glaciers will feel the push and rapidly respond hundreds of kilometers inland."
This finding suggests that glacier acceleration models may need to be reevaluated, Thomas added. Most current models only take into account isolated speed changes resulting from a local disturbance, rather than representing how these changes affect the glacier as a whole.
More information: "Sustained increase in ice discharge from the Amundsen Sea Embayment, West Antarctica, from 1973 to 2013" onlinelibrary.wiley.com/doi/10.1002/2013GL059069/abstract

http://www.eurekalert.org/pub_releases/2014-03/nrr-aea032714.php#rssowlmlink

Acupuncture enhances antidepressant effect of Seroxat

Acupuncture is more effective than oral antidepressants in improving depressive symptoms, and produces fewer side effects than tricyclic antidepressants.

Despite the continued development of antidepressants and alternative/synergistic therapies, major depressive disorder has not been comprehensively recognized and treatment outcome is often insufficient.
An epidemiological study addressing depression showed that poor recognition and treatment are largely linked to the lack of an accurate assessment tool and to patients' economic situation. Prof. Yong Huang and team from Southern Medical University in China compared the clinical efficacy of acupuncture/electroacupuncture combined with an antidepressant drug, with that of an antidepressant drug alone, using the Symptom Checklist-90. Researchers found that administration of Seroxat alone or in combination with acupuncture/electroacupuncture can produce a significant effect in patients with primary unipolar depression. Furthermore, acupuncture/electroacupuncture has a rapid onset of therapeutic effect and produces a noticeable improvement in obsessive-compulsive, depressive and anxiety symptoms. These findings have been published in the Neural Regeneration Research (Vol. 9, No. 2, 2014).
Article: "Acupuncture/electroacupuncture enhances anti-depressant effect of Seroxat: the Symptom Checklist-90 scores " by Junqi Chen1, Weirong Lin2, Shengxu Wang3, Chongqi Wang3, Ganlong Li1, Shanshan Qu3, Yong Huang3, Zhangjin Zhang4, Wei Xiao3 (1 The Third Affiliated Hospital of Southern Medical University, Guangzhou, Guangdong Province, China; 2 The Shenzhen TCM hospital, Shenzhen, Guangdong Province, China; 3 School of Traditional Chinese Medicine, Southern Medical University, Guangzhou, Guangdong Province, China; 4 School of Chinese Medicine, The University of Hong Kong, Hong Kong Special Administrative Region, China)
Chen JQ, Lin WR, Wang SX, Wang CQ, Li GL, Qu SS, Huang Y, Zhang ZJ, Xiao W. Acupuncture/electroacupuncture enhances anti-depressant effect of Seroxat: the Symptom Checklist-90 scores. Neural Regen Res. 2014;9(2):213-222.

http://www.eurekalert.org/pub_releases/2014-03/nrr-kjf032714.php#rssowlmlink

Kaixin Jieyu Fang for treatment of vascular depression

The Chinese compound Kaixin Jieyu Fang can be used to treat vascular depression; however, the underlying mechanism remains unclear.

Dr. Ying Zhang and co-workers from Guang'anmen Hospital, China Academy of Chinese Medical Sciences in China This study established a rat model of chronic cerebral ischemia-caused white matter damage by ligation of the bilateral common carotid arteries.
Rats received daily intragastric administration of a suspension of Kaixin Jieyu Fang powder. Kaixin Jieyu Fang was made from two prescriptions of Kaixin San and Sini San supplemented with Radix Morindae Offcinalis, consisting of eight Chinese herbs including Radix Ginseng, Radix Bupleuri, Fructus Aurantii Immaturus, Radix Morindae Officinalis, Poria, Radix Polygalae, Radix Paeoniae Rubra and Radix Glycytthizae.
After treatment, the degree of white matter damage in the cerebral ischemia rat model was alleviated, Bcl-2 protein and mRNA expression in brain tissue increased, and Bax protein and mRNA expression decreased. These results, published in the Neural Regeneration Research (Vol. 9, No. 1, 2014), indicate that Kaixin Jieyu Fang can alleviate cerebral white matter damage, and the underlying mechanism is associated with regulation of Bcl-2/Bax protein and mRNA expression, which is one of possible mechanism behind the protective effect of Kaixin Jieyu Fang against vascular depression.
Article: "Mechanism underlying the protective effect of Kaixin Jieyu Fang on vascular depression following cerebral white matter damage," by Ying Zhang, Shijing Huang, Yanyun Wang, Junhua Pan, Jun Zheng, Xianhui Zhang, Yuxia Chen, Duojiao Li (Guang'anmen Hospital, China Academy of Chinese Medical Sciences, Beijing 100053, China)
Zhang Y, Huang SJ, Wang YY, Pan JH, Zheng J, Zhang XH, Chen YX, Li DJ. Mechanism underlying the protective effect of Kaixin Jieyu Fang on vascular depression following cerebral white matter damage. Neural Regen Res. 2014;9(1):61-68.

http://www.bbc.com/news/health-26763385##rssowlmlink

World now 80% polio free, World Health Organization says

The World Health Organization has declared its South East Asia region polio-free.

By Tulip Mazumdar Global health reporter

The certification is being hailed a "historic milestone" in the global fight to eradicate the deadly virus.

It comes after India officially recorded three years without a new case of polio.

The announcement means 80% of the world is now officially free of polio, although the disease is still endemic in Afghanistan, Nigeria and Pakistan. Other countries in the WHO South East Asia region, such as Sri Lanka, Maldives and Bhutan, have been free of the virus for more than 15 years.

However, despite the "huge global significance" of the announcement, the WHO admits there are still major challenges to overcome if the world is the reach the goal of eradicating polio everywhere by 2018.

There have also been outbreaks in conflict-hit countries such as Syria, which had previously managed to stamp out the virus.

Polio mainly affects children under five years old. The virus is transmitted through contaminated food and water, and multiplies in the intestine. It can then invade the nervous system, causing paralysis in one in every 200 infections.

South East Asia is the fourth of six WHO regions to be declared polio-free after the Americas, Western Pacific and Europe regions. Eastern Mediterranean and Africa have yet to gain a similar status.

Dr Poonam Khetrapal Singh, WHO South East Asia regional director, said: "This is very significant because before this region was certified polio-free, we had half the world's population polio free.

"With the South East Asia region being added we now have 80% of the population polio free.

"This was a problem the region was struggling with for a long time, but now finally, we are polio free."

Rise in polio cases

Many experts thought India would be the last country in the world to get rid of polio says Deepak Kapur, of Rotary International's India National Polio Plus Committee.

He said India faced several enormous challenges including its large population. He said: "India has close to 170 million children under five who needed to be immunised. "Then there's the existence of insanitary conditions which helped the polio virus to proliferate - and impure drinking water because polio is a water borne disease."

But he said the fact that India had managed it and now the whole of South East Asia could be declared polio free sent a powerful and optimistic message to the three remaining polio-endemic countries.

The world signed up to eradicating polio in 1988. The Global Polio Eradication Initiative was launched, which is a partnership between governments and organisations such as Unicef, the WHO and Rotary International.

The aim was to banish polio once and for all. In 1988 there were 350,000 recorded cases. By 2012 cases had fallen to 223. But last year there was a rise in cases to 406 new infections.

"Every child is still at risk"

The increase is largely down to vaccination campaigns being interrupted by conflict. In October 2013, Syria reported its first case of polio since 1999. By March 2014 there were 25 cases.

An outbreak in the Horn of Africa, which started in May 2013, has seen 217 new cases in Somalia, Kenya and Ethiopia.

Rise and fall in endemic countries
Afghanistan: 2012, 37 cases 2013, 14 cases
Nigeria: 2012, 122 cases. 2013, 53 cases
Pakistan: 2012, 58 cases 2013, 93 cases
Source: Global Polio Eradication Initiative

While Thursday's announcement clearly marked an important milestone, there was still a long way to go, said Mr Kapur. "Every child in the world is at risk of contracting polio until such a time as the wild polio virus is completely eradicated from every part of the world," he said.

"Until then no child - be it in North America or Europe - will be free of polio potentially hunting them down all over again. "The only way to ensure the wild polio virus no longer exists in any part of the world is to wipe it out of every community in the world. "It is not good enough to wipe it out on one continent and not the rest of the world because today the world is just one global village. "The only way to keep polio away is through immunisation."

He said if every child on the planet were immunised, there would be nowhere for the virus to flourish and spread.

"Today's a big occasion for the entire global polio eradication initiative because if India - which had the most difficult of situations - can do it, others around the world can do it too," Mr Kapur said.

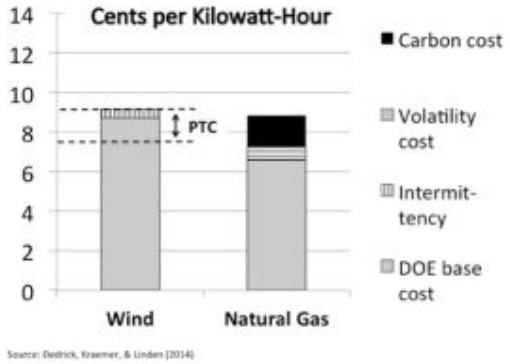
"So Pakistan, Afghanistan and Nigeria need to replicate the example of India and go after this virus.

"Global eradication could and should be achieved in the very near future."

http://phys.org/news/2014-03-power-competitive-natural-gas.html#rssowlmlink

Wind power cost competitive with natural gas, study finds

The costs of using wind energy and natural gas for electricity are virtually equal when accounting for the full private and social costs of each, making wind a competitive energy source for the United States, according to a new study on the federal tax credit for wind energy.



Phys.org - Just released by researchers at Syracuse University and the University of California, the analysis shows that wind energy comes within .35 cents per kWh when levelized over the 20-year life of a typical wind contract, compared on an equivalent basis to the full costs for natural gas-fired energy, according to Jason Dedrick, associate professor at Syracuse University's School of Information Studies (iSchool).

"The true cost of electricity from wind power and natural gas are effectively indistinguishable, yet because the cost of carbon emissions is not included in the market price of gas, wind has not been a competitive form of energy use in most of the United States, without government pricingsupport," Dedrick said.

The analysis starts from the U.S. Department of Energy (DOE) estimates of the lifetime "levelized" cost of electricity from a new wind farm, and also from an advanced combined cycle gas plant.

The analysis develops a new metric that incorporates long-term factors which are not included in the DOE numbers. Accordingly, the study also reveals that the recently-expired Production Tax Credit for wind makes up for the lack of any mechanism to make fossil fuel generators pay for the cost of carbon emissions, Dedrick noted.

Researchers for the study, "Visualizing the Production Tax Credit for Wind Energy," in addition to Dedrick, are Kenneth L. Kraemer, research professor, University of California, Irvine; and Greg Linden, senior research associate at the University of California, Berkeley.

Gas Appears Cheaper

Current national-average estimates from the DOE are 8.7 cents per kilowatt-hour (kWh) for wind and 6.6 cents for gas-fired energy—making gas appear as a much cheaper alternative, Linden noted. Incorporating the new metric into the analysis, however, shows that the tax credit "is actually compensating for a market failure to price the future cost to society of carbon emissions," Linden explained. "In the absence of a carbon tax, the PTC can serve as a stand-in to make the market reflect the true costs of energy."

The study incorporates these aspects:

Future costs of carbon dioxide emissions are added to the price of gas (using the government's most recent Interagency Working Group average of $43 per metric ton)—at a cost of 1.6 cents per kWh. The cost of supply intermittency (the cost to utilities to compensate for wind stoppages and variations) is added to the price of wind—estimated at 0.5 cents per kWh.

The cost of correcting natural gas price volatility for 20 years (the length of time for which wind prices are typically fixed) is added to the price of gas— estimated at 0.65 cents per kWh. Adding these costs together finds that the adjusted levelized cost of electricity for wind is 9.2 cents per kWh, versus 8.85 cents per kWh for gas.

The components of the adjusted levelized cost, reported here as averages, are actually estimates that fall in a range, Linden noted. "The result is even more favorable for wind if you consider some of the larger possible values for carbon emissions," he added. Further details can be found in a brief working paper available at http://ischool.syr.edu/media/documents/2014/3/PTC32514.pdf .

Dedrick noted that while the amounts discussed here are averages, the costs of wind and gas vary considerably across the U.S. The price difference between wind and gas power is actually less than 1.6 cents per kWh in many regions of the country, "and that is where the PTC will have its impact," he concluded.

Support for PTC?

The question of whether the federal government should support wind energy has been debated by Congress for more than two decades, at least since the PTC was created in 1992, according to Kraemer. He said the credit has been implemented in an on-again/off-again fashion, expiring five times since then.

Until now, the tax credit has always been renewed for another year or two. This year, Kraemer said, President Obama's proposed budget for the Department of Energy calls for permanently extending the PTC, at a cost of $19.2 billion over the next 10 years.

"Effectively Indistinguishable"

Dedrick suggested that "Since the levelized value of the PTC happens to be very close to the average estimated cost of carbon from a natural gas plant, a long-term extension of the PTC would have a similar effect to a carbon tax in terms of the relative price of electricity from wind and gas." He continued, "Given the ranges of the estimates for each of the costs involved, our research shows that the true cost of electricity from wind power and natural gas are effectively indistinguishable. Yet, because the cost of carbon emissions is not included in the market price of gas, wind is not competitive in most of the U.S. without government support. An alternative would be to create a pricing mechanism for carbon emissions, either through a carbon tax or cap-and-trade scheme. However, neither of those options seems likely in the current U.S. political environment," Dedrick added.

More information: A brief working paper is available online: ischool.syr.edu/media/documents/2014/3/PTC32514.pdf.

http://bit.ly/1dEXLfI

Homeopathic remedies recalled for containing real medicine

They actually contain ingredients for a change, and that could be harmful.

by Olivia Solon, wired.co.uk Mar 27 2014, 10:51pm TST

The US Food and Drug Administration (FDA) has recalled homeopathic remedies made by a company called Terra-Medica because they may contain actual medicine—possibly penicillin or derivatives of the antibiotic.

Terra-Medica creates a range of homeopathic capsules, suppositories and ointments under clinical-sounding brand names including Pleo-Fort, Pleo-Quent and Pleo-EX. The FDA has found that 56 lots of the drugs may contain penicillin or derivatives of penicillin, which may have been produced during fermentation. This is a problem, because Terra-Medica says that its products don't contain antibiotics. The Pleo Sanum range of products, for example, "can address acute and chronic inflammations and infections without the use of traditional antibiotics." Homeopathic remedies are generally highly diluted substances (in fact, the more a substance is diluted, the more effective homeopaths deem it to be) that practitioners claim can cause the body to heal itself. A 2010 House of Commons Science and Technology Committee report found these remedies to perform no better than placebos.

Homeopathic medicines are regulated by the FDA in the same way that over-the-counter, nonprescription drugs are in terms of purity and packaging, but they aren't subjected to the same level of testing of effectiveness before they can be sold.

Terra-Medica is voluntarily recalling the batches after the FDA determined that the products may contain these antibiotics. "In patients who are allergic to beta-lactam antibiotics, even at low levels, exposure to penicillin can result in a range of allergic reactions from mild rashes to severe and life-threatening anaphylactic reactions."

Michael Marshall, the vice president of Merseyside Skeptics, the group behind anti-homeopathy campaign group 10.23, said that it's "[funny] to see homeopathic products recalled because, for a change, they actually contain some real ingredients." But, he added, there's "real cause for concern here."

"People are often persuaded to try homeopathy by claims that homeopathic remedies have no side effects—and that's true, albeit because they also have no beneficial effects. These so-called medicines are simply drops of water, put onto sugar pills, and no more than that," Marshall said.

This is not the first time that the FDA has had to recall homeopathic remedies. In 2009, it recalled the Zicam Cold Remedy products because they were causing people to lose their sense of smell—some 130 people reported long-lasting loss of their sense of smell to the FDA, while 800 more people complained to Zicam. Zicam's parent company Matrixx ended up recalling all of the products—the problem seemed to be caused by taking zinc intranasally.

The FDA also explored products from Nelson's, one of the biggest homeopathy suppliers in the UK, which makes products for retailers like Boots.

"Their inspection found some incredibly worrying things," says Marshall. This included the fact that one out of every six bottles in one observed batch did not receive the dose of active homeopathic drug solution "due to the wobbling and vibration of the bottle assembly during filling of the active ingredient," the report—written by the FDA's Steven Lynn—explains.

"The active ingredient was instead seen dripping down the outside of the vial assembly. Your firm lacked controls to ensure that the active ingredient is delivered to every bottle," said the 2012 assessment.

Glass fragments were also observed in an assembly line area where open glass vials were inserted into outer plastic sheaths. "Your firm failed to implement adequate measures to prevent glass contamination and had no documentation to demonstrate that appropriate line clearance and cleaning is conducted following occurrences of glass breakage, which has been a recurring problem."

Marshall says that cases in which trusting vulnerable consumers have believed the claims of homeopaths and "forgone real medicine" in place of "these overpriced sugar pills" are "too numerable to count" and "often with unnecessary and tragic consequences."
"Our advice to the consumer is clear: leave sugar pills in the 19th century where they belong."

http://bit.ly/1lvEtM4

Greenhouse experiments show plant's long-term memory

Scientists have demonstrated that Mimosa pudica plants not only learn from experience—they also remember what they have learnt over extended periods of time.

Mar 27, 2014 by Rebecca Graham

The groundbreaking study used the same experimental methods usually reserved for testing learned behavioural responses in animals. Mimosa pudica, native to South and Central America, is known as the 'sensitive plant' due to its defensive leaf-folding reflex in response to physical stimuli.

Lead researcher Dr Monica Gagliano from UWA's Centre for Evolutionary Biology School of Animal Biology, was curious to explore Mimosa's capacity to develop learned behavioural responses through habituation. "Habituation is where you actively learn to adapt to and filter out stimuli which have proven over time to be harmless, enabling you to remain responsive to your surrounding environment," she says.

"The little plants remembered one event of one day, one month later which was just amazing!" **Dr Gagliano. Credit: Jkadavoor**

The researchers devised an apparatus which dropped each potted Mimosa 15cm down a vertical rail onto a foam base, generating a physical shock that elicited the leaf-folding behaviour. The plants were divided into a low-light (LL) and high-light (HL) environment, hypothesising the LL plants would be faster learners and retain their memory longer given their greater need for open leaves (for photosynthesis).
A single drop was administered to 16 control plants (eight per light condition) and again eight hours later; they swiftly closed their leaves both times. The researchers then 'trained' 56 plants (28 per light condition) by administering 60 consecutive drops, five to 10 seconds apart, seven times within a day.
After the first four to six drops the plants habituated swiftly, keeping their leaves open after learning the drops presented no real threat. As predicted, plants in LL re-opened their leaves more widely.
"They learn the same way we do … they acquire a new understanding of their environment and change their behaviour accordingly," Dr Gagliano says. "They also change their behaviour depending on what the environment is demanding, so when the light was not at an optimum level, it became very important to work this out and adapt quickly."

Plants display long-term behaviour changes

Mimosa's long-term memory when exposed to new environments was tested, where plants from LL were switched to HL and vice versa, and re-tested 28 days later using the full-day training regime. They continued to exhibit the learned behaviour in the new light condition, indicating long-term habituation in the face of changed environments.
"The plants' learnt behaviour is important in the present but also important in the future, so they don't waste energy repeating the same process of acquiring knowledge again," Dr Gagliano says. "The little plants remembered one event of one day, one month later which was just amazing!" She is interested in seeing what happens when more complex conditions and scenarios of learning are introduced to the plants.

http://www.eurekalert.org/pub_releases/2014-03/wfbm-ssp032714.php#rssowlmlink

Study shows promise of preserving fertility in boys with cancer

Scientists have moved a step closer to being able to preserve fertility in young boys who undergo chemotherapy and radiation treatments for cancer.

WINSTON-SALEM, N.C. - The new research, published in Fertility and Sterility, the journal of the American Society for Reproductive Medicine, addresses the safety of an option scientists are developing for boys who aren't sexually mature and cannot bank sperm.
Scientists aim to freeze a sample of the boys' testicular tissue so that when they reach adulthood, spermatogonial stem cells (SSCs) found in the tissue can be reproduced and transplanted back into the patients. These cells are responsible for sperm production throughout adulthood.
"Our study addressed an important safety issue – whether cancer cells that might be present in testicular tissue samples can survive the process to replicate the sperm-producing stem cells," said lead author Hooman Sadri-

Ardekani, M.D., Ph.D., an instructor in urology and regenerative medicine at Wake Forest Baptist Medical Center.
"This is an important consideration because of the potential to re-introduce cancer into the patient," he said. "The research, which involved one of the most common childhood cancers, shows that the cancer cells were eliminated. Based on these findings, we recommend that all boys with cancer be offered the option of storing testicular tissue for possible future clinical use."
Sadri-Ardekani performed the work with researchers at the University of Amsterdam and Avicenna Research Institute in Tehran, Iran, before joining Wake Forest Baptist.
Cancers that can have a high risk of infertility, depending on the treatment, are certain leukemias, Hodgkin's disease, brain tumors and bone cancer. Because of the high survival rates of childhood cancer – close to 80 percent – more cancer patients than ever are reaching adulthood and many face fertility problems.
The current research involved acute lymphoblastic leukemia (ALL) cells, a common type of childhood cancer. Previous research had shown that up to 30 percent of boys with ALL had cancer cells in their testicular tissue. Several earlier studies have attempted to eliminate cancer cells from biopsy tissue, but they showed contradictory results. The approach of Sadri-Ardekani and colleagues was to investigate whether cancer cells would survive the laboratory protocol they had developed to reproduce SSCs from a small tissue biopsy. This process multiplies the original SSCs by 18,000-fold so there are enough cells to transplant back into the patient when he reaches adulthood.
For the research, ALL cells were taken from three patients' bone marrow. The team then put the ALL cells alone, and ALL cells combined with testicular cells, through the cell-reproduction process.
Even when ALL cells made up 40 percent of the cell mixture being cultured, they were entirely eliminated in 26 days of culture.
"This pilot study showed that the culture system not only allowed for efficient propagation of sperm stem cells, but also eliminated ALL cells," said Sadri-Ardekani.
SSC transplantation has not yet been attempted in humans, but has been performed successfully in several species of animals, including monkeys, said Sadri-Ardekani. He noted that before physicians and scientists begin offering SSC transplantation in patients, additional research will be needed, including whether other types of leukemia cells will also be eliminated in the cell-propagation process.
Co-researchers were Christa Homberg, M.Sc., and Ellen van der Schoot, M.D., Ph.D., Sanquin Research, Amsterdam, the Netherlands; and Toni M. M. van Capel, B.Sc., Henk van den Berg, M.D., Ph.D., Fulco van der Veen, M.D., Ph.D., Ans M.M. van Pelt, Ph.D., and Sjoerd Repping, Ph.D., University of Amsterdam.

http://www.eurekalert.org/pub_releases/2014-03/p-aac032114.php#rssowlmlink

Ancient African cattle first domesticated in Middle East

Geneticists and anthropologists previously suspected that ancient Africans domesticated cattle native to the African continent nearly 10,000 years ago.

Now, a team of University of Missouri researchers has completed the genetic history of 134 cattle breeds from around the world. In the process of completing this history, they found that ancient domesticated African cattle originated in the "Fertile Crescent," a region that covered modern day Iraq, Jordan, Syria and Israel.
In their study published in PLOS Genetics, Prof. Decker (University of Missouri) and a team of international researchers compared the similarities and differences among the genetics of many different cattle breeds to determine how the breeds are related. Their research found mixing of native cattle in Indonesia with imports from India, European and African cattle in Italy and Spain, and European and Asian cattle in Korea and Japan. The MU researchers also determined that unique American cattle breeds, such as Texas longhorns, are the result of breeding between Spanish cattle, transported from Europe by explorers in the 16th century, and breeds of Zebu, or Brahman cattle from India imported into the U.S. from Brazil in the late 1800s. Decker says these discoveries help advance genetics and uncover important information about human history.
Prof. Decker says the genetics of these African cattle breeds are similar to those of cattle first domesticated in the Middle East nearly 10,000 years ago, proving that those cattle were brought to Africa as farmers migrated south. Those cattle then interbred with wild cattle, or aurochs, which were native to the region, and changed their genetic makeup enough to confuse geneticists.
"In many ways, the history of cattle genetics mirrors human history," Decker said. "In the case of African cattle, anthropologists and geneticists used to suspect that domesticated African cattle were native to the continent, when in fact, they were brought by migrating peoples thousands of years ago. By better understanding the history of the animals we domesticate, we can better understand ourselves."

Decker also said that cattle breeding is important for animal farmers looking to maximize their herds' meat and dairy production. He says that understanding the genetic history of cattle breeds is important when looking for solutions to agricultural issues.
"Now that we have this more complete genetic history of cattle worldwide, we can better understand the diversity of the species," Decker said. "By understanding the variations present, we can improve cattle for agricultural purposes, whether that is through breeding more disease-resistant animals or finding ways to increase dairy or beef production."
Link to article (please include in your press): http://www.plosgenetics.org/doi/pgen.1004254
Citation: Decker JE, McKay SD, Rolf MM, Kim J, Molina Alcala´ A, et al. (2014) Worldwide Patterns of Ancestry, Divergence, and Admixture in Domesticated Cattle. PLoS Genet 10(3): e1004254. doi:10.1371/journal.pgen.1004254

http://www.eurekalert.org/pub_releases/2014-03/uoc--gwi032414.php#rssowlmlink

Gulf War illness not in veterans' heads, but in their mitochondria

Researchers at the UC San Diego School of Medicine have demonstrated for the first time that veterans of the 1990-91 Persian Gulf War who suffer from "Gulf War illness" have impaired function of mitochondria – the energy powerhouses of cells.

The findings, published in the March 27, 2014 issue of PLOS ONE, could help lead to new treatments benefitting affected individuals – and to new ways of protecting servicepersons (and civilians) from similar problems in the future, said principal investigator Beatrice A. Golomb MD, PhD, professor of medicine.
Golomb, with associate Hayley Koslik and Gavin Hamilton, PhD, a research scientist and magnetic resonance physicist, used the imaging technology to compare Gulf War veterans with diagnosed Gulf War illness to healthy controls. Cases were matched by age, sex and ethnicity.
The technique used – 31-phosphorus magnetic resonance spectroscopy or 31P-MRS – reveals amounts of phosphorus-containing compounds in cells. Such compounds are important for cell energy production, in particular phosphocreatine or PCr, which declines in muscle cells during exercise. PCr recovery takes longer when mitochondrial function is impaired, and delayed recovery is recognized as a robust marker of mitochondrial dysfunction.
Affected Gulf War veterans displayed significantly delayed PCr recovery after an exercise challenge. In fact, said Golomb, there was almost no overlap in the recovery times of Gulf War illness veterans compared to controls: All but one control participant had a recovery time-constant clustered under 31 seconds. In contrast, all but one Gulf Illness veteran had a recovery time-constant exceeding 35 seconds, with times ranging as high as 70 seconds.
There were 14 participants in the study: seven Gulf War illness cases and seven matching controls. Golomb notes that the use of 1:1 matching markedly improves statistical "power," allowing a smaller sample size. The separation between the two groups was "visibly striking, and the large average difference was statistically significant," she said.
Golomb noted that impaired mitochondrial function accounts for numerous features of Gulf War illness, including symptoms that have been viewed as perplexing or paradoxical.
"The classic presentation for mitochondrial illness involves multiple symptoms spanning many domains, similar to what we see in Gulf War illness. These classically include fatigue, cognitive and other brain-related challenges, muscle problems and exercise intolerance, with neurological and gastrointestinal problems also common."
There are other similarities between patients with mitochondrial dysfunction and those suffering from Gulf War illness: Additional symptoms appear in smaller subsets of patients; varying patterns of symptoms and severity among individuals; different latency periods across symptoms, or times when symptoms first appear; routine blood tests that appear normal.
"Some have sought to ascribe Gulf War illness to stress," said Golomb, "but stress has proven not to be an independent predictor of the condition. On the other hand, Gulf veterans are known to have been widely exposed to acetylcholinesterase inhibitors, a chemical class found in organophosphate and carbamate pesticides, nerve gas and nerve gas pre-treatment pills given to troops.
"These inhibitors have known mitochondrial toxicity and generally show the strongest and most consistent relationship to predicting Gulf War illness. Mitochondrial problems account for which exposures relate to Gulf War illness, which symptoms predominate, how Gulf War illness symptoms manifest themselves, what objective tests have been altered, and why routine blood tests have not been useful."
Funding for this research came, in part, from a UC San Diego Academic Senate Award and the U.S. Department of Defense.

http://www.medscape.com/viewarticle/822669?src=rss

Autism Rates Jump 30%, CDC Reports

More children in the United States have an autism spectrum disorder (ASD) than previously thought, the US Centers for Disease Control and Prevention (CDC) reports today.

Megan Brooks

New estimates put the figure at 1 in 68 children aged 8 years (or 14.7 per 1000) — roughly 30% higher than previous estimates reported in 2012 of 1 in 88 children (11.3 per 1000) having an ASD, the agency said.

"The criteria used to diagnose ASDs and the methods used to collect data have not changed," the CDC noted.

The new estimates are published in the March 28 issue of the Morbidity and Mortality Weekly Report.

"The number of children identified with autism continues to rise," Coleen Boyle, PhD, director of CDC's National Center on Birth Defects and Developmental Disabilities, said during a telebriefing with reporters today.

"Over the last decade, the most notable change in the characteristics of children identified with autism is the growing number who have average or above average intelligence, from one third in 2002 to nearly 50% in 2010," Dr. Boyle said.

"To better understand why, there is an urgent need to do more research. It could be that doctors are getting better at identifying these children. There could be a growing number of children with autism and higher intellectual ability, or it may a combination of better recognition and increased prevalence," she added.

The new estimates are based on 2010 data from 11 sites participating in the Autism and Developmental Disabilities Monitoring (ADDM) Network, an active surveillance system that provides estimates of the prevalence of ASD and other characteristics among children aged 8 years. They chose age 8 because "most children who are diagnosed with autism will be diagnosed by age 8, based on previous data," Dr. Boyle explained.

For 2010, the overall prevalence of ASD among the ADDM sites was 14.7 per 1000 (1 in 68) children aged 8 years. Overall ASD prevalence estimates varied among sites from 5.7 to 21.9 per 1000 children. ASD prevalence estimates also varied by sex and racial/ethnic group. The data continue to show that ASD is almost 5 times more common among boys than girls: 1 in 42 boys vs 1 in 189 girls. White children are more likely to be identified as having ASD than are black or Hispanic children, the CDC said.

Among the 7 sites with sufficient data on intellectual ability, 31% of children with ASD were classified as having IQ scores in the range of intellectual disability (IQ $\leq$ 70), 23% in the borderline range (IQ = 71 - 85), and 46% in the average or above average range of intellectual ability (IQ > 85).

"The study found that almost half of children identified with ASD have average or above average intellectual ability (an IQ above 85) compared to a third of children a decade ago," the CDC said.

"Community leaders, health professionals, educators and childcare providers should use these data to ensure children with ASD are identified as early as possible and connected to the services they need," said Dr. Boyle.

The CDC said most children with ASD are diagnosed after age 4, even though ASD can be diagnosed as early as age 2. Healthy People 2020, the nation's 10-year health objectives, strives to increase the proportion of young children with ASD and other developmental delays who are screened, evaluated, and enrolled in early intervention services in a timely manner.

The most important thing for parents to do is to act early when there is a concern about a child's development," said Marshalyn Yeargin-Allsopp, MD, chief of CDCs Developmental Disabilities Branch.

New Initiative Announced

Katherine C. Beckman, PhD, MPH, of the US Department of Health and Human Services Administration for Children and Families, announced a new "unprecedented" government-backed initiative launching today that will encourage developmental and behavioral screening for autism and provide support for children, families, and providers who care for children with autism.

The so-called Birth to 5: Watch Me Thrive! program will help families look for and celebrate milestones; promote universal screenings; identify delays as early as possible; and improve the support available to help children succeed in school and thrive alongside their peers, she noted.

The program features "a compendium of first-line research-based screening tools that meet specific quality inclusion criteria [and] an array of resources" for multiple audiences, including early care and education providers, pediatricians, child welfare case workers, families, and communities, Dr. Beckman said.

The American Academy of Pediatrics (AAP) is a partner in the initiative.

"The AAP is working to help make pediatric practices more equipped to provide ongoing care to the many children with autism," James Perrin, MD, FAAP, president of the AAP, said in a statement. "These rising rates

[announced today] certainly underscore the need to improve our understanding of the causes of autism and to work on prevention," he added.
"The prevalence data makes even more important the Academy's focus on early screening, identification, and referral for intervention for all children and our work to support collaborative medical homes for children, youth, and adults with autism spectrum disorder," added Susan Hyman, MD, FAAP, chair of the AAP autism subcommittee.
"It's critical that we as a society do not become numb to these numbers," Dr. Hyman said. "They remind us of the work we need to do in educating clinicians and parents in effective interventions for all children, including those with developmental disabilities." *MMWR Morb Mortal Wkly Rep. 2014:63;1-21.* Full article

http://bit.ly/1rSL7NT

Gunshot victims to be suspended between life and death

Doctors will try to save the lives of 10 patients with knife or gunshot wounds by placing them in suspended animation, buying time to fix their injuries

26 March 2014 by Helen Thomson

NEITHER dead or alive, knife-wound or gunshot victims will be cooled down and placed in suspended animation later this month, as a groundbreaking emergency technique is tested out for the first time.
Surgeons are now on call at the UPMC Presbyterian Hospital in Pittsburgh, Pennsylvania, to perform the operation, which will buy doctors time to fix injuries that would otherwise be lethal.
"We are suspending life, but we don't like to call it suspended animation because it sounds like science fiction," says Samuel Tisherman, a surgeon at the hospital, who is leading the trial. "So we call it emergency preservation and resuscitation."
The technique involves replacing all of a patient's blood with a cold saline solution, which rapidly cools the body and stops almost all cellular activity. "If a patient comes to us two hours after dying you can't bring them back to life. But if they're dying and you suspend them, you have a chance to bring them back after their structural problems have been fixed," says surgeon Peter Rhee at the University of Arizona in Tucson, who helped develop the technique.
The benefits of cooling, or induced hypothermia, have been known for decades. At normal body temperature – around 37 °C – cells need a regular oxygen supply to produce energy. When the heart stops beating, blood no longer carries oxygen to cells. Without oxygen the brain can only survive for about 5 minutes before the damage is irreversible.
However, at lower temperatures, cells need less oxygen because all chemical reactions slow down. This explains why people who fall into icy lakes can sometimes be revived more than half an hour after they have stopped breathing.
Just before heart and brain surgery, doctors sometimes lower body temperature using ice packs, and by circulating the blood through an external cooling system. This can give them up to 45 minutes in which to stop blood flow and perform surgery. However, the cooling process takes time and can only be done with careful planning and preparation.
When someone reaches an emergency department with a traumatic gunshot injury or stab wound, slow cooling isn't an option. Often their heart has stopped beating due to extreme blood loss, giving doctors only minutes to stop the bleeding and restart the heart. Even if the bleeding can be stopped, it's not like filling up an empty gas tank. Resuscitation exposes the body to a sudden onslaught of oxygen, which can cause tissues to release chemicals that damage cells and cause fatal "reperfusion" injuries.
Finding ways to cool the body until it reaches a state of suspended animation – where people are not alive but not yet dead – could give doctors more time in an emergency.
The technique was first demonstrated in pigs in 2002 by Hasan Alam at the University of Michigan Hospital in Ann Arbor, and his colleagues. The animals were sedated and a massive haemorrhage induced, to mimic the effect of multiple gunshot wounds. Their blood was drained and replaced by either a cold potassium or saline solution, rapidly cooling the body to around 10 °C. After the injuries were treated, the animals were gradually warmed up as the solution was replaced with blood.

Vital signs

The pig's heart usually started beating again by itself, although some pigs needed a jump-start. There was no effect on physical or cognitive function (Surgery, doi.org/dvhdzs).
"After we did those experiments, the definition of 'dead' changed," says Rhee. "Every day at work I declare people dead. They have no signs of life, no heartbeat, no brain activity. I sign a piece of paper knowing in my heart that they are not actually dead. I could, right then and there, suspend them. But I have to put them in a body bag. It's frustrating to know there's a solution."

That solution will be put to the test in humans for the first time. A final meeting this week will ensure that a team of doctors is fully prepared to try it. Then all they have to do is wait for the right patient to arrive.
That person will have suffered a cardiac arrest after a traumatic injury, and will not have responded to attempts to start their heart. When this happens, every member of Tisherman's team will be paged. "The patient will probably have already lost about 50 per cent of their blood and their chest will be open," he says. The team sees one of these cases each month. Their chance of survival is less than 7 per cent.
The first step is to flush cold saline through the heart and up to the brain – the areas most vulnerable to low oxygen. To do this, the lower region of their heart must be clamped and a catheter placed into the aorta – the largest artery in the body – to carry the saline. The clamp is later removed so the saline can be artificially pumped around the whole body. It takes about 15 minutes for the patient's temperature to drop to 10 °C. At this point they will have no blood in their body, no breathing, and no brain activity. They will be clinically dead.
In this state, almost no metabolic reactions happen in the body, so cells can survive without oxygen. Instead, they may be producing energy through what's called anaerobic glycolysis. At normal body temperatures this can sustain cells for about 2 minutes. At low temperatures, however, glycolysis rates are so low that cells can survive for hours. The patient will be disconnected from all machinery and taken to an operating room where surgeons have up to 2 hours to fix the injury. The saline is then replaced with blood. If the heart does not restart by itself, as it did in the pig trial, the patient is resuscitated. The new blood will heat the body slowly, which should help prevent any reperfusion injuries.
The technique will be tested on 10 people, and the outcome compared with another 10 who met the criteria but who weren't treated this way because the team wasn't on hand. The technique will be refined then tested on another 10, says Tisherman, until there are enough results to analyse. "We've always assumed that you can't bring back the dead. But it's a matter of when you pickle the cells," says Rhee.
Getting this technique into hospitals hasn't been easy. Because the trial will happen during a medical emergency, neither the patient nor their family can give consent. The trial can only go ahead because the US Food and Drug Administration considers it to be exempt from informed consent. That's because it will involve people whose injuries are likely to be fatal and there is no alternative treatment. The team had to have discussions with groups in the community and place adverts in newspapers describing the trial. People can opt out online. So far, nobody has.
Tisherman says he eventually hopes to extend the technique to other conditions.
For now, suspended animation is limited to a few hours. But that's not to say that more lengthy suspension isn't possible (see "Will human hibernation ever happen").
"We're trying to save lives, not pack people off to Mars," says Tisherman. "Can we go longer than a few hours with no blood flow? I don't know. Maybe years from now someone will have figured out how to do it, but it will certainly take time."

Will human hibernation ever happen?

Is long-term suspended animation possible? Humans may soon be held at death's door for a few hours (see main story), but what about more lengthy "human hibernation"?
Clues could be found in our genes. The fat-tailed dwarf lemur is the only primate known to hibernate. Its brain might hold clues to the genetic mechanisms behind such metabolic flexibility. Kathrin Dausmann at the University of Hamburg, Germany, who made the discovery with her colleagues in 2004, reckons that humans may have the genes to hibernate, but we just don't switch them on (New Scientist, 21 January 2006, p 28).
Chemicals could also help slow metabolism. Mark Roth at the Fred Hutchinson Cancer Research Center in Seattle, Washington, and his colleagues have used hydrogen sulphide to put mice into suspended animation for 6 hours. The gas slows the metabolism by limiting oxygen uptake by cells. They are now studying a metabolism-decreasing chemical found naturally in the body.
It may all be down to economics, says Peter Rhee at the University of Arizona. "When I was in medical school, 5 minutes of brain death and you were dead. Now we can increase that to hours. With the time and money, maybe we could start to think about extending [suspended animation] to months and years."

http://bit.ly/1fBZ2zh

Misleading Mouse Studies Waste Medical Resources

A retrospective analysis of more than 100 failed drugs show that many should never have made it to clinical trials

Erika Check Hayden and Nature magazine

The failure of experimental drugs that had once looked promising could have been prevented with better animal studies, according to a re-examination of past clinical trials. “I hear too many stories about patients who have

used their one shot at getting into a trial on a drug that didn't have enough legs to begin with, and that's a tragedy," says Steve Perrin, an amyotrophic lateral sclerosis (ALS) researcher who led the work.
Perrin, chief scientific officer of the ALS Therapy Development Institute in Cambridge, Massachusetts, used mice with symptoms similar to ALS to test more than 100 compounds that had previously been identified as candidate drugs. Most — including eight that had shown promise in previous mouse work but ultimately failed in humans trials — failed to slow the progressive, fatal degenerative disease, also called Lou Gehrig's disease or motor neuron disease.
Perrin argues that positive results seen in previous mouse trials were spurious, probably resulting from poorly conducted studies. In a comment published today in Nature, he is urging researchers to boost the quality of animal studies by better characterizing and understanding how mouse models correspond to human disease, minimizing result-muddling variation between animals, and using statistical models to guide study design.
"The recommendations could have a profound positive impact on translational research, strongly improving the quality of preclinical studies," says Adriano Chiò, a neurologist at the University of Turin in Italy.
Not as advertised
Perrin found that one type of mouse model for ALS, in which animals express a mutant version of the protein TDP43, differs in key ways from the human disease. For example, TDP43 mice usually died of bowel obstructions, whereas humans with the disease tend to succumb to muscle wasting, which often results in the inability to breathe. He further found that although the first generation of TDP43 mice had been reported to die within 200 days, later generations bred from those originals lived for up to 400 days without signs of disease.
Other researchers have highlighted problems with reproducibility of animal studies in cancer. Neurobiologist Caterina Bendotti of the Mario Negri Institute for Pharmacological Research in Milan, Italy, agrees that the issues Perrin describes are not unique to his field: "The poor reproducibility of preclinical results, particularly in animal models, goes beyond ALS," she says.
Irreproducible preclinical results can lead to a massive waste of time and money in clinical trials. Chiò points to the example of a 2008 study in mice and 44 humans with ALS, which suggested that therapeutic lithium might slow the disease. The metal is already used as a drug to treat mental disorders including schizophrenia, so it is available cheaply, and people with ALS began administering it to themselves. Perrin's and Bendotti's groups both tried to replicate the original results, and found that they could not — but not before clinical trials began to test the effect. Ultimately, five trials involving more than 1,000 people with ALS in five countries found no benefit, Chiò says, and the initial mouse results were never duplicated. Untreated animals in the original study survived for 20 days less than those in other mouse studies, suggesting that there may have been some anomaly with these animals.
"It is our stringent responsibility to avoid a new lithium saga, and Perrin's recommendations go exactly in this direction," Chiò says.
Other researchers say they agree broadly with Perrin, but that they would also like to see the data from his group's experiments, and that it may not be necessary to find a positive animal result to progress to a human trial. "Many ALS researchers would say that if there is other preclinical evidence that a drug might work, it may be sufficient to go into human trials," says neurologist Leonard van den Berg, director of the Netherlands ALS Center at University Medical Center Utrecht.
But work to discover how relevant animal models are to human disease — such as Perrin's studies on TDP43 mice — is expensive and unrewarding for researchers and their teams. Perrin argues that they must be funded specifically, perhaps by private–public collaborations.
"Somebody has to do this, or else we're wasting precious resources," says Perrin.

http://www.medscape.com/viewarticle/822709?src=rss

FDA Panel Unanimously Backs Cologuard Colorectal Cancer Test

An advisory panel of the US Food and Drug Administration (FDA) has unanimously recommended premarket approval for the Cologuard (Exact Sciences Corporation) colorectal cancer (CRC) diagnostic device today.

Troy Brown, RN

The Molecular and Clinical Genetics Panel of the FDA's Medical Devices Committee voted unanimously that the test is safe and effective and that its benefits outweigh its risks. Cologuard is an in vitro diagnostic device that analyzes patients' stool to detect hemoglobin, multiple DNA methylation and mutational markers, and the total amount of human DNA contained in cells shed by CRC or advanced adenoma into the large bowel
The test is intended to be used as an adjunctive screening test to detect colorectal neoplasia-associated DNA markers and the presence of occult hemoglobin in human stool. A positive test result may indicate the presence of CRC or premalignant colorectal neoplasia. The device is not meant to be a replacement for colonoscopy and

is intended to be used in conjunction with colonoscopy and other test methods according to recognized screening guidelines.
The vote follows a discussion of data from a pivotal prospective, multicenter trial that enrolled 12,776 patients aged 50 to 84 years with average risk for CRC. The study evaluated the safety and efficacy of Cologuard and fecal immunochemical test (FIT) compared with colonoscopy. The study was published this month by the New England Journal of Medicine.
The study's primary performance measures were Cologuard CRC sensitivity and Cologuard advanced-neoplasia (AN) specificity. Cologuard sensitivity for CRC was 92.3% (60/65), with a 1-sided 95% lower confidence bound of 84.5% (Clopper-Pearson method). It met the primary study objective of Cologuard CRC sensitivity greater than 65% and a 1-sided 95% lower confidence bound exceeding 65%.
Cologuard AN specificity (categories 3 - 6) was 86.6% (7967/9198), with 95% 1-sided lower confidence bound 86.0% (Clopper-Pearson method). It met the primary study objective of Cologuard AN specificity greater than 85% with a 1-sided 95% lower confidence bound exceeding 85%.
In a secondary analysis of data from 9989 patients with available Cologuard, PolyMedco FIT, and histology results, CRC sensitivity was 92.3% (60/65) for Cologuard and 73.8% (48/65) for PolyMedco FIT, showing a difference of 18.5%. The 1-sided 95% lower confidence bound on the difference was 8.0%. Thus, Cologuard met the secondary study objective and was noninferior to Poly FIT in CRC sensitivity with respect to protocol-specified noninferiority margin 5.0% because the lower bound of 8.0% is greater than −5.0%.
Although not a secondary objective, Cologuard specificity for AN was lower than FIT (86.6% vs 94.9%).

Sensitivity Superior to FIT

"The sensitivity data that are shown to be superior [to] FIT for colorectal cancer and for advanced neoplasia do indicate that this would be useful and appropriate as a screening test," said voting panel member Karen E. Weck, MD, professor and director of the Molecular Genetics Laboratory, University of North Carolina, Chapel Hill.
Among 100,000 patients in a screening population, 700 are expected to have CRC, 7580 are expected to have AA, and 91,720 are expected to be not AN (neither CRC nor AA). Cologuard is expected to detect 129 more patients with CRC and 1412 more patients with AA than PolyMedco FIT. However, the test is also expected to have 7594 more false-positives in non-AN patients than PolyMedco FIT. Compared with PolyMedco FIT, Cologuard is expected to detect 1 more patient with CRC and 11 more patients with AA for every 59 more false-positives on non-AN patients.
"I think this is a very impressive study, with very positive conclusions," said temporary voting panel member Steven Skates, PhD, associate in Biostatistics (Medicine), Cancer Center, Massachusetts General Hospital, Boston. Regarding whether or not the test's benefits outweigh its risks, he said, "I thought the trade-off was balanced and completely justified."

Alternative to FIT?

Voting panel member Mary B. Mahowald, PhD, professor emerita at the University of Chicago, Illinois, in the Department of Obstetrics and Gynecology, MacLean Center for Clinical Ethics, and the Committee on Genetics, said she would like to see the test recommended as an alternative to the FIT test rather than as an adjunctive to the FIT test. "I don't see it as adjunctive to the FIT test," she said.
"I think this is a phenomenal study.... You're looking at the large polyps you would not otherwise find," said panel chair Ronald Przygodzki, MD, Acting director, Biomedical Laboratory Research and Development in the Office of Research and Development, Department of Veterans Affairs, Washington, DC.
The voting members have disclosed no relative financial relationships.

http://www.bbc.com/news/world-africa-26774343##rssowlmlink

Ebola: Guinea outbreak reaches capital Conakry

Guinea's government has for the first time confirmed cases of the deadly Ebola virus in the capital Conakry.

Until now, the 66 confirmed deaths have only been in rural areas, although there have been suspected cases, which have since proved negative, in the capital.
There have also been suspected cases in neighbouring West African states Liberia and Sierra Leone.
Ebola is spread by close contact and kills between 25% and 90% of victims.
Earlier this week, the health ministry banned the sale and consumption of bats, in a bid to prevent the spread of the virus. Fruit

bats, which are a delicacy in the worst affected south-eastern region, are thought to be carriers of the disease.
Health Minister Remy Lamah said the virus appeared to have been transmitted by an man who showed symptoms of haemorrhagic fever after visiting Dinguiraye in central Guinea, far from the identified outbreaks of Ebola in the remote south-east.
Four of the man's brothers, who attended his funeral in the central town of Dabola, started to show the same symptoms and were tested for Ebola on their return to Conakry.
The four have been placed in an isolation ward and the dead man's family have also been quarantined, the minister said.
The spread of the disease to Conakry, a city of some two million people, marks an escalation in the Ebola outbreak in Guinea - one of the poorest nations on earth, despite rich deposits of bauxite and iron ore.
Discovered in 1976 after an outbreak in the Democratic Republic of Congo, then Zaire, Ebola causes a severe haemorrhagic fever where victims suffer vomiting, diarrhoea and both internal and external bleeding.
Scientists have yet to develop an effective drug or vaccine to fight it.
Part of the problem is that the deadly virus is rare and its victims are often poor people living in rural areas of Africa without well-functioning health systems. But there is also little incentive for major pharmaceutical companies to invest in medical solutions when there is little chance of a return, analysts say.
However, many health officials believe the virus could be better controlled with good basic hygiene and the eradication of dangerous bush meat consumption. The US government also funds some research, partly out of concern the virus could be used for bioterrorism.
"Ebola virus is one of the deadliest killers known," said Ben Neuman, a virologist at Britain's University of Reading. "If this virus spread between people more easily, it would probably be more deadly than the black plague. Fortunately, up to this point, it has not," he added.
Outbreaks of Ebola occur primarily in remote villages in Central and West Africa, near tropical rainforests, the World Health Organization says.

http://bit.ly/1kaW488

Guinea Battles Ebola as Senegal Closes Its Border

Guinea is racing to contain the spread of the deadly Ebola virus, while neighboring Senegal has closed its southern land borders with Guinea.

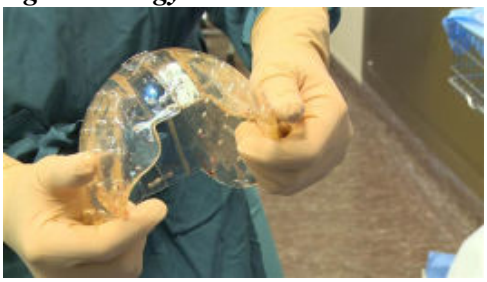
Health officials in Guinea are on high alert after eight confirmed cases of Ebola, including one fatality turned up in Conakry, the capital city that is home to at least two million people. Authorities say before the cases were confirmed in the capital, most of the people who tested positive for the deadly Ebola virus had been in the more rural southeastern region. Senegal, in an attempt to prevent the virus from entering among its population, has closed border crossings with Guinea (in the southern region of Kolda and Kedougou).
The World Health Organization (WHO) says 70 people have died and more than 100 have been infected in Guinea since the start of the hemorrhagic fever outbreak. Health officials say 11 people are suspected to have died of Ebola in recent days in Liberia and Sierra Leone. West African foreign ministers said at a conference last week that the Ebola outbreak poses a "threat to regional security."
The Ebola virus is highly contagious. It causes symptoms that include high fever, vomiting, diarrhea and bleeding from the eyes, ears, nose and mouth. Health officials are urging caretakers and funeral workers to minimize direct or close contact with those who may have been infected.

http://nbcnews.to/1dxijGE

Medical First: 3-D Printed Skull Successfully Implanted in Woman

Another day, another advance in 3-D printing technology.

By James Eng



Doctors in the Netherlands report that they have for the first time successfully replaced most of a human's skull with a 3-D printed plastic one — and likely saved a woman's life in the process.
The 23-hour surgery took place three months ago at University Medical Center Utrecht. The hospital announced details of the groundbreaking operation this week and said the patient, a 22-year-old woman, is doing just fine.

Doctors at UMC Utrecht in the Netherlands replaced the top part of a woman's skull with a 3-D printed plastic one.

The woman, whose name wasn't released, suffered from severe headaches due to a thickening of her skull. She slowly lost her vision, her motor coordination was suffering and it was only a matter of time before other essential brain functions would have atrophied, Verweij said in a press release issued by UMC Utrecht.

Verweij noted that in some brain operations it's common for part of the skull to be temporarily removed to reduce pressure on the brain, then put back later or replaced by an artificial implant. In this case, doctors inserted nearly an entire plastic skull that was manufactured with the help of Anatomics, an Australian medical device company that specializes in 3-D printing,

"We used to create an implant by hand in the operating theater using a kind of cement, but those implants did not have a very good fit," Verweij said. "Now we can use 3-D printing to ensure that these components are an exact fit. This has major advantages, not only cosmetically but also because patients often have better brain function compared with the old method."

Three months after surgery, the woman's pain is gone and she can see again. "The patient has fully regained her vision, she has no more complaints, she's gone back to work and there are almost no traces that she had any surgery at all," said Verweij. ***In the video below, doctors describe the procedure in Dutch.***

http://www.eurekalert.org/pub_releases/2014-03/uotm-rig032714.php#rssowlmlink

Researchers identify good bacteria that protects against HIV

Researchers may be able to better identify the good bacteria that protect women from HIV infection and other sexually transmitted infections

Researchers at the University of Texas Medical Branch at Galveston by growing vaginal skin cells outside the body and studying the way they interact with "good and bad" bacteria, think they may be able to better identify the good bacteria that protect women from HIV infection and other sexually transmitted infections.

The health of the human vagina depends on a symbiotic/mutually beneficial relationship with "good" bacteria that live on its surface feeding on products produced by vaginal skin cells.

These good bacteria, in turn, create a physical and chemical barrier to bad bacteria and viruses including HIV.

A publication released today from a team of scientists representing multiple disciplines at UTMB and the Oak Crest Institute of Science in Pasadena, Calif., reports a new method for studying the relationship between the skin cells and the "good" bacteria.

The researchers are the first to grow human vaginal skin cells in a dish in a manner that creates surfaces that support colonization by the complex good and bad communities of bacteria collected from women during routine gynecological exams. The bacteria communities have never before been successfully grown outside a human.

The research group led by Richard Pyles at UTMB reports in the journal PLOS One that by using this model of the human vagina, they discovered that certain bacterial communities alter the way HIV infects and replicates.

Their laboratory model will allow careful and controlled evaluation of the complex community of bacteria to ultimately identify those species that weaken the defenses against HIV. Pyles also indicated that this model "will provide the opportunity to study the way that these mixed species bacterial communities change the activity of vaginal applicants including over-the-counter products like douches and prescription medications and contraceptives. These types of studies are very difficult or even impossible to complete in women who are participating in clinical trials."

In fact, the team's report documented the potential for their system to better evaluate current and future antimicrobial drugs in terms of how they interact with "good and bad" bacteria. In their current studies a bacterial community associated with a symptomatic condition called bacterial vaginosis substantially reduced the antiviral activity of one of the leading anti-HIV medicines.

Conversely, vaginal surfaces occupied by healthy bacteria and treated with the antiviral produced significantly less HIV than those vaginal surfaces without bacteria treated with the same antiviral.

Dr. Marc Baum, the lead scientist at Oak Crest and co-author of the work, stated "this model is unique as it faithfully recreates the vaginal environment ex vivo, both in terms of the host cellular physiology and the associated complex vaginal microbiomes that could not previously be cultured. I believe it will be of immense value in the study of sexually transmitted infections."

Original findings published in PLOS One Journal, March 27, 2014: "Cultivated vaginal microbiomes alter HIV-1 infection and antiretroviral efficacy in colonized epithelial multilayer cultures."

Authors: Richard B. Pyles, Kathleen L. Vincent, Marc M. Baum, Barry Elsom, Aaron L. Miller, Carrie Maxwell, Tonyia D. Eaves-Pyles, Guangyu Li, Vsevolod L. Popov, Rebecca J. Nusbaum and Monique R. Ferguson.

http://www.eurekalert.org/pub_releases/2014-03/oupu-aci032114.php#rssowlmlink

Adjuvant chemotherapy increases markers of molecular aging in the blood of BC survivors

Adjuvant chemotherapy for breast cancer is "gerontogenic", accelerating the pace of physiologic aging, according to a new study published March 28 in the Journal of the National Cancer Institute.

Loss of organ function, characterized by an increase in cellular senescence, is one physiological part of aging. Studies have identified leukocyte telomere length, expression of senescence-associated cytokines including interleukin-6, and expression of p16INK4aand ARF in peripheral blood T lymphocytes (PBTLs) as markers of cellular senescence.

The authors previously showed p16INK4a is a marker of accelerated molecular age in PBTLs associated with smoking, physical inactivity, and chronic human immunodeficiency virus infection. To date, the long term effect of cytotoxic chemotherapy given with curative intent on molecular aging has not been reported.

Hanna K. Sanoff, M.D., Norman E. Sharpless, M.D., and Hyman B. Muss, M.D., and their colleagues prospectively collected blood and clinical data from 33 women with stage I-III breast cancer before, immediately after, 3 months after, and 12 months after anthracycline-based chemotherapy.

Blood was analyzed for markers of cellular senescence. They observed increased expression of the senescence markers p16INK4a and ARF in PBLTs immediately after chemotherapy, and which remained elevated for at least a year after treatment. In an independent cohort of 176 breast cancer survivors, prior chemotherapy was associated with a persistent increase in p16INK4a at an average of 3.4y after treatment.

These results suggest the age-promoting effects of chemotherapy last for several years after treatment, and may be permanent.

The authors conclude, "We have shown that cytotoxic chemotherapy potently induces the expression of markers of cellular senescence in the hematologic compartment in vivo, comparable with the effects of 10 to 15 years of chronologic aging in independent cohorts of healthy donors." Further studies are underway.

http://www.eurekalert.org/pub_releases/2014-03/ps-soe032814.php#rssowlmlink

Stigmas, once evolutionarily sound, are now bad health strategies

Stigmatization may have once served to protect early humans from infectious diseases, but that strategy may do more harm than good for modern humans, according to Penn State researchers.

"The things that made stigmas a more functional strategy thousands of years ago rarely exist," said Rachel Smith, associate professor of communication arts and sciences and human development and family studies. "Now, it won't promote positive health behavior and, in many cases, it could actually make the situation worse."

Stigmatizing and ostracizing members stricken with infectious diseases may have helped groups of early humans survive, said Smith, who worked with David Hughes, assistant professor of entomology and biology. Infectious agents thrive by spreading through populations, according to Smith and Hughes, who published an essay in the current issue of Communication Studies.

For early humans, a person who was stigmatized by the group typically suffered a quick death, often from a lack of food or from falling prey to a predator. Groups did not mix on a regular basis, so another group was unlikely to adopt an ostracized person. Infectious disease stigmas may have evolved as a social defense for group-living species, and had adaptive functions when early humans had these interaction patterns.

However, modern society is much larger, more mobile and safer from predators, eliminating the effectiveness of this strategy, according to Smith.

"In modern times, we mix more regularly, travel more widely, and also there are so many people now," Smith said. "These modern interaction patterns make stigmatization unproductive and often create more problems."

Hughes studies disease in another successful society, the ants, which have strong stigma and ostracism strategies that serve group interests at the cost to individuals.

"Ants are often held up as paragons of society and efficiency but we certainly do not want to emulate how they treat their sick members, which can be brutal," said Hughes.

Stigmatization could actually make infectious disease management worse. The threat of ostracization may make people less likely to seek out medical treatment. If people refuse to seek treatment and go about their daily routines, they may cause the disease to spread farther and faster, according to the researchers, who are both investigators in the Center of Infectious Disease Dynamics in Penn State Huck Institutes of the Life Sciences.

Stigmatization may harm a person's ability to survive a disease. Ostracization may increase stress, lessening the body's ability to fight off diseases and infections.

"People are very sensitive to rejection and humans worry about being ostracized," said Smith. "These worries and experiences with rejection can cause problematic levels of stress and, unfortunately, stress can compromise the immune system's ability to fight off an infection, accelerating disease progression."
Once applied, a stigma is difficult to remove, even when there are obvious signs that the person was never infected or is cured. Health communicators should make sure they intentionally monitor if their public communication or intervention materials create or bolster stigmas before using them, Smith said.

http://www.medscape.com/viewarticle/822716?src=rss

Anxiolytic, Hypnotic Medications May Triple Mortality Risk

Use of anxiolytic or hypnotic medications may significantly increase mortality risk, new research suggests.

Deborah Brauser

A retrospective cohort study of more than 100,000 age- and sex-matched patients showed that those who used anxiolytics and/or hypnotics were 3 times more likely to die prematurely during the 7 -year follow-up period than those who did not use these drugs. In addition, significant dose-response associations were shown for benzodiazepines and the "Z drugs" – zaleplon (Sonata, Pfizer Inc), zolpidem, and zopiclone.
"These results add to evidence of an association with mortality, but must be treated with caution," write Scott Weich, professor of psychiatry in the Division of Mental Health and Wellbeing at the Warwick Medical School in Coventry, United Kingdom, and colleagues.
The investigators note that this is because of the study's observational nature and because of factors that were not examined, such as socioeconomic status. "These results are prone to bias arising from unmeasured and residual confounding," they write. The study was published online March 19 in BMJ.

16 Million Prescriptions

According to the researchers, more than 16 million prescriptions for hypnotics and anxiolytics were written in UK primary care practices between 2011 and 2012, with benzodiazepines accounting for 62% and Z drugs accounting for 32%.
For this study, records were examined from the General Practice Research Database for 34,727 patients from 273 primary practices in the UK. All were older than 15 years and were first prescribed the study drugs between 1998 and 2001. In addition, each of these patients was age- and sex-matched to 2 other individuals who did not take the drugs and who acted as the control group (n = 69,418).
The primary outcome measure was all-cause mortality during the follow-up period, as shown in the practice records. Study drugs referred to benzodiazepines, Z drugs, and other anxiolytic and hypnotic medications.
Results showed that coprescribing was common, with 76.3% of the group using study drugs also being prescribed at least 1 benzodiazepine, 38.8% being prescribed Z drugs, and 33.5% being prescribed 1 or more of the other examined medications. Diazepam was the most commonly prescribed of all study drugs (47.9%), followed by temazepam (35.1%) and zopiclone (34.1%).
The age-adjusted hazard ratio (HR) for mortality was 3.46 (95% confidence interval [CI], 3.34 - 3.59) for the patients who used any of the study drugs during the first year after baseline compared with those who did not take any of the drugs. After further adjusting for potential confounders, the HR for mortality for this group was still 3.32 (95% CI, 3.19 - 3.45).
In addition, "after excluding deaths in the first year, there were approximately four excess deaths linked to drug use per 100 people followed for an average of 7.6 years after their first prescription," report the investigators.

Dose-Dependent Link

The adjusted HR for mortality was 4.51 (95% CI, 4.22 - 4.82) for the patients who received more than 90 daily doses of any study drug in 1 year. Although there was a dose-dependent link for all 3 classes of medications, the HRs were largest for benzodiazepines (3.89 for any daily dose vs 3.5 for Z drugs and 2.18 for other study drugs). These numbers increased to 6.75, 4.83, and 3.34, respectively, for those prescribed more than 90 daily doses in the first year of follow-up.
When examining patient characteristics, the researchers found that the patients who had study drug prescriptions were more likely than those without prescriptions to be smokers, to have higher rates of all forms of physical morbidity (including cancer and respiratory disorders), and to have higher rates of sleep, anxiety, and other psychiatric disorders.
"In patients who were prescribed these drugs, there was an estimated overall statistically significant doubling of the hazard of death (hazard ratio 2.08), after adjusting for a wide range of potential confounders, including physical and psychiatric comorbidities, sleep disorders, and other drugs," write the investigators.
"Crude cumulative mortality in those given drugs was 26.46 per 100 people over the full follow-up period compared with 16.82 per 100 controls," they add.

But they again note that, as with all observational studies, there is the possibility of bias in the findings. "While we largely excluded immortal time bias and selection bias, we are unable to exclude the possibility that the results were due to confounding by indication or to residual confounding by unmeasured or incompletely measured factors," note the investigators.

The study authors have reported no relevant financial relationships. BMJ. Published online March 19, 2014. Full article

http://nyti.ms/1mEuhkT

Antiviral Drugs Cut Flu Deaths, Study Finds

During a recent flu outbreak, use of antiviral drugs reduced the death rate in hospitalized patients by as much as 50 percent, researchers report.

By NICHOLAS BAKALAR

Their study, published online in The Lancet Respiratory Medicine, evaluated the efficacy of drugs like oral oseltamivir (brand name Tamiflu) or inhaled zanamivir (Relenza) in more than 29,000 patients in 38 countries who were infected during the H1N1 flu epidemic of 2009-2010. (Tamiflu was by far the most commonly used drug of this type, called neuraminidase inhibitors.)

Over all, use of these drugs reduced mortality in adults by 25 percent, compared with untreated patients. If treatment began within two days of the onset of symptoms, mortality was reduced by 50 percent. The results held for all adults, pregnant women and adults in critical care, but the drugs had no statistically significant effect on mortality rates in children.

The scientists were not fully able to measure disease severity. Still, the senior author, Dr. Jonathan Van-Tam, a professor of health protection at the University of Nottingham, pointed out that "patients in intensive care had a one-third reduction in mortality even if treatment started late, and in a sense we've adjusted for severity there."

The study was paid for by F. Hoffmann-La Roche, whose subsidiary, Genentech, manufactures Tamiflu.

http://nyti.ms/1mEuhkT

Scientists Find a Way to Read Minds

Scientists have used brain scanners to detect and reconstruct the faces that people are thinking of, a scientific achievement that could someday lead to a dream-recorder.

Maxim Lott, FoxNews.com/SciTech

Think mind reading is science fiction?

Think again.

Scientists have used brain scanners to detect and reconstruct the faces that people are thinking of, according to a a study accepted for publication this month in the journal NeuroImage.

In the study, scientists hooked participants up to an fMRI brain scanner -- which determines activity in different parts of the brain by measuring blood flow -- and showed them images of faces. Then, using only the brain scans, the scientists were able to create images of the faces the people were looking at.

"It is mind reading," said Alan S. Cowen, a graduate student at the University of California Berkeley who co-authored the study with professor Marvin M. Chun from Yale and Brice A. Kuhl from New York University.

The study says it is the first to try to reconstruct faces from thoughts. The photos above are the actual photos and reconstructions done in the lab. While the reconstructions based on 30 brain readings are blurry, they approximate the true images. They got the skin color right in all of them, and 24 out of 30 reconstructions correctly detected the presence or absence of a smile. The brain readings were worse at determining gender and hair color: About two-thirds of the reconstructions clearly detected the gender, and only half got hair color correct.

"There's definitely room for improvement," Cowen said, adding that these experiments were conducted two years ago, though they only recently were accepted for publication. He said he and others have been working on improving the process in the interim. "I'm applying more sophisticated mathematical models [to the brain scan results], so the results should get better," he said.

To tease out faces based on brain activity, the scientists showed participants in the study 300 faces while recording their brain activity. Then they showed the participants 30 new faces and used their previously recorded patterns to create 30 images based only on their brain scans.

Once the technology improves, Cowen said, applications could range from better understanding mental disorders, to recording dreams, to solving crimes. "You can see how people perceive faces depending on different disorders, like autism -- and use that to help diagnose therapies," he said.

That's because the reconstructions are based not on the actual image, but on how the image is perceived by a subject's brain. If an autistic person sees a face differently, the difference will show up in the brain scan reconstruction. Images from dreams are also detectable. "And you can even imagine," Cowen said, "way down the road, a witness to a crime might want to come in and reconstruct a suspect's face."

How soon could that happen?
"It really depends on advances in brain imaging technology, more so than the mathematical analysis. It could be 10, 20 years away."
One challenge is that different brains show different activity for the same image. The blurry images pictured here are actually averages of the thoughts of six lab volunteers. If one were to look at any individual's reading, the image would be less consistent. "There's a wide variation in how people's brains work under a scanner -- some people have better brains for fMRI -- and so if you were to pick a participant at random it might be that their reconstructions are really good, or it might be that their reconstructions are really poor, which is why we averaged across all the participants," Cowen said.
For now, he added, you shouldn't worry about others snooping on your memories or forcibly extracting information. "This sort of technology can only read active parts of the brain. So you couldn't read passive memories -- you would have to get the person to imagine the memory to read it," Cowen said.
"It's a matter of time, and eventually -- maybe 200 years from now -- we'll have some way of reading inactive parts of the brain. But that's a much harder problem, as it involves measuring very fine details of brain structure that we don't even really understand."

http://www.eurekalert.org/pub_releases/2014-03/tjnj-sep032714.php#rssowlmlink

Study estimates proportion of adults affected by new blood pressure guideline

Nearly 6 million adults are no longer classified as needing hypertension medication

Applying the updated 2014 blood pressure (BP) guideline to the U.S. population suggests that nearly 6 million adults are no longer classified as needing hypertension medication, and that an estimated 13.5 million adults would now be considered as having achieved goal blood pressure, primarily older adults, according to a JAMA study released online to coincide with the 2014 American College of Cardiology Scientific Sessions.
Ann Marie Navar-Boggan, M.D., Ph.D., of Duke University Medical Center, Durham, N.C., and colleagues quantified the proportion of adults potentially affected by the updated 2014 recommendations, compared to the previous guideline, issued nearly 10 years ago (Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure [JNC 7]). The researchers used data from the National Health and Nutrition Examination Survey (NHANES) between 2005 and 2010 (n = 16,372), and evaluated hypertension control and treatment recommendations for U.S. adults. The new guideline proposed less restrictive BP targets for adults 60 years of age or older and for those with diabetes and chronic kidney disease.
The authors estimate that the proportion of younger adults (18-59 years) in the U.S. considered to have treatment-eligible hypertension would be decreased from 20.3 percent under JNC 7 to 19.2 percent under the 2014 BP guideline and from 68.9 percent to 61.2 percent among older adults (≥ 60 years). Extrapolating these numbers to the population represented by this NHANES sample (U.S. adults in 2007) translates to a reduction in 5.8 million adults no longer classified as needing hypertension medication (70 million under JNC 7 to 64.2 million under the 2014 BP guideline).
The proportion of adults with treatment-eligible hypertension who met BP goals also increased slightly for younger adults, from 41.2 percent under JNC 7 to 47.5 percent under the 2014 BP guideline, and more substantially for older adults, from 40.0 percent to 65.8 percent.
The authors estimate that 13.5 million adults not previously considered to be meeting BP targets would be considered at goal BP under the new guideline, with the majority affected age 60 years and older, and many of whom have diabetes, chronic kidney disease, and cardiovascular disease.
Overall, 1.6 percent of U.S. adults 18-59 years of age and 27.6 percent of adults age 60 years or older were receiving BP-lowering medication and meeting more stringent JNC 7 targets. These patients may be eligible for less stringent or no BP therapy with the 2014 BP guideline.
"Public health messaging should target the large number of adults in the United States with changing recommendations under new guideline to ensure that new recommendations do not result in unintended consequences in adults now with 'relabeled' BP status," the authors write. "Further research is needed to determine how this new guideline affects overall BP levels attained and to determine the related effects on cardiovascular disease outcomes."
(doi:10.1001/jama.2014.2531 Available pre-embargo to the media at http://media.jamanetwork.com)
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Editorial: The New Cholesterol and Blood Pressure Guidelines

Harlan M. Krumholz, M.D., S.M., of the Yale University School of Medicine, New Haven, Conn., writes in an accompanying editorial that these new guidelines, with their innovations and controversy, have established a new course.

"Navigating it may be uncomfortable and will perhaps force clinicians to grapple with issues that have been ignored for too long. While it is important to advocate for health and promote healthy environments and behaviors on the broader scale, for medical decision making, it is even more important to ensure informed choice with the full participation of the person who will incur the risks and benefits of the decision. When viewed through this lens, the controversies about the guidelines become less contentious and the focus shifts to refining the evidence and producing better ways to communicate what is known for decision-making purposes. By directing attention to that message, already firmly embedded in these guidelines with their bold recommendations and deference to patient preference, they may have accomplished more than they ever envisioned."

(doi:10.1001/jama.2014.2634; Available pre-embargo to the media at http://media.jamanetwork.com)

http://www.japantimes.co.jp/news/2014/03/30/world/black-death-wasnt-spread-by-fleas/

Black Death wasn't spread by fleas

U.K. outbreak in 14th century was airborne, scientists say

LONDON – Archaeologists and forensic scientists who have examined 25 skeletons unearthed in the Clerkenwell area of central London a year ago believe they have uncovered the truth about the nature of the Black Death that ravaged Britain and Europe in the mid-14th century. Analysis of the bodies and of wills registered in London at the time has cast serious doubt on "facts" that every schoolchild has learned for decades: that the epidemic was caused by a highly contagious strain spread by the fleas on rats.

Now evidence taken from the human remains found in Charterhouse Square, to the north of the City of London (the financial district), during excavations carried out as part of the construction of the Crossrail train line serving London and its environs, have suggested a different cause: Only an airborne infection could have spread so fast and killed so quickly.

The Black Death arrived in Britain from central Asia in the autumn of 1348, and by late the next spring it had killed 6 out of every 10 people in London. Such a rate of destruction would kill 5 million now. By extracting the DNA of the disease bacterium, Yersinia pestis, from the largest teeth in some of the skulls retrieved from the square, the scientists were able to compare the strain of bubonic plague preserved there with that which was recently responsible for killing 60 people in Madagascar. To their surprise, the 14th-century strain, the cause of the most lethal catastrophe in recorded history, was no more virulent than today's disease. The DNA codes were an almost perfect match.

According to scientists working at Public Health England (an executive agency of the U.K.'s Department of Health) in Porton Down, southwest England, for any plague to spread at such a pace it must have gotten into the lungs of those victims who were most malnourished and then been spread by coughs and sneezes.

It was therefore a pneumonic plague rather than a bubonic plague — one in which infection is spread from human to human, rather than by rat fleas. "As an explanation for the Black Death in its own right, it simply isn't good enough. It cannot spread fast enough from one household to the next to cause the huge number of cases that we saw during the Black Death epidemics," said Dr. Tim Brooks from Porton Down.

In support of the growing case that this was a fast-acting, direct contagion, archaeologist Dr. Barney Sloane discovered that in the medieval City of London, all wills had to be registered at the Court of Hustings. The documents lead him to believe that 60 percent of Londoners were wiped out.

Today, antibiotics can prevent the disease from becoming pneumonic.

http://www.eurekalert.org/pub_releases/2014-03/cndi-nsc032814.php#rssowlmlink

New study confirms benefits of treating heart attack patients with a cheap drug

The 6-month follow-up data from the METOCARD-CNIC trial are published today in the Journal of the American College of Cardiology

The initial results of this trial were published a few months ago (Circulation. 2013;128:1495-1503), and showed that patients who received this treatment during emergency transit to hospital had much smaller amounts of dead heart muscle than those randomly assigned to receive no treatment. The new study shows that the proportion of patients with a severely deteriorated heart contractile function is much less (60%) in the group that received metoprolol. Early treatment with metoprolol treatment also significantly reduced the rate of hospital readmission for chronic heart failure, and massively reduced the need to implant a cardioverter-defibrillator.

Borja Ibáñez—joint lead investigator on the study with Valentín Fuster—explains that "the possibility to reduce so dramatically the number of cases of chronic heart failure (with all the associated treatments and hospital readmissions) with such a cheap procedure (the metoprolol treatment costs less than two euros per patient) could generate enormous savings for health services across Europe."
An initial estimate indicates that if half the heart-attack patients in Europe received early treatment with this cheap drug, the savings in treatment for heart failure alone could exceed €10 billion a year. But as Dr. Fuster is careful to emphasize, it is important to remain cautious, and these estimates will need to be confirmed in a much larger study population across Europe. The research team is already preparing a new clinical trial, with more than 3000 patients in several European countries, which will be powered to demonstrate a reduction in mortality with this treatment. According to the authors, "The results presented today and published simultaneously in this issue of JACC are unprecedented and extremely promising, but rigorous clinical investigation requires corroboration in an independent population." The European consortium for this larger scale study, which will be led from Spain by the CNIC, is already being formed, and includes renowned researchers from Belgium, the Netherlands, Germany, France, Denmark, Serbia, Poland, Sweden, and the United Kingdom.
Dr. Borja Ibáñez, leader of the Imaging in Experimental Cardiology group at the CNIC and cardiologist at the Hospital Clínico San Carlos, emphasizes that the new study "will be a flagship project for our country that reinforces Spain's international leadership in research into cardiovascular diseases." The CNIC, a center dedicated to the study of cardiovascular diseases, has been led by internationally renowned cardiologist Dr. Valentín Fuster since 2007. Since Dr. Fuster's arrival, the CNIC has become an international reference center, and the leadership of studies such as the one published today demonstrates the high quality of cardiovascular research in our country.
Dr. Gonzalo Pizarro, one of the first authors on the study, comments that "it has been possible to demonstrate the beneficial and sustained effect of this acute treatment thanks to the realization of advanced cardiac magnetic resonance analysis of almost all the patients in this clinical trial." The CNIC is recognized for its expertise and research in different imaging technologies, particularly magnetic resonance imaging. The center runs a range of training programs in cardiovascular imaging in collaboration with the Mount Sinai School of Medicine, which is also directed by Dr. Fuster. Many of the cardiologists who contributed to the design, performance and analysis of the MRI scans in the METOCARD-CNIC trial, including Drs. Pizarro and Fernández-Friera (joint first authors on the study), received training on these programs, and now work at the CNIC, combining their research activity and their clinical work in the Spanish hospital network.
This is one of the first studies to reveal extraordinary benefits from very early intervention—in this case with metoprolol—during the first contact with the emergency medical services. Dr. Vicente Sánchez-Brunete, a doctor with the ambulance service SUMMA112 and a principal co-investigator on METOCARD-CNIC is in no doubt about the significance of the study, which has "highlighted the importance of the out-of-hospital emergency medical services, which are the first link in the chain of patient care. We have indirect data showing the earlier the patient receives metoprolol during a heart attack, the greater the benefit."
The active participation of the emergency medical services (SUMMA112, 061 Galicia and SAMUR) in METOCARD-CNIC has been voluntary. As Sánchez-Brunete explained, "the professionals in the emergency medical services were motivated by the promise of this treatment to change clinical guidelines and the perception that the study was motivated purely by scientific interest."
The results of the study were presented today at the meeting of the American College of Cardiolgy (ACC) in Washington DC, in a special session dedicated to the best clinical trials presented at the meeting.
The METOCARD-CNIC team received additional funding from the Spanish Ministry of Health, the Fundación Mutua Madrileña and the other members of the Pro-CNIC Foundation, which manages private financing for the CNIC.

http://phys.org/news/2014-03-experts-intelligent-plaster-patients.html#rssowlmlin

Experts create intelligent 'plaster' to monitor patients

Medical engineers said Sunday they had created a device the size of a plaster which can monitor patients by tracking their muscle activity before administering their medication.

Methods for monitoring so-called "movement disorders" such as epilepsy and Parkinson's disease have traditionally included video recordings or wearable devices, but these tend to be bulky and inflexible. The new gadget, which is worn on the skin, looks like a Band-Aid but uses nanotechnology—in which building blocks as small as atoms and molecules are harnessed to bypass problems of bulkiness and stiffness— to monitor the patient.
Scientists have long hoped to create an unobtrusive device able to capture and store medical information as well as administer drugs in response to the data. This has proved difficult due to the large amount of onboard

electronics and storage space required, high power consumption, and the lack of a mechanism for delivering medicine via the skin.
But although monitoring helps to track disease progression and allows better treatment, until now the electronics used in the devices have been hard and brittle, and not ideal for an on-the-skin device.
But the team from South Korea and the United States said they had found the solution in nanomaterials, creating a flexible and stretchable device that resembles an adhesive plaster, about one millimetre (0.04 inches) thick.
Still a prototype, the gadget comprises multiple layers of ultrathin nanomembranes and nanoparticles, the creators wrote in the journal Nature Nanotechnology. "The team use silicon nanomembranes in the motion sensors, gold nanoparticles in the non-volatile memory and silica nanoparticles, loaded with drugs, in a thermal actuator," they wrote in a summary. The study showed that when worn on the wrist of a patient, the patch could measure and record muscle activity. The recorded data then triggered the release, with the aid of a wafer-thin internal heater, of drugs stored inside the nanoparticles.
A temperature sensor made of silicon nanomembranes monitored the skin temperature to prevent burns during drug delivery. "This platform overcomes the limitations of conventional wearable devices and has the potential to improve compliance, data quality and the efficacy of current clinical procedures," the authors wrote.
Dae-Hyeong Kim from the Center for Nanoparticle Research in Seoul said that the device currently needs a microprocessor from an external computer, which could be in a wristwatch, to which it is attached with thin wires. "But in the future wireless components will be incorporated," to make the device independent and fully mobile, he told AFP.
Explore further: Unobtrusive, wearable blood pressure sensor for long-term continuous monitoring
More information: Paper: dx.doi.org/10.1038/nnano.2014.38

http://bit.ly/1mojB6Z

Ebola outbreak spreads to Liberia after killing 70 in Guinea

The World Health Organization has confirmed that an outbreak of the ebola virus that has killed 70 people in Guinea has spread to Liberia.

By Rich McCormick

Two cases of the disease have been reported in the country, and Reuters says that another 11 deaths in Liberia and Sierra Leone — both of which share borders with Guinea — are suspected to be linked to ebola.
The WHO took seven samples from the Foya district of Liberia, a region less than 12 miles (20 kilometers) from the border with Guinea. The organization said two of those samples tested positive for the ebola virus. The outbreak in Guinea was first reported on March 23rd, when the WHO and Guinea's Ministry of Health acknowledged fatal cases of the ebola virus in south-eastern areas of the country. The disease then spread to Guinea's capital, Conakry, with four suspected cases of the virus confirmed by laboratory analysis. Guinea's Ministry of Health claimed a fatality rate of 63 percent, with 70 deaths from 111 cases of haemorrhagic fever.
Ebola appears to have made its way into Liberia more than a week ago: the WHO said that a 35-year-old woman who died on March 21st tested positive for the virus.
"11 deaths in Sierra Leone and Liberia are suspected to be linked to Ebola"
Guinea's neighbors have reacted to quell the spread of the disease. Reuters reports Senegal closed its land border with Guinea on Saturday, and halted the operation of weekly markets in the area. Senegal has also implemented sanitary checks on flights between its capital Dakar and Conakry, while West African airline Gambia Bird has delayed the launch of a new route to Guinea's capital.
Ebola is spread primarily through contact with infected bodily fluids. It's a highly contagious and regularly lethal disease — 68 percent of all recorded cases in the past have been fatal - that has killed more than 1,500 people since its first recorded transferal to humans in 1976. The confirmed cases in Guinea and Liberia are particularly notable because they are the first to be recorded in the west of the continent - prior to this outbreak, every known case of fatal Ebola infection (excluding laboratory accidents) took place in in south and central Africa. Should the outbreak continue to gather pace, it could stretch West African health providers to the limit.